

Module Handbook Information Systems M.Sc.

SPO 2019

Winter term 2023/24

Date: 04/10/2023

KIT DEPARTMENT OF ECONOMICS AND MANAGEMENT / KIT DEPARTMENT OF INFORMATICS



Table Of Contents

1. General information	14
1.1. Structural elements	14
1.2. Begin and completion of a module	14
1.3. Module versions	14
1.4. General and partial examinations	14
1.5. Types of examinations	15
1.6. Repeating examinations	15
1.7. Examiners	15
1.8. Additional accomplishments	15
1.9. Further information	15
1.10. Contact persons	15
2. Study plan	16
3. Qualification goals	17
4. Field of study structure	18
4.1. Master's Thesis	18
4.2. Information Systems	18
4.3. Informatics	19
4.4. Economics and Management	24
4.5. Law	26
4.6. Seminars	26
5. Modules	27
5.1. Access Control Systems: Models and Technology - M-INFO-106303	27
5.2. Advanced Artificial Intelligence - M-INFO-106299	29
5.3. Advanced Data Structures - M-INFO-102731	30
5.4. Advanced Machine Learning and Data Science - M-WIWI-105659	31
5.5. Advanced Topics in Public Finance - M-WIWI-101511	32
5.6. Advanced Topics in Strategy and Management - M-WIWI-103119	33
5.7. Algorithm Engineering - M-INFO-100795	34
5.8. Algorithmic Graph Theory - M-INFO-100762	36
5.9. Algorithmic Methods for Network Analysis - M-INFO-102400	37
5.10. Algorithms for Ad-Hoc and Sensor Networks - M-INFO-102093	38
5.11. Algorithms for Routing - M-INFO-100031	39
5.12. Algorithms for Visualization of Graphs - M-INFO-102094	40
5.13. Algorithms II - M-INFO-101173	41
5.14. Analytics and Statistics - M-WIWI-101637	42
5.15. Application Security Lab - M-INFO-103166	43
5.16. Applied Strategic Decisions - M-WIWI-101453	44
5.17. Artificial Intelligence - M-WIWI-105366	45
5.18. Automated Planning and Scheduling - M-INFO-104447	46
5.19. Automated Visual Inspection and Image Processing - M-INFO-100826	47
5.20. Biologically Inspired Robots - M-INFO-100814	48
5.21. Biometric Systems for Person Identification - M-INFO-102968	49
5.22. Business & Service Engineering - M-WIWI-101410	50
5.23. Collective Decision Making - M-WIWI-101504	51
5.24. Computational Cartography - M-INFO-100754	52
5.25. Computational Complexity Theory, with a View Towards Cryptography - M-INFO-101575	53
5.26. Computational Geometry - M-INFO-102110	54
5.27. Computer Architecture - M-INFO-100818	55
5.28. Computer Graphics - M-INFO-100856	56
5.29. Context Sensitive Systems - M-INFO-100728	57
5.30. Critical Digital Infrastructures - M-WIWI-104403	58
5.31. Cross-Functional Management Accounting - M-WIWI-101510	59
5.32. Cryptographic Voting Schemes - M-INFO-100742	60
5.33. Curves and Surfaces for Geometric Design - M-INFO-101231	61
5.34. Curves and Surfaces in CAD I - M-INFO-100837	62
5.35. Curves and Surfaces in CAD III - M-INFO-101213	63
5.36. Data and Storage Management - M-INFO-100739	64

5.37. Data Privacy: From Anonymization to Access Control - M-INFO-104045	65
5.38. Data Science - M-INFO-106505	66
5.39. Data Science: Data-Driven Information Systems - M-WIWI-103117	67
5.40. Data Science: Data-Driven User Modeling - M-WIWI-103118	69
5.41. Data Science: Evidence-based Marketing - M-WIWI-101647	70
5.42. Data Science: Intelligent, Adaptive, and Learning Information Services - M-WIWI-105661	71
5.43. Database as a Service - M-INFO-105724	72
5.44. Decentralized Systems: Fundamentals, Modeling, and Applications - M-INFO-105334	73
5.45. Deep Learning and Neural Networks - M-INFO-104460	75
5.46. Deep Learning for Computer Vision I: Basics - M-INFO-105753	76
5.47. Deep Learning for Computer Vision II: Advanced Topics - M-INFO-105755	77
5.48. Deployment of Database Systems - M-INFO-100780	78
5.49. Design and Architectures of Embedded Systems (ES2) - M-INFO-100831	79
5.50. Design Principles for Interactive Real-Time Systems - M-INFO-100753	80
5.51. Designing Interactive Information Systems - M-WIWI-104080	81
5.52. Development of Business Information Systems - M-WIWI-101477	82
5.53. Digital Accessibility and Assistive Technologies - M-INFO-105882	83
5.54. Digital Marketing - M-WIWI-106258	84
5.55. Digital Service Systems in Industry - M-WIWI-102808	85
5.56. Distributed Computing - M-INFO-100761	86
5.57. Econometrics and Statistics I - M-WIWI-101638	87
5.58. Econometrics and Statistics II - M-WIWI-101639	88
5.59. Economic Theory and its Application in Finance - M-WIWI-101502	89
5.60. eEnergy: Markets, Services and Systems - M-WIWI-103720	90
5.61. Electronic Markets - M-WIWI-101409	91
5.62. Empirical Software Engineering - M-INFO-100798	93
5.63. Energy Economics and Energy Markets - M-WIWI-101451	94
5.64. Energy Economics and Technology - M-WIWI-101452	95
5.65. Energy Informatics 1 - M-INFO-101885	96
5.66. Energy Informatics 2 - M-INFO-103044	97
5.67. Entrepreneurship (EnTechnon) - M-WIWI-101488	98
5.68. Environmental Economics - M-WIWI-101468	99
5.69. Experimental Economics - M-WIWI-101505	100
5.70. Explainable Artificial Intelligence - M-INFO-106302	101
5.71. Finance 1 - M-WIWI-101482	103
5.72. Finance 2 - M-WIWI-101483	104
5.73. Finance 3 - M-WIWI-101480	106
5.74. Formal Systems - M-INFO-100799	108
5.75. Formal Systems II: Application - M-INFO-100744	109
5.76. Formal Systems II: Theory - M-INFO-100841	110
5.77. Foundations for Advanced Financial -Quant and -Machine Learning Research - M-WIWI-105894	111
5.78. Fuzzy Sets - M-INFO-100839	112
5.79. Geometric Optimization - M-INFO-100730	113
5.80. Graph Partitioning and Graph Clustering in Theory and Practice - M-INFO-100758	114
5.81. Growth and Agglomeration - M-WIWI-101496	115
5.82. Hands-on Bioinformatics Practical - M-INFO-101573	116
5.83. Heterogeneous Parallel Computing Systems - M-INFO-100822	117
5.84. Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy - M-INFO-100725	118
5.85. Human Computer Interaction - M-INFO-100729	119
5.86. Human Factors in Security and Privacy - M-WIWI-104520	120
5.87. Human-Machine-Interaction in Anthropomatics: Basics - M-INFO-100824	122
5.88. Humanoid Robotics Laboratory - M-INFO-105792	123
5.89. Incentives, Interactivity & Decisions in Organizations - M-WIWI-105923	124
5.90. Industrial Production II - M-WIWI-101471	125
5.91. Industrial Production III - M-WIWI-101412	127
5.92. Information Processing in Sensor Networks - M-INFO-100895	129
5.93. Information Systems in Organizations - M-WIWI-104068	130
5.94. Information Systems: Analytical and Interactive Systems - M-WIWI-104814	131
5.95. Information Systems: Engineering and Transformation - M-WIWI-104812	132

5.96. Information Systems: Internet-Based Markets and Services - M-WIWI-104813	133
5.97. Innovation and Growth - M-WIWI-101478	134
5.98. Innovation Economics - M-WIWI-101514	135
5.99. Innovation Management - M-WIWI-101507	136
5.100. Innovative Concepts for Programming Industrial Robots - M-INFO-100791	138
5.101. Integrated Network and Systems Management - M-INFO-100747	139
5.102. Intellectual Property Law - M-INFO-101215	140
5.103. Intelligent Systems and Services - M-WIWI-101456	141
5.104. Interactive Computer Graphics - M-INFO-100732	142
5.105. Internet of Everything - M-INFO-100800	143
5.106. Introduction to Bioinformatics for Computer Scientists - M-INFO-100749	144
5.107. Introduction to Hybrid Quantum Machine Learning Algorithms - M-INFO-106189	145
5.108. Introduction to Video Analysis - M-INFO-100736	146
5.109. IT Security - M-INFO-106315	147
5.110. IT-Security Management for Networked Systems - M-INFO-100786	149
5.111. Lab Course Heterogeneous Computing - M-INFO-104072	150
5.112. Lab Project: Speech Translation - M-INFO-105997	151
5.113. Lab: Efficient Parallel C++ - M-INFO-103506	152
5.114. Lab: Graph Visualization in Practice - M-INFO-103302	153
5.115. Lab: Internet of Things (IoT) - M-INFO-103706	154
5.116. Lab: Low Power Design and Embedded Systems - M-INFO-104031	155
5.117. Laboratory Course Algorithm Engineering - M-INFO-102072	156
5.118. Laboratory in Cryptanalysis - M-INFO-101559	157
5.119. Laboratory in Cryptography - M-INFO-101558	158
5.120. Laboratory in Security - M-INFO-101560	159
5.121. Localization of Mobile Agents - M-INFO-100840	160
5.122. Logical Foundations of Cyber-Physical Systems - M-INFO-106102	161
5.123. Low Power Design - M-INFO-100807	163
5.124. Machine Learning - M-WIWI-103356	164
5.125. Machine Learning - Foundations and Algorithms - M-INFO-105778	165
5.126. Machine Translation - M-INFO-100848	166
5.127. Management Accounting - M-WIWI-101498	167
5.128. Market Engineering - M-WIWI-101446	168
5.129. Marketing and Sales Management - M-WIWI-105312	169
5.130. Mathematical Programming - M-WIWI-101473	170
5.131. Meshes and Point Clouds - M-INFO-100812	172
5.132. Microeconomic Theory - M-WIWI-101500	173
5.133. Mobile Communication - M-INFO-100785	174
5.134. Model-Driven Software Development - M-INFO-100741	175
5.135. Module Master's Thesis - M-WIWI-104833	176
5.136. Natural Language Dialog Systems - M-INFO-102414	178
5.137. Natural Language Processing - M-INFO-105999	179
5.138. Natural Language Processing and Software Engineering - M-INFO-100735	180
5.139. Network Economics - M-WIWI-101406	181
5.140. Network Security: Architectures and Protocols - M-INFO-100782	182
5.141. Next Generation Internet - M-INFO-100784	183
5.142. Operations Research in Supply Chain Management - M-WIWI-102832	184
5.143. Optimization and Synthesis of Embedded Systems (ES1) - M-INFO-100830	186
5.144. Parallel Algorithms - M-INFO-100796	187
5.145. Parallel Computer Systems and Parallel Programming - M-INFO-100808	189
5.146. Pattern Recognition - M-INFO-100825	190
5.147. Penetration Testing Lab - M-INFO-104895	191
5.148. Photorealistic Rendering - M-INFO-100731	192
5.149. Practical Course Applied Telematics - M-INFO-101889	193
5.150. Practical Course Automatic Speech Recognition - M-INFO-102411	194
5.151. Practical Course Computer Vision for Human-Computer Interaction - M-INFO-102966	195
5.152. Practical Course Decentralized Systems and Network Services - M-INFO-103047	196
5.153. Practical Course FPGA Programming - M-INFO-102661	197
5.154. Practical Course Model-Driven Software Development - M-INFO-101579	198
5.155. Practical Course on Network Security Research - M-INFO-105413	199

5.156. Practical Course Protocol Engineering - M-INFO-102092	200
5.157. Practical Course Software Defined Networking - M-INFO-101891	201
5.158. Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics - M-INFO-105870	202
5.159. Practical Course: Biologically Inspired Robots - M-INFO-105495	203
5.160. Practical Course: Current Topics of Quantum Computing - M-INFO-106286	204
5.161. Practical Course: Customized Embedded Processor Design - M-INFO-105740	205
5.162. Practical Course: Data Science - M-INFO-105632	206
5.163. Practical Course: Data Science for Scientific Data - M-INFO-106329	207
5.164. Practical Course: Database Systems - M-INFO-101662	208
5.165. Practical Course: Digital Design & Test Automation Flow - M-INFO-102570	209
5.166. Practical Course: Discrete Freeform Surfaces - M-INFO-101667	210
5.167. Practical Course: General-Purpose Computation on Graphics Processing Units - M-INFO-100724	211
5.168. Practical Course: Geometric Modeling - M-INFO-101666	212
5.169. Practical Course: Graphics and Game Development - M-INFO-105384	213
5.170. Practical Course: Hot Research Topics in Computer Graphics - M-INFO-104699	214
5.171. Practical Course: Machine Learning and Intelligent Systems - M-INFO-105958	215
5.172. Practical Course: Neural Network Exercises - M-INFO-103143	216
5.173. Practical Course: Programme Verification - M-INFO-101537	217
5.174. Practical Course: Scientific Data Management - M-INFO-106312	218
5.175. Practical Course: Smart Data Analytics - M-INFO-103235	219
5.176. Practical Course: Smart Energy System Lab - M-INFO-105955	220
5.177. Practical Course: Visual Computing - M-INFO-101567	221
5.178. Practical Course: Web Applications and Service-Oriented Architectures (II) - M-INFO-101635	222
5.179. Practical Introduction to Hardware Security - M-INFO-104357	223
5.180. Practical Project Robotics and Automation I (Software) - M-INFO-102224	224
5.181. Practical Project Robotics and Automation II (Hardware) - M-INFO-102230	225
5.182. Practical SAT Solving - M-INFO-102825	226
5.183. Practical: Course Engineering Approaches to Software Development - M-INFO-104254	227
5.184. Principles of Automatic Speech Recognition - M-INFO-100847	228
5.185. Private Business Law - M-INFO-101216	229
5.186. Probability and Computing - M-INFO-106469	230
5.187. Project Lab Applied Machine Learning - M-WIWI-106491	231
5.188. Project Lab: Image Analysis and Fusion - M-INFO-102383	232
5.189. Public Business Law - M-INFO-101217	233
5.190. Rationale Splines - M-INFO-101857	234
5.191. Rationale Splines - M-INFO-101853	235
5.192. Real-Time Systems - M-INFO-100803	236
5.193. Reconfigurable and Adaptive Systems - M-INFO-100721	237
5.194. Reliable Computing I - M-INFO-100850	238
5.195. Requirements Engineering - M-INFO-100763	239
5.196. Research Focus Class: Blockchain & Payment Channel Networks - M-INFO-105620	240
5.197. Research Project (Project, 1st Semester) - M-INFO-105037	241
5.198. Research Project (Project, 2nd Semester) - M-INFO-105038	242
5.199. Research Project Autonomous Learning Robots - M-INFO-105378	243
5.200. Robotics - Practical Course - M-INFO-102522	244
5.201. Robotics I - Introduction to Robotics - M-INFO-100893	245
5.202. Robotics II - Humanoid Robotics - M-INFO-102756	246
5.203. Robotics III - Sensors and Perception in Robotics - M-INFO-104897	247
5.204. Scientific Methods to Design and Analyze Secure Decentralized Systems - M-INFO-105780	248
5.205. Seminar Information Systems - M-WIWI-104815	249
5.206. Seminar Laboratory: Machine Learning and Intelligent Systems - M-INFO-105959	250
5.207. Seminar Module Economic Sciences - M-WIWI-102736	251
5.208. Seminar Module Informatics - M-INFO-102822	252
5.209. Seminar Module Law - M-INFO-101218	253
5.210. Service Analytics - M-WIWI-101506	254
5.211. Service Design Thinking - M-WIWI-101503	255
5.212. Service Economics and Management - M-WIWI-102754	257
5.213. Service Innovation, Design & Engineering - M-WIWI-102806	258
5.214. Service Management - M-WIWI-101448	260

5.215. Service Operations - M-WIWI-102805	261
5.216. Signals and Codes - M-INFO-100823	263
5.217. Software Architecture and Quality - M-INFO-100844	264
5.218. Software Engineering II - M-INFO-100833	265
5.219. Software Lab Parallel Numerics - M-INFO-102998	266
5.220. Software Product Line Engineering - M-INFO-105471	267
5.221. Software Security Engineering - M-INFO-106344	268
5.222. Software-Evolution - M-INFO-100719	269
5.223. Statistics and Econometrics II - M-WIWI-105414	270
5.224. Stochastic Information Processing - M-INFO-100829	271
5.225. Stochastic Optimization - M-WIWI-103289	272
5.226. Subdivision Algorithms - M-INFO-101863	274
5.227. Symmetric Encryption - M-INFO-100853	275
5.228. Telematics - M-INFO-100801	276
5.229. Testing Digital Systems I - M-INFO-100851	277
5.230. Testing Digital Systems II - M-INFO-102962	278
5.231. Theoretical Foundations of Cryptography - M-INFO-105584	279
5.232. Transport Infrastructure Policy and Regional Development - M-WIWI-101485	280
5.233. Ubiquitous Computing - M-WIWI-101458	281
5.234. Ubiquitous Computing - M-INFO-100789	282
5.235. Visualization - M-INFO-100738	283
5.236. Wearable Robotic Technologies - M-INFO-103294	284
5.237. Web and Data Science - M-WIWI-105368	285
5.238. Web Applications and Service-Oriented Architectures (II) - M-INFO-100734	286
5.239. Web Data Management - M-WIWI-101455	287
6. Courses.....	288
6.1. Access Control Systems: Models and Technology - T-INFO-112775	288
6.2. Advanced Artificial Intelligence - T-INFO-112768	289
6.3. Advanced Data Structures - T-INFO-105687	291
6.4. Advanced Data Structures Project/Experiment - T-INFO-111849	292
6.5. Advanced Empirical Asset Pricing - T-WIWI-110513	293
6.6. Advanced Game Theory - T-WIWI-102861	295
6.7. Advanced Lab Blockchain Hackathon (Master) - T-WIWI-111126	296
6.8. Advanced Lab in Ubiquitous Computing - T-WIWI-102761	297
6.9. Advanced Lab Informatics (Master) - T-WIWI-110548	298
6.10. Advanced Lab Realization of Innovative Services (Master) - T-WIWI-112914	303
6.11. Advanced Lab Security, Usability and Society - T-WIWI-108439	304
6.12. Advanced Machine Learning - T-WIWI-109921	309
6.13. Advanced Machine Learning and Data Science - T-WIWI-111305	311
6.14. Advanced Management Accounting - T-WIWI-102885	312
6.15. Advanced Statistics - T-WIWI-103123	314
6.16. Advanced Stochastic Optimization - T-WIWI-106548	315
6.17. Advanced Topics in Digital Management - T-WIWI-111912	316
6.18. Advanced Topics in Economic Theory - T-WIWI-102609	318
6.19. Advanced Topics in Human Resource Management - T-WIWI-111913	319
6.20. Algorithm Engineering - T-INFO-101332	321
6.21. Algorithm Engineering Pass - T-INFO-111856	322
6.22. Algorithmic Graph Theory - T-INFO-103588	323
6.23. Algorithmic Methods for Network Analysis - T-INFO-104759	324
6.24. Algorithms for Ad-Hoc and Sensor Networks - T-INFO-104388	325
6.25. Algorithms for Routing - T-INFO-100002	326
6.26. Algorithms for Visualization of Graphs - T-INFO-104390	327
6.27. Algorithms II - T-INFO-102020	328
6.28. Analysis of Multivariate Data - T-WIWI-103063	329
6.29. Application Security Lab - T-INFO-106289	330
6.30. Applied Econometrics - T-WIWI-111388	331
6.31. Applied material flow simulation - T-MACH-112213	332
6.32. Artificial Intelligence in Service Systems - T-WIWI-108715	334
6.33. Artificial Intelligence in Service Systems - Applications in Computer Vision - T-WIWI-111219	336
6.34. Asset Pricing - T-WIWI-102647	338

6.35. Auction Theory - T-WIWI-102613	339
6.36. Automated Planning and Scheduling - T-INFO-109085	340
6.37. Automated Visual Inspection and Image Processing - T-INFO-101363	341
6.38. Basics of German Company Tax Law and Tax Planning - T-WIWI-108711	342
6.39. Behavioral Lab Exercise - T-WIWI-111806	343
6.40. Biologically Inspired Robots - T-INFO-101351	344
6.41. Biometric Systems for Person Identification - T-INFO-105948	345
6.42. Blockchains & Cryptofinance - T-WIWI-108880	346
6.43. Bond Markets - T-WIWI-110995	347
6.44. Bond Markets - Models & Derivatives - T-WIWI-110997	348
6.45. Bond Markets - Tools & Applications - T-WIWI-110996	349
6.46. Business Data Analytics: Application and Tools - T-WIWI-109863	350
6.47. Business Data Strategy - T-WIWI-106187	351
6.48. Business Dynamics - T-WIWI-102762	352
6.49. Business Intelligence Systems - T-WIWI-105777	353
6.50. Business Models in the Internet: Planning and Implementation - T-WIWI-102639	355
6.51. Business Planning - T-WIWI-102865	356
6.52. Business Strategies of Banks - T-WIWI-102626	358
6.53. Case Studies Seminar: Innovation Management - T-WIWI-102852	359
6.54. Challenges in Supply Chain Management - T-WIWI-102872	360
6.55. Competition in Networks - T-WIWI-100005	361
6.56. Computational Cartography - T-INFO-101291	362
6.57. Computational Complexity Theory, with a View Towards Cryptography - T-INFO-103014	363
6.58. Computational Geometry - T-INFO-104429	364
6.59. Computer Architecture - T-INFO-101355	365
6.60. Computer Contract Law - T-INFO-102036	366
6.61. Computer Graphics - T-INFO-101393	367
6.62. Computer Graphics Pass - T-INFO-104313	368
6.63. Context Sensitive Systems - T-INFO-107499	369
6.64. Convex Analysis - T-WIWI-102856	370
6.65. Cooperative Autonomous Vehicles - T-WIWI-112690	372
6.66. Copyright - T-INFO-101308	373
6.67. Corporate Compliance - T-INFO-101288	374
6.68. Corporate Financial Policy - T-WIWI-102622	375
6.69. Corporate Risk Management - T-WIWI-109050	376
6.70. Critical Information Infrastructures - T-WIWI-109248	377
6.71. Cryptographic Voting Schemes - T-INFO-101279	378
6.72. Curves and Surfaces for Geometric Design II - T-INFO-102041	379
6.73. Curves and Surfaces in CAD I - T-INFO-101374	380
6.74. Curves and Surfaces in CAD II - T-INFO-102006	381
6.75. Data and Storage Management - T-INFO-101276	382
6.76. Data Privacy: From Anonymization to Access Control - T-INFO-108377	383
6.77. Data Science - T-INFO-113124	384
6.78. Data Science 1 - T-INFO-111622	385
6.79. Database as a Service - T-INFO-111400	386
6.80. Database Systems and XML - T-WIWI-102661	387
6.81. Decentralized Systems: Fundamentals, Modeling, and Applications - T-INFO-110820	389
6.82. Deep Learning and Neural Networks - T-INFO-109124	391
6.83. Deep Learning for Computer Vision I: Basics - T-INFO-111491	392
6.84. Deep Learning for Computer Vision II: Advanced Topics - T-INFO-111494	393
6.85. Demand-Driven Supply Chain Planning - T-WIWI-110971	394
6.86. Deployment of Database Systems - T-INFO-101317	395
6.87. Derivatives - T-WIWI-102643	396
6.88. Design and Architectures of Embedded Systems (ES2) - T-INFO-101368	397
6.89. Design Principles for Interactive Real-Time Systems - T-INFO-101290	398
6.90. Design Thinking - T-WIWI-102866	399
6.91. Designing Interactive Systems - T-WIWI-110851	401
6.92. Development of Sustainable Business Models - T-WIWI-112143	403
6.93. Digital Accessibility and Assistive Technologies - T-INFO-111830	404
6.94. Digital Democracy - T-WIWI-113160	405

6.95. Digital Health - T-WIWI-109246	406
6.96. Digital Marketing - T-WIWI-112693	407
6.97. Digital Marketing and Sales in B2B - T-WIWI-106981	408
6.98. Digital Services: Innovation & Business Models - T-WIWI-112757	409
6.99. Digital Transformation and Business Models - T-WIWI-108875	411
6.100. Discrete-Event Simulation in Production and Logistics - T-WIWI-102718	412
6.101. Distributed Computing - T-INFO-101298	414
6.102. Dynamic Macroeconomics - T-WIWI-109194	415
6.103. Economics of Innovation - T-WIWI-112822	416
6.104. Efficient Energy Systems and Electric Mobility - T-WIWI-102793	418
6.105. eFinance: Information Systems for Securities Trading - T-WIWI-110797	419
6.106. Emerging Trends in Digital Health - T-WIWI-110144	420
6.107. Emerging Trends in Internet Technologies - T-WIWI-110143	421
6.108. Emissions into the Environment - T-WIWI-102634	422
6.109. Empirical Software Engineering - T-INFO-101335	423
6.110. Employment Law - T-INFO-111436	424
6.111. Energy and Environment - T-WIWI-102650	425
6.112. Energy Informatics 1 - T-INFO-103582	426
6.113. Energy Informatics 1 - Preliminary Work - T-INFO-110356	427
6.114. Energy Informatics 2 - T-INFO-106059	428
6.115. Energy Market Engineering - T-WIWI-107501	429
6.116. Energy Networks and Regulation - T-WIWI-107503	430
6.117. Energy Trading and Risk Management - T-WIWI-112151	432
6.118. Engineering Interactive Systems - T-WIWI-110877	434
6.119. Entrepreneurial Leadership & Innovation Management - T-WIWI-102833	435
6.120. Entrepreneurship - T-WIWI-102864	436
6.121. Entrepreneurship Research - T-WIWI-102894	440
6.122. Entrepreneurship Seasonal School - T-WIWI-113151	441
6.123. Environmental and Resource Policy - T-WIWI-102616	443
6.124. Environmental Economics and Sustainability - T-WIWI-102615	444
6.125. Environmental Law - T-BGU-111102	445
6.126. European and International Law - T-INFO-101312	446
6.127. Experimental Economics - T-WIWI-102614	447
6.128. Explainable Artificial Intelligence - T-INFO-112774	448
6.129. Extraordinary Additional Course in the Module Cross-Functional Management Accounting - T-WIWI-108651	451
6.130. Financial Analysis - T-WIWI-102900	452
6.131. Financial Econometrics - T-WIWI-103064	453
6.132. Financial Econometrics II - T-WIWI-110939	455
6.133. Financial Intermediation - T-WIWI-102623	456
6.134. Firm creation in IT security - T-WIWI-110374	457
6.135. Formal Systems - T-INFO-101336	458
6.136. Formal Systems II: Application - T-INFO-101281	459
6.137. Formal Systems II: Theory - T-INFO-101378	460
6.138. Fundamentals for Financial-Quant and -Machine Learning Research - T-WIWI-111846	461
6.139. Fundamentals of National and International Group Taxation - T-WIWI-111304	462
6.140. Fuzzy Sets - T-INFO-101376	463
6.141. Geometric Optimization - T-INFO-101267	464
6.142. Global Manufacturing - T-WIWI-112103	465
6.143. Global Optimization I - T-WIWI-102726	466
6.144. Global Optimization I and II - T-WIWI-103638	468
6.145. Global Optimization II - T-WIWI-102727	471
6.146. Graph Partitioning and Graph Clustering in Theory and Practice - T-INFO-101295	473
6.147. Graph Partitioning and Graph Clustering in Theory and Practice - Practical - T-INFO-110999	474
6.148. Graph Theory and Advanced Location Models - T-WIWI-102723	475
6.149. Growth and Development - T-WIWI-112816	476
6.150. Hands-on Bioinformatics Practical - T-INFO-103009	478
6.151. Heat Economy - T-WIWI-102695	479
6.152. Heterogeneous Parallel Computing Systems - T-INFO-101359	480
6.153. Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy - T-INFO-101262	481

6.154. Human Factors in Security and Privacy - T-WIWI-109270	482
6.155. Human-Machine-Interaction - T-INFO-101266	483
6.156. Human-Machine-Interaction in Anthropomatics: Basics - T-INFO-101361	484
6.157. Human-Machine-Interaction Pass - T-INFO-106257	485
6.158. Humanoid Robotics Laboratory - T-INFO-111590	486
6.159. Incentives in Organizations - T-WIWI-105781	488
6.160. Information Processing in Sensor Networks - T-INFO-101466	490
6.161. Information Service Engineering - T-WIWI-106423	491
6.162. Innovation Management: Concepts, Strategies and Methods - T-WIWI-102893	493
6.163. Innovative Concepts for Programming Industrial Robots - T-INFO-101328	494
6.164. Integrated Network and Systems Management - T-INFO-101284	495
6.165. Intelligent Agent Architectures - T-WIWI-111267	496
6.166. Intelligent Agents and Decision Theory - T-WIWI-110915	498
6.167. Interactive Computer Graphics - T-INFO-101269	501
6.168. International Business Development and Sales - T-WIWI-110985	502
6.169. International Finance - T-WIWI-102646	503
6.170. Internet Law - T-INFO-101307	504
6.171. Internet of Everything - T-INFO-101337	505
6.172. Introduction to Bayesian Statistics for Analyzing Data - T-WIWI-110918	506
6.173. Introduction to Bioinformatics for Computer Scientists - T-INFO-101286	507
6.174. Introduction to Hybrid Quantum Machine Learning Algorithms - T-INFO-112571	508
6.175. Introduction to Stochastic Optimization - T-WIWI-106546	509
6.176. Introduction to Video Analysis - T-INFO-101273	510
6.177. IT Security - T-INFO-112818	511
6.178. IT-Security Management for Networked Systems - T-INFO-101323	512
6.179. Joint Entrepreneurship Summer School - T-WIWI-109064	513
6.180. Judgement and Decision Making - T-WIWI-111099	514
6.181. KD ² Lab Hands-On Research Course: New Ways and Tools in Experimental Economics - T-WIWI-111109	515
6.182. Knowledge Discovery - T-WIWI-102666	516
6.183. Lab Course Heterogeneous Computing - T-INFO-108447	518
6.184. Lab Project: Speech Translation - T-INFO-112175	519
6.185. Lab: Efficient Parallel C++ - T-INFO-106992	520
6.186. Lab: Graph Visualization in Practice - T-INFO-106580	521
6.187. Lab: Internet of Things (IoT) - T-INFO-107493	522
6.188. Lab: Low Power Design and Embedded Systems - T-INFO-108323	525
6.189. Laboratory Course Algorithm Engineering - T-INFO-104374	526
6.190. Laboratory in Cryptanalysis - T-INFO-102990	527
6.191. Laboratory in Cryptography - T-INFO-102989	528
6.192. Laboratory in Security - T-INFO-102991	529
6.193. Large-scale Optimization - T-WIWI-106549	530
6.194. Liberalised Power Markets - T-WIWI-107043	531
6.195. Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context - T-WIWI-113107	534
6.196. Localization of Mobile Agents - T-INFO-101377	535
6.197. Logical Foundations of Cyber-Physical Systems - T-INFO-112360	536
6.198. Low Power Design - T-INFO-101344	537
6.199. Machine Learning - Foundations and Algorithms - T-INFO-111558	538
6.200. Machine Learning 1 - Basic Methods - T-WIWI-106340	539
6.201. Machine Learning 2 – Advanced Methods - T-WIWI-106341	541
6.202. Machine Learning and Optimization in Energy Systems - T-WIWI-113073	543
6.203. Machine Translation - T-INFO-101385	544
6.204. Management Accounting 1 - T-WIWI-102800	545
6.205. Management Accounting 2 - T-WIWI-102801	547
6.206. Management of IT-Projects - T-WIWI-112599	549
6.207. Managing New Technologies - T-WIWI-102612	551
6.208. Market Research - T-WIWI-107720	552
6.209. Marketing Analytics - T-WIWI-103139	554
6.210. Marketing Strategy Business Game - T-WIWI-102835	556
6.211. Master's Thesis - T-WIWI-103142	557
6.212. Matching Theory - T-WIWI-113264	558
6.213. Mathematics for High Dimensional Statistics - T-WIWI-111247	559

6.214. Media Management - T-WIWI-112711	560
6.215. Meshes and Point Clouds - T-INFO-101349	561
6.216. Methods in Economic Dynamics - T-WIWI-102906	562
6.217. Methods in Innovation Management - T-WIWI-110263	564
6.218. Microeconometrics - T-WIWI-112153	565
6.219. Mixed Integer Programming I - T-WIWI-102719	566
6.220. Mixed Integer Programming II - T-WIWI-102720	568
6.221. Mobile Communication - T-INFO-101322	569
6.222. Model Driven Software Development - T-INFO-101278	570
6.223. Modeling and OR-Software: Advanced Topics - T-WIWI-106200	571
6.224. Modeling and Simulation - T-WIWI-112685	572
6.225. Multicriteria Optimization - T-WIWI-111587	574
6.226. Multivariate Statistical Methods - T-WIWI-103124	575
6.227. Natural Language Processing - T-INFO-112177	576
6.228. Natural Language Processing and Software Engineering - T-INFO-101272	577
6.229. Network Security: Architectures and Protocols - T-INFO-101319	578
6.230. Next Generation Internet - T-INFO-101321	579
6.231. Non- and Semiparametrics - T-WIWI-103126	580
6.232. Nonlinear Optimization I - T-WIWI-102724	581
6.233. Nonlinear Optimization I and II - T-WIWI-103637	583
6.234. Nonlinear Optimization II - T-WIWI-102725	585
6.235. Online Concepts for Karlsruhe City Retailers - T-WIWI-111848	587
6.236. Operations Research in Health Care Management - T-WIWI-102884	588
6.237. Operations Research in Supply Chain Management - T-WIWI-102715	589
6.238. Optimization and Synthesis of Embedded Systems (ES1) - T-INFO-101367	591
6.239. Optimization Models and Applications - T-WIWI-110162	592
6.240. Optimization under Uncertainty - T-WIWI-106545	593
6.241. Panel Data - T-WIWI-103127	594
6.242. Parallel Algorithms - T-INFO-101333	595
6.243. Parallel Algorithms Pass - T-INFO-111857	596
6.244. Parallel Computer Systems and Parallel Programming - T-INFO-101345	597
6.245. Parametric Optimization - T-WIWI-102855	598
6.246. Patent Law - T-INFO-101310	599
6.247. Pattern Recognition - T-INFO-101362	600
6.248. Penetration Testing Lab - T-INFO-109929	601
6.249. Photorealistic Rendering - T-INFO-101268	602
6.250. Planning and Management of Industrial Plants - T-WIWI-102631	603
6.251. Platform & Market Engineering: Commerce, Media, and Digital Democracy - T-WIWI-112823	604
6.252. Portfolio and Asset Liability Management - T-WIWI-103128	605
6.253. Practical Course Applied Telematics - T-INFO-103585	606
6.254. Practical Course Automatic Speech Recognition - T-INFO-104775	607
6.255. Practical Course Computer Vision for Human-Computer Interaction - T-INFO-105943	608
6.256. Practical Course Decentralized Systems and Network Services - T-INFO-106063	609
6.257. Practical Course Digital Design & Test Automation Flow - T-INFO-105565	610
6.258. Practical Course Engineering Approaches to Software Development - T-INFO-108791	611
6.259. Practical Course FPGA Programming - T-INFO-105576	612
6.260. Practical Course Model-Driven Software Development - T-INFO-103029	613
6.261. Practical Course Natural Language Dialog Systems - T-INFO-104780	614
6.262. Practical Course on Network Security Research - T-INFO-110938	615
6.263. Practical Course Protocol Engineering - T-INFO-104386	616
6.264. Practical Course Software Defined Networking - T-INFO-103587	617
6.265. Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics - T-INFO-111803	618
6.266. Practical Course: Biologically Inspired Robots - T-INFO-111039	619
6.267. Practical Course: Current Topics of Quantum Computing - T-INFO-112741	620
6.268. Practical Course: Customized Embedded Processor Design - T-INFO-111457	621
6.269. Practical Course: Data Science - T-INFO-111262	622
6.270. Practical Course: Data Science for Scientific Data - T-INFO-112844	623
6.271. Practical Course: Database Systems - T-INFO-103201	624
6.272. Practical Course: Discrete Freeform Surfaces - T-INFO-103208	625

6.273. Practical Course: General-Purpose Computation on Graphics Processing Units - T-INFO-109914	626
6.274. Practical Course: Geometric Modeling - T-INFO-103207	627
6.275. Practical Course: Graphics and Game Development - T-INFO-110872	628
6.276. Practical Course: Hot Research Topics in Computer Graphics - T-INFO-109577	629
6.277. Practical Course: Machine Learning and Intelligent Systems - T-INFO-112104	630
6.278. Practical Course: Neural Network Exercises - T-INFO-106259	631
6.279. Practical Course: Programme Verification - T-INFO-102953	632
6.280. Practical Course: Scientific Data Management - T-INFO-112810	633
6.281. Practical Course: Smart Data Analytics - T-INFO-106426	634
6.282. Practical Course: Smart Energy System Lab - T-INFO-112030	635
6.283. Practical Course: Visual Computing - T-INFO-103000	636
6.284. Practical Course: Web Applications and Service-Oriented Architectures (II) - T-INFO-103121	637
6.285. Practical Introduction to Hardware Security - T-INFO-108920	638
6.286. Practical Project Robotics and Automation I (Software) - T-INFO-104545	640
6.287. Practical Project Robotics and Automation II (Hardware) - T-INFO-104552	641
6.288. Practical SAT Solving - T-INFO-105798	642
6.289. Practical Seminar Digital Service Systems - T-WIWI-106563	643
6.290. Practical Seminar: Advanced Analytics - T-WIWI-108765	644
6.291. Practical Seminar: Artificial Intelligence in Service Systems - T-WIWI-112152	645
6.292. Practical Seminar: Data-Driven Information Systems - T-WIWI-106207	646
6.293. Practical Seminar: Health Care Management (with Case Studies) - T-WIWI-102716	647
6.294. Practical Seminar: Information Systems and Service Design - T-WIWI-108437	648
6.295. Practical Seminar: Service Innovation - T-WIWI-110887	649
6.296. Predictive Mechanism and Market Design - T-WIWI-102862	650
6.297. Predictive Modeling - T-WIWI-110868	651
6.298. Price Management - T-WIWI-105946	652
6.299. Pricing - T-WIWI-102883	653
6.300. Principles of Automatic Speech Recognition - T-INFO-101384	655
6.301. Probabilistic Time Series Forecasting Challenge - T-WIWI-111387	656
6.302. Probability and Computing - T-INFO-113082	658
6.303. Product and Innovation Management - T-WIWI-109864	659
6.304. Production and Logistics Management - T-WIWI-102632	661
6.305. Project Lab Cognitive Automobiles and Robots - T-WIWI-109985	662
6.306. Project Lab Machine Learning - T-WIWI-109983	664
6.307. Project Lab: Image Analysis and Fusion - T-INFO-104746	665
6.308. Project Management - T-WIWI-103134	666
6.309. Public Management - T-WIWI-102740	667
6.310. Public Revenues - T-WIWI-102739	668
6.311. Quantitative Methods in Energy Economics - T-WIWI-107446	669
6.312. Rationale Splines - T-INFO-103544	670
6.313. Rationale Splines - T-INFO-103543	671
6.314. Real-Time Systems - T-INFO-101340	672
6.315. Recommender Systems - T-WIWI-102847	673
6.316. Reconfigurable and Adaptive Systems - T-INFO-101258	677
6.317. Regulation Theory and Practice - T-WIWI-102712	678
6.318. Reliable Computing I - T-INFO-101387	679
6.319. Requirements Engineering - T-INFO-101300	680
6.320. Research Focus Class: Blockchain & Payment Channel Networks - T-INFO-111251	681
6.321. Research Focus Class: Blockchain & Payment Channel Networks - Seminar - T-INFO-111252	682
6.322. Research Project (Project, 1st Semester) - Oral Exam - T-INFO-110218	683
6.323. Research Project (Project, 1st Semester) - Presentation - T-INFO-110219	684
6.324. Research Project (Project, 1st Semester) - Project Proposal - T-INFO-110220	685
6.325. Research Project (Project, 2nd Semester) - Oral Exam - T-INFO-110221	686
6.326. Research Project (Project, 2nd Semester) - Presentation - T-INFO-110222	687
6.327. Research Project (Project, 2nd Semester) - Scientific Report - T-INFO-110223	688
6.328. Research Project Autonomous Learning Robots - T-INFO-110861	689
6.329. Responsible Artificial Intelligence - T-WIWI-111385	690
6.330. Risk Management in Industrial Supply Networks - T-WIWI-102826	691
6.331. Roadmapping - T-WIWI-102853	692
6.332. Robotics - Practical Course - T-INFO-105107	693

6.333. Robotics I - Introduction to Robotics - T-INFO-108014	694
6.334. Robotics II - Humanoid Robotics - T-INFO-105723	695
6.335. Robotics III - Sensors and Perception in Robotics - T-INFO-109931	696
6.336. Scientific Methods to Design and Analyze Secure Decentralized Systems - T-INFO-111568	698
6.337. Selected Legal Issues of Internet Law - T-INFO-108462	700
6.338. Semantic Web Technologies - T-WIWI-110848	701
6.339. Seminar in Business Administration A (Master) - T-WIWI-103474	704
6.340. Seminar in Economic Policy - T-WIWI-102789	716
6.341. Seminar in Economics A (Master) - T-WIWI-103478	717
6.342. Seminar in Informatics B (Master) - T-WIWI-103480	722
6.343. Seminar in Information Systems (Master) - T-WIWI-109827	727
6.344. Seminar in Operations Research A (Master) - T-WIWI-103481	731
6.345. Seminar in Statistics A (Master) - T-WIWI-103483	735
6.346. Seminar Informatics A - T-INFO-104336	737
6.347. Seminar Informatics Master - T-INFO-111205	744
6.348. Seminar Laboratory: Machine Learning and Intelligent Systems - T-INFO-112105	754
6.349. Seminar: Commercial and Corporate Law in the IT Industry - T-INFO-111405	755
6.350. Seminar: IT- Security Law - T-INFO-111404	756
6.351. Seminar: Legal Studies I - T-INFO-101997	757
6.352. Service Design Thinking - T-WIWI-102849	759
6.353. Service Innovation - T-WIWI-102641	762
6.354. Signals and Codes - T-INFO-101360	764
6.355. Simulation Game in Energy Economics - T-WIWI-108016	765
6.356. Smart Energy Infrastructure - T-WIWI-107464	766
6.357. Smart Grid Applications - T-WIWI-107504	767
6.358. Social Choice Theory - T-WIWI-102859	768
6.359. Sociotechnical Information Systems Development - T-WIWI-109249	769
6.360. Software Architecture and Quality - T-INFO-101381	770
6.361. Software Engineering II - T-INFO-101370	771
6.362. Software Lab Parallel Numerics - T-INFO-105988	772
6.363. Software Product Line Engineering - T-INFO-111017	773
6.364. Software Quality Management - T-WIWI-102895	774
6.365. Software Security Engineering - T-INFO-112862	776
6.366. Software-Evolution - T-INFO-101256	777
6.367. Spatial Economics - T-WIWI-103107	778
6.368. Special Topics in Information Systems - T-WIWI-109940	780
6.369. Startup Experience - T-WIWI-111561	781
6.370. Statistical Modeling of Generalized Regression Models - T-WIWI-103065	784
6.371. Stochastic Calculus and Finance - T-WIWI-103129	785
6.372. Stochastic Information Processing - T-INFO-101366	787
6.373. Strategic Finance and Technology Change - T-WIWI-110511	788
6.374. Strategic Management of Information Technology - T-WIWI-102669	789
6.375. Strategy and Management Theory: Developments and "Classics" - T-WIWI-106190	790
6.376. Subdivision Algorithms - T-INFO-103551	792
6.377. Successful Transformation Through Innovation - T-WIWI-111823	793
6.378. Supplement Enterprise Information Systems - T-WIWI-110346	794
6.379. Supply Chain Management in the Automotive Industry - T-WIWI-102828	795
6.380. Supply Chain Management with Advanced Planning Systems - T-WIWI-102763	796
6.381. Symmetric Encryption - T-INFO-101390	798
6.382. Tax Law - T-INFO-111437	799
6.383. Technologies for Innovation Management - T-WIWI-102854	800
6.384. Technology Assessment - T-WIWI-102858	801
6.385. Telecommunications and Internet - Economics and Policy - T-WIWI-113147	802
6.386. Telecommunications Law - T-INFO-101309	804
6.387. Telematics - T-INFO-101338	805
6.388. Testing Digital Systems I - T-INFO-101388	807
6.389. Testing Digital Systems II - T-INFO-105936	808
6.390. Theoretical Foundations of Cryptography - T-INFO-111199	809
6.391. Topics in Experimental Economics - T-WIWI-102863	810
6.392. Topics in Stochastic Optimization - T-WIWI-112109	811

6.393. Trademark and Unfair Competition Law - T-INFO-101313	812
6.394. Transport Economics - T-WIWI-100007	813
6.395. Trustworthy Emerging Technologies - T-WIWI-113026	814
6.396. Ubiquitous Computing - T-INFO-101326	815
6.397. Valuation - T-WIWI-102621	816
6.398. Visualization - T-INFO-101275	817
6.399. Wearable Robotic Technologies - T-INFO-106557	818
6.400. Web App Programming for Finance - T-WIWI-110933	819
6.401. Web Applications and Service-Oriented Architectures (II) - T-INFO-101271	820
6.402. Workshop Business Wargaming – Analyzing Strategic Interactions - T-WIWI-106189	821
6.403. Workshop Current Topics in Strategy and Management - T-WIWI-106188	824

1 General information

Welcome to the new module handbook of your study program! We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester! In the following we would like to give you a short introduction to the most important terms and rules that are important in connection with the choice of modules, courses and examinations.

1.1 Structural elements

The program exists of several **subjects** (e.g. business administration, economics, operations research). Every subject is split into **modules** and every module itself consists of one or more interrelated **module component exams**. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are **obligatory**. According to the interdisciplinary character of the program, a great variety of **individual specialization and deepening possibilities** exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The **module handbook** describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the **course catalog**, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

1.2 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

1.3 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student's "binding declaration" on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive at http://www.wiwi.kit.edu/Archiv_MHB.php.

1.4 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on <https://campus.studium.kit.edu/>:

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, see <https://campus.studium.kit.edu/faq.php>.

1.5 Types of examinations

Examinations are split into written examinations, oral examinations and alternative exam assessments ("Prüfungsleistungen anderer Art"). Examinations are always graded. Non exam assessments ("Studienleistungen") can be repeated several times and are not graded.

1.6 Repeating examinations

Principally, a failed written exam, oral exam or alternative exam assessment can be repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after losing the examination claim. For further information see <http://www.wiwi.kit.edu/hinweiseZweitwdh.php>.

1.7 Examiners

The examination committee has appointed the KIT examiners and lecturers listed in the module handbook for the modules and their courses as examiners for the courses they offer.

1.8 Additional accomplishments

Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments with at most 30 CP may appear additionally in the certificate.

1.9 Further information

For current information about studying at the KIT Department of Economics and Management, please visit our website www.wiwi.kit.edu as well as [Instagram](#), [LinkedIn](#), and [YouTube](#). Please also see current notices and announcements for students at: <https://www.wiwi.kit.edu/studium.php>.

Information around the legal and official framework of the study program can be found in the respective study and examination regulations of your study program. These are available under the Official Announcements of KIT (<http://www.sle.kit.edu/amtlicheBekanntmachungen.php>).

More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (<http://www.sle.kit.edu/amtlicheBekanntmachungen.php>).

1.10 Contact persons

for Bachelor students

Personal consultation: KIT Department of Informatics, Informatics Study Program Service
Informatics Building 50.34, EG, Rooms 001.2/.3
bachelor@wirtschaftsinformatik.kit.edu

editorial responsibility: Lena Coerdts, KIT Department of Informatics
Phone: +49 721 608-48893
modulhandbuch@informatik.kit.edu

for master students

Personal consultation: KIT Department of Economics and Management, Examination Office
Gebäude am Kronenplatz Building 05.20, 3rd floor, Room 3C-05
master@wirtschaftsinformatik.kit.edu

editorial responsibility: Dr. André Wiesner, KIT Department of Economics and Management
Phone: +49 721 608-44061
modul@wiwi.kit.edu

2 Study plan

The Master's programme in Information Systems has a standard duration of four semesters and comprises 120 credit points. Depending on personal interests and goals, the specialist knowledge acquired in the Bachelor's programme can be expanded and deepened within the scope of the study plan.

Figure 2 shows the subject and module structure with the allocation of credit points (LP) and, as an example, a possible distribution of modules over the semesters.

Semester	Leistungs- punkte	Wirtschaftsinformatik	Informatik	Wirtschaftswissenschaften	Recht		Seminare	Masterarbeit
1	33	Wirtschaftsinformatik 9 LP	Informatik 4 LP	Wirtschafts- wissenschaften 9 LP	Recht 9 LP	Recht 9 LP	Seminar modul Wirtschafts- informatik Informatik Wirtschafts- wissenschaften Rechts- wissenschaften 3 LP + 3 LP*	
	Informatik 4 LP							
	Informatik 4 LP							
	Informatik 4 LP							
2	27		Informatik 8 LP					
3	30	Wirtschaftsinformatik 9 LP	Informatik 6 LP	Wirtschafts- wissenschaften 9 LP				
4	30							Masterarbeit 30 LP
	120	18	30	18	18		6	30

* In Summe sind 2 Seminare zu wählen. Die Vermittlung von überfachlichen Qualifikationen erfolgt integrativ im Rahmen der fachwissenschaftlichen Module.

Figure 2: Structure of the Master's programme in Information Systems (german)

Within the scope of the master's programme, modules from the subjects of Information Systems, Informatics, Economics and Law are to be completed and a master's thesis is to be written.

In the subject Informatics, modules with a total volume of 30 credit points are to be taken. In the remaining subjects Information Systems, Economics and Law, modules with a total of 18 credit points must be proven.

In the subjects Information Systems, Informatics, Economics and Management and Law, two seminars of 3 LP each must be completed. The seminars have to be chosen from different subjects.

It is up to the individual study plan (taking into account the relevant requirements in the study and examination regulations as well as any module regulations) in which subject semester the selected module examinations are started or completed. However, it is recommended that all other academic achievements of the Master's examination be proven before the start of the Master's thesis.

All modules including options within the modules are described in the module handbook. WiWi seminars that can be attended as part of the seminar modules will be published on the Wiwi portal at <https://portal.wiwi.kit.edu/Seminare>.

3 Qualification goals

The KIT graduates of the interdisciplinary, four-semester Master's program in Information Systems have an in-depth research-oriented expertise in Information Systems and the related disciplines of Informatics, Economics and Law. This specialist knowledge is supplemented by subject-independent competences that can be applied across several disciplines. Depending on their profile, their qualifications are particularly suitable for interdisciplinary activities as IT managers, management consultants, technology entrepreneurs, process managers, company founders and for a further scientific career (scientist).

KIT business IT specialists are characterized by their interdisciplinary methodological competence and their innovative ability in shaping the digital transformation of business and society.

By combining their knowledge and competencies, they are able to independently recognize economic and information technology conditions as well as innovative development potentials for the digitization of processes, products and services and to implement them within the legal framework.

KIT business IT specialists design and develop interdisciplinary information goods and information systems from a socio-technical perspective with the aim of creating social and economic value through the digitisation of economy and society.

They are able to analyse and structure complex subject-relevant problems and requirements and develop tailor-made solutions and options for action.

They know how to identify the advantages and disadvantages of existing processes, models, technologies and approaches, compare them with alternatives, evaluate them critically and transfer them to new areas of application.

According to their needs, they can also combine, adapt or independently develop new solutions and implement them using innovative information and communication technologies. They can make and justify their decisions in a scientifically sound manner, taking into account social and ethical aspects.

They know how to critically interpret, validate, document and present the results obtained.

Graduates will be able to communicate with representatives at a scientific level and take on outstanding responsibility in a team.

4 Field of study structure

Mandatory		
Master's Thesis		30 CR
Information Systems		18 CR
Informatics		30 CR
Economics and Management		18 CR
Law		18 CR
Seminars		6 CR

4.1 Master's Thesis

Credits
30

Mandatory		
M-WIWI-104833	Module Master's Thesis	30 CR

4.2 Information Systems

Credits
18

Information Systems (Election:)		
M-WIWI-104814	Information Systems: Analytical and Interactive Systems	9 CR
M-WIWI-104812	Information Systems: Engineering and Transformation	9 CR
M-WIWI-104813	Information Systems: Internet-Based Markets and Services	9 CR

4.3 Informatics

Credits
30

Optional Modules Informatics (Election:)		
M-INFO-106303	Access Control Systems: Models and Technology	5 CR
M-INFO-100795	Algorithm Engineering	5 CR
M-INFO-101173	Algorithms II	6 CR
M-INFO-102093	Algorithms for Ad-Hoc and Sensor Networks	5 CR
M-INFO-100031	Algorithms for Routing	5 CR
M-INFO-102094	Algorithms for Visualization of Graphs	5 CR
M-INFO-102110	Computational Geometry	6 CR
M-INFO-100762	Algorithmic Graph Theory	5 CR
M-INFO-100754	Computational Cartography	5 CR
M-INFO-102400	Algorithmic Methods for Network Analysis	5 CR
M-INFO-103294	Wearable Robotic Technologies	4 CR
M-WIWI-105366	Artificial Intelligence	9 CR
M-INFO-104447	Automated Planning and Scheduling	5 CR
M-INFO-100826	Automated Visual Inspection and Image Processing	6 CR
M-INFO-100814	Biologically Inspired Robots	3 CR
M-INFO-102968	Biometric Systems for Person Identification	3 CR
M-INFO-100856	Computer Graphics	6 CR
M-WIWI-104403	Critical Digital Infrastructures	9 CR
M-INFO-100739	Data and Storage Management	4 CR
M-INFO-106505	Data Science <small>neu</small>	8 CR
M-INFO-104045	Data Privacy: From Anonymization to Access Control	3 CR
M-INFO-101662	Practical Course: Database Systems	4 CR
M-INFO-100780	Deployment of Database Systems	5 CR
M-INFO-105724	Database as a Service	5 CR
M-INFO-105334	Decentralized Systems: Fundamentals, Modeling, and Applications	6 CR
M-INFO-105753	Deep Learning for Computer Vision I: Basics	3 CR
M-INFO-105755	Deep Learning for Computer Vision II: Advanced Topics	3 CR
M-INFO-104460	Deep Learning and Neural Networks	6 CR
M-INFO-105882	Digital Accessibility and Assistive Technologies	3 CR
M-INFO-100803	Real-Time Systems	6 CR
M-INFO-100736	Introduction to Video Analysis	3 CR
M-INFO-106189	Introduction to Hybrid Quantum Machine Learning Algorithms	3 CR
M-INFO-101885	Energy Informatics 1	5 CR
M-INFO-103044	Energy Informatics 2	5 CR
M-INFO-100798	Empirical Software Engineering	4 CR
M-INFO-100831	Design and Architectures of Embedded Systems (ES2)	3 CR
M-WIWI-101477	Development of Business Information Systems	9 CR
M-INFO-106302	Explainable Artificial Intelligence <small>neu</small>	3 CR
M-INFO-102731	Advanced Data Structures	5 CR
M-INFO-100799	Formal Systems	6 CR
M-INFO-100841	Formal Systems II: Theory	5 CR
M-INFO-100744	Formal Systems II: Application	5 CR
M-INFO-105378	Research Project Autonomous Learning Robots	6 CR
M-INFO-105413	Practical Course on Network Security Research	3 CR
M-INFO-106299	Advanced Artificial Intelligence	6 CR
M-INFO-100725	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy	3 CR
M-INFO-100730	Geometric Optimization	3 CR
M-INFO-100753	Design Principles for Interactive Real-Time Systems	3 CR
M-INFO-100847	Principles of Automatic Speech Recognition	6 CR

M-INFO-100758	Graph Partitioning and Graph Clustering in Theory and Practice	5 CR
M-INFO-101573	Hands-on Bioinformatics Practical	3 CR
M-INFO-100822	Heterogeneous Parallel Computing Systems	3 CR
M-WIWI-104520	Human Factors in Security and Privacy	9 CR
M-INFO-100895	Information Processing in Sensor Networks	6 CR
M-INFO-100791	Innovative Concepts for Programming Industrial Robots	4 CR
M-WIWI-101456	Intelligent Systems and Services	9 CR
M-INFO-100747	Integrated Network and Systems Management	4 CR
M-INFO-100732	Interactive Computer Graphics	5 CR
M-INFO-100800	Internet of Everything	4 CR
M-INFO-100749	Introduction to Bioinformatics for Computer Scientists	3 CR
M-INFO-106315	IT Security	6 CR
M-INFO-100786	IT-Security Management for Networked Systems	5 CR
M-INFO-101575	Computational Complexity Theory, with a View Towards Cryptography	6 CR
M-INFO-100728	Context Sensitive Systems	5 CR
M-INFO-100742	Cryptographic Voting Schemes	3 CR
M-INFO-100837	Curves and Surfaces in CAD I	5 CR
M-INFO-101231	Curves and Surfaces for Geometric Design	5 CR
M-INFO-101213	Curves and Surfaces in CAD III	5 CR
M-INFO-106102	Logical Foundations of Cyber-Physical Systems	4 CR
M-INFO-100840	Localization of Mobile Agents	6 CR
M-INFO-100807	Low Power Design	3 CR
M-INFO-100848	Machine Translation	6 CR
M-WIWI-103356	Machine Learning	9 CR
M-INFO-105778	Machine Learning - Foundations and Algorithms	5 CR
M-INFO-100729	Human Computer Interaction	6 CR
M-INFO-100824	Human-Machine-Interaction in Anthropomatics: Basics	3 CR
M-INFO-100785	Mobile Communication	4 CR
M-INFO-100741	Model-Driven Software Development	3 CR
M-INFO-100825	Pattern Recognition	6 CR
M-INFO-100812	Meshes and Point Clouds	3 CR
M-INFO-100782	Network Security: Architectures and Protocols	4 CR
M-INFO-100784	Next Generation Internet	4 CR
M-INFO-100830	Optimization and Synthesis of Embedded Systems (ES1)	3 CR
M-INFO-100808	Parallel Computer Systems and Parallel Programming	4 CR
M-INFO-100796	Parallel Algorithms	5 CR
M-INFO-100731	Photorealistic Rendering	5 CR
M-INFO-105870	Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics	6 CR
M-INFO-104699	Practical Course: Hot Research Topics in Computer Graphics	6 CR
M-INFO-106286	Practical Course: Current Topics of Quantum Computing	6 CR
M-INFO-102072	Laboratory Course Algorithm Engineering	6 CR
M-INFO-103166	Application Security Lab	4 CR
M-INFO-102411	Practical Course Automatic Speech Recognition	3 CR
M-INFO-105495	Practical Course: Biologically Inspired Robots	6 CR
M-INFO-105632	Practical Course: Data Science	6 CR
M-INFO-106329	Practical Course: Data Science for Scientific Data	6 CR
M-INFO-106312	Practical Course: Scientific Data Management	4 CR
M-INFO-103047	Practical Course Decentralized Systems and Network Services	4 CR
M-INFO-102570	Practical Course: Digital Design & Test Automation Flow	3 CR
M-INFO-101667	Practical Course: Discrete Freeform Surfaces	6 CR

M-INFO-103506	Lab: Efficient Parallel C++	6 CR
M-INFO-105740	Practical Course: Customized Embedded Processor Design	4 CR
M-INFO-102661	Practical Course FPGA Programming	3 CR
M-INFO-100724	Practical Course: General-Purpose Computation on Graphics Processing Units	3 CR
M-INFO-101666	Practical Course: Geometric Modeling	3 CR
M-INFO-103302	Lab: Graph Visualization in Practice	5 CR
M-INFO-105384	Practical Course: Graphics and Game Development	6 CR
M-INFO-104254	Practical: Course Engineering Approaches to Software Development	6 CR
M-INFO-103706	Lab: Internet of Things (IoT)	4 CR
M-INFO-101559	Laboratory in Cryptoanalysis	3 CR
M-INFO-101558	Laboratory in Cryptography	3 CR
M-INFO-104031	Lab: Low Power Design and Embedded Systems	4 CR
M-INFO-101579	Practical Course Model-Driven Software Development	6 CR
M-INFO-103143	Practical Course: Neural Network Exercises	3 CR
M-INFO-102414	Natural Language Dialog Systems	6 CR
M-INFO-104895	Penetration Testing Lab	4 CR
M-INFO-101889	Practical Course Applied Telematics	3 CR
M-INFO-101537	Practical Course: Programme Verification	3 CR
M-INFO-102092	Practical Course Protocol Engineering	4 CR
M-INFO-101560	Laboratory in Security	4 CR
M-INFO-103235	Practical Course: Smart Data Analytics	6 CR
M-INFO-105955	Practical Course: Smart Energy System Lab	6 CR
M-INFO-105997	Lab Project: Speech Translation	6 CR
M-INFO-101567	Practical Course: Visual Computing	6 CR
M-INFO-101635	Practical Course: Web Applications and Service-Oriented Architectures (II)	5 CR
M-INFO-104357	Practical Introduction to Hardware Security	6 CR
M-INFO-105037	Research Project (Project, 1st Semester)	10 CR
M-INFO-105038	Research Project (Project, 2nd Semester)	10 CR
M-INFO-102966	Practical Course Computer Vision for Human-Computer Interaction	6 CR
M-INFO-104072	Lab Course Heterogeneous Computing	6 CR
M-INFO-105792	Humanoid Robotics Laboratory	6 CR
M-INFO-102383	Project Lab: Image Analysis and Fusion	6 CR
M-WIWI-106491	Project Lab Applied Machine Learning neu	5 CR
M-INFO-105958	Practical Course: Machine Learning and Intelligent Systems	8 CR
M-INFO-102224	Practical Project Robotics and Automation I (Software)	6 CR
M-INFO-102230	Practical Project Robotics and Automation II (Hardware)	6 CR
M-INFO-101891	Practical Course Software Defined Networking	6 CR
M-INFO-106469	Probability and Computing neu	5 CR
M-INFO-101853	Rationale Splines	5 CR
M-INFO-101857	Rationale Splines	3 CR
M-INFO-100818	Computer Architecture	6 CR
M-INFO-100721	Reconfigurable and Adaptive Systems	3 CR
M-INFO-100850	Reliable Computing I	3 CR
M-INFO-100763	Requirements Engineering <i>First usage possible until 3/31/2024.</i>	3 CR
M-INFO-105620	Research Focus Class: Blockchain & Payment Channel Networks	6 CR
M-INFO-102522	Robotics - Practical Course	6 CR
M-INFO-100893	Robotics I - Introduction to Robotics	6 CR
M-INFO-102756	Robotics II - Humanoid Robotics	3 CR
M-INFO-104897	Robotics III - Sensors and Perception in Robotics	3 CR
M-INFO-102825	Practical SAT Solving	5 CR

M-INFO-105780	Scientific Methods to Design and Analyze Secure Decentralized Systems	5 CR
M-INFO-105959	Seminar Laboratory: Machine Learning and Intelligent Systems	3 CR
M-INFO-100823	Signals and Codes	3 CR
M-INFO-100844	Software Architecture and Quality	3 CR
M-INFO-102998	Software Lab Parallel Numerics	6 CR
M-INFO-105471	Software Product Line Engineering	3 CR
M-INFO-100833	Software Engineering II	6 CR
M-INFO-100719	Software-Evolution	3 CR
M-INFO-106344	Software Security Engineering neu	3 CR
M-INFO-100829	Stochastic Information Processing	6 CR
M-INFO-100735	Natural Language Processing and Software Engineering	3 CR
M-INFO-100853	Symmetric Encryption	3 CR
M-INFO-100801	Telematics	6 CR
M-INFO-100851	Testing Digital Systems I	3 CR
M-INFO-102962	Testing Digital Systems II	3 CR
M-INFO-105584	Theoretical Foundations of Cryptography	6 CR
M-INFO-100789	Ubiquitous Computing	5 CR
M-WIWI-101458	Ubiquitous Computing	9 CR
M-INFO-100839	Fuzzy Sets	6 CR
M-INFO-101863	Subdivision Algorithms	3 CR
M-INFO-105999	Natural Language Processing	6 CR
M-INFO-100761	Distributed Computing	4 CR
M-INFO-100738	Visualization	5 CR
M-WIWI-105368	Web and Data Science	9 CR
M-INFO-100734	Web Applications and Service-Oriented Architectures (II)	4 CR
M-WIWI-101455	Web Data Management	9 CR

4.4 Economics and Management

Credits
18

Business Administration (Election:)		
M-WIWI-105659	Advanced Machine Learning and Data Science	9 CR
M-WIWI-101410	Business & Service Engineering	9 CR
M-WIWI-101498	Management Accounting	9 CR
M-WIWI-101510	Cross-Functional Management Accounting	9 CR
M-WIWI-103117	Data Science: Data-Driven Information Systems	9 CR
M-WIWI-103118	Data Science: Data-Driven User Modeling	9 CR
M-WIWI-101647	Data Science: Evidence-based Marketing	9 CR
M-WIWI-105661	Data Science: Intelligent, Adaptive, and Learning Information Services	9 CR
M-WIWI-104080	Designing Interactive Information Systems	9 CR
M-WIWI-106258	Digital Marketing	9 CR
M-WIWI-102808	Digital Service Systems in Industry	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-101409	Electronic Markets	9 CR
M-WIWI-101451	Energy Economics and Energy Markets	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101488	Entrepreneurship (EnTechnon)	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-105894	Foundations for Advanced Financial -Quant and -Machine Learning Research	9 CR
M-WIWI-101471	Industrial Production II	9 CR
M-WIWI-101412	Industrial Production III	9 CR
M-WIWI-105923	Incentives, Interactivity & Decisions in Organizations	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-101507	Innovation Management	9 CR
M-WIWI-101446	Market Engineering	9 CR
M-WIWI-105312	Marketing and Sales Management	9 CR
M-WIWI-101506	Service Analytics	9 CR
M-WIWI-101503	Service Design Thinking	9 CR
M-WIWI-102754	Service Economics and Management	9 CR
M-WIWI-102806	Service Innovation, Design & Engineering	9 CR
M-WIWI-101448	Service Management	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
Economics (Election:)		
M-WIWI-101453	Applied Strategic Decisions	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-101505	Experimental Economics	9 CR
M-WIWI-101478	Innovation and Growth	9 CR
M-WIWI-101514	Innovation Economics	9 CR
M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101406	Network Economics	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-105414	Statistics and Econometrics II	9 CR
M-WIWI-101468	Environmental Economics	9 CR
M-WIWI-101485	Transport Infrastructure Policy and Regional Development	9 CR
M-WIWI-101511	Advanced Topics in Public Finance	9 CR
M-WIWI-101496	Growth and Agglomeration	9 CR
Operations Research (Election:)		
M-WIWI-101473	Mathematical Programming	9 CR

M-WIWI-102832	Operations Research in Supply Chain Management	9 CR
M-WIWI-102805	Service Operations	9 CR
M-WIWI-103289	Stochastic Optimization	9 CR
Statistics (Election:)		
M-WIWI-101637	Analytics and Statistics	9 CR
M-WIWI-101638	Econometrics and Statistics I	9 CR
M-WIWI-101639	Econometrics and Statistics II	9 CR
M-WIWI-105414	Statistics and Econometrics II	9 CR

4.5 Law

Credits
18

Compulsory Elective Module in Law (Election:)		
M-INFO-101217	Public Business Law	9 CR
M-INFO-101216	Private Business Law	9 CR
M-INFO-101215	Intellectual Property Law	9 CR

4.6 Seminars

Credits
6

Election notes

In the subjects Information Systems, Informatics, Economics and Management and Law, two seminars of 3 LP each must be completed. The seminars have to be chosen from different subjects.

Seminars (Election: at most 2 items)		
M-INFO-102822	Seminar Module Informatics	3 CR
M-INFO-101218	Seminar Module Law	3 CR
M-WIWI-104815	Seminar Information Systems	3 CR
M-WIWI-102736	Seminar Module Economic Sciences	3 CR

5 Modules

M

5.1 Module: Access Control Systems: Models and Technology [M-INFO-106303]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-112775	Access Control Systems: Models and Technology	5 CR	Böhm

Competence Certificate

See Partial Achievements (Teilleistung).

Prerequisites

See Partial Achievements (Teilleistung).

Competence Goal

The student understands that an information security model defines access rights that express for a given system which subjects are allowed to perform which actions on which objects. The student understands that a system is said to be secure with respect to a given information security model, if it enforces the corresponding access rights.

The student is able to derive suitable access control models from scenario requirements and is able to specify concrete access control systems. The student is aware of the limits of access control models and systems with respect to their analyzability and performance and security characteristics. The student is able to identify the resulting tradeoffs. The student knows the state of the art with respect to current research endeavors in the field of access control.

The specific competences are as follows. The student...

- ... understand the challenges of access control in the era of hyperconnectivity
- ... is able to decide which concrete architectures and protocols are technically suited for realizing a given access control model.
- ... is able to design an access control system architecture adhering to the requirements of a concrete scenario.
- ... knows access control models derived from social graphs
- ... knows specific access control of cloud-based services.
- ... knows access control mechanisms for secure data outsourcing and is able to analyze and compare the performance and security guarantees of the different approaches.
- ... knows access control protocols to enable decentralized data sharing through cryptographic methods and is able to compare protocol realizations based on different cryptographic building blocks with respect to their performance.
- ... is aware of hardware-assisted access control mechanisms (e.g., Trusted Execution Environments) and attacks on hardware and operating system security
- ... is able to name and describe desired features of Trusted Execution Environments and knows current approaches from industry and research.
- ... knows the requirements for access control mechanisms in decentralized systems (e.g., blockchain-based systems, Matrix) and is able to name and describe current approaches to address the domain-specific requirements

Content

Access control systems are everywhere: think of operating systems, information systems, banking, vehicles, robotics, cryptocurrencies, or decentralized applications as examples. Access control systems are the backbone of secure services as they incorporate who is authorized and who is not. The course starts with current challenges of access control in the era of hyperconnectivity, i.e. in cyber physical systems and decentralized systems. Based on the derived needs for next generation access control, we first study how to specify access control (access control matrix, role-based access control, attribute-based access control, usage control) and analyze strengths and weaknesses of various approaches. We then focus on up-to-date proposals, like relationship-based access control and IoT access control. We look at current cryptographic access control aspects of secure data outsourcing and sharing, blockchains and cryptocurrencies, and trusted execution environments. We also discuss the ethical dimension of access management.

Students prepare for lecture and exercise sessions by studying previously announced literature and by preparation of exercises that are jointly discussed in the sessions.

Workload

Lecture workload:

1. Attendance time (Course, exercise, etc.)

Lecture: 2 SWS: 2,0h x 15 = 30h

Exercises: 1 SWS: 1,0h x 15 = 15h

2. Self-study (e.g. independent review of course material,
work on homework assignments)

Weekly preparation and follow-up of the lecture: 15 x 1h x 3 = 45h

Weekly preparation and follow-up of the exercise: 15 x 2h = 30h

3. Preparation for the exam: 30 h

$\Sigma = 150h = 5$ ECTS

Recommendation

Basics according to the lectures "IT Security Management for Networked Systems" and "Telematics" are recommended.

M

5.2 Module: Advanced Artificial Intelligence [M-INFO-106299]

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-INFO-112768	Advanced Artificial Intelligence	6 CR	Niehues

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

- The students know the relevant elements of a technical cognitive system.
- The students understand the algorithms and methods of AI to model cognitive systems.
- The students are able to understand the different sub-components to develop and analyze a system .
- The students can transfer this knowledge to new applications, as well as analyze and compare different methods.

Content

Due to the successes in research, AI systems are increasingly integrated into our everyday lives. These are, for example, systems that can understand and generate language or analyze images and videos. In addition, AI systems are essential in robotics in order to be able to develop the next generation of intelligent robots .

Based on the knowledge of the lecture "Introduction to AI", the students learn to understand, develop and evaluate these systems. In order to bring this knowledge closer to the students, the lecture is divided into 4 parts. First, the lecture investigates method of perception using different modalities. The second part deals with advanced methods of learning that go beyond supervised learning. Then methods are discussed that are required for the representation of knowledge in AI systems. Finally, methods that enable AI systems to generate content are presented.

Workload

Lecture with 3 SWS + 1 SWS exercise , 6 CP.
 6 LP corresponds to approx. 180 hours, of which
 approx. 45 hours lecture attendance
 approx. 15 hours exercise visit
 approx. 90 hours post-processing and processing of the exercise sheets
 approx. 30 hours exam preparation

M

5.3 Module: Advanced Data Structures [M-INFO-102731]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-INFO-105687	Advanced Data Structures	4 CR	Sanders
T-INFO-111849	Advanced Data Structures Project/Experiment	1 CR	Sanders

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

Students acquire a systematic understanding of algorithmic issues and solution approaches in the area of advanced data structures, building on existing knowledge in the subject area of algorithms. They will also be able to apply learned techniques to related problems and interpret and comprehend current research topics in this area.

Upon successful completion of the course, students will be able to:

- explain terms, structures, basic problem definitions, and algorithms from the lecture;
- select which algorithms and data structures are suitable for solving a problem and, if necessary, adapt them to the requirements of a specific problem;
- use algorithms and data structures, analyze them mathematically, and prove the algorithmic properties.

Content

In this lecture we deal with modern data structures for fundamental objects such as trees, graphs, integers, and strings. These data structures are the basis for many applications and an important part of efficient algorithms. We look at highlights from different research areas and learn techniques for solving a wide variety of problems.

In addition to the theoretical analysis of data structures, we also look at the practical performance of the various data structures and their applications.

Workload

The lectures including the project/experiment with 5 CP corresponds to 150 working hours, which are divided approximately as follows:

- ca. 30 hours attending lectures
- ca. 60 hours preparing and following-up lectures
- ca. 30 hours working on the project/experiment
- ca. 30 hours preparing for the examination

M

5.4 Module: Advanced Machine Learning and Data Science [M-WIWI-105659]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-WIWI-111305	Advanced Machine Learning and Data Science	9 CR	Ulrich

Competence Certificate

Due to the professor's research sabbatical, the BSc module "Financial Data Science" and MSc module "Foundations for Advanced Financial -Quant and -Machine Learning Research" and the MSc module "Advanced Machine Learning and Data Science" along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The assessment is carried out in an alternative form. The final grade is evaluated based on the intermediate presentations during the project, the quality of the implementation, the final written thesis and a final presentation.

Prerequisites

see T-WIWI-106193 "Advanced Machine Learning and Data Science".

Competence Goal

After a successful project, the students can:

- select and apply modern machine learning methods to solve a data science problem;
- organize themselves in a team in a goal-oriented manner and bring an extensive software project in the field of data science and machine learning to success;
- deepen their data science and machine learning skills
- solve a finance problem with the help of data science and machine learning algorithm.

Content

The course is targeted at students with a major in Data Science and/or Machine Learning and/or Quantitative Finance. It offers students the opportunity to develop hands-on knowledge on new developments in the intersection of quantitative financial markets, data science and machine learning. The result of the project should not only be a final thesis, but the implementation of methods or development of an algorithm in machine learning and data science. Typically, problems and data are taken from current research and innovations in the field of quantitative asset and risk management.

Workload

Total effort for 9 credit points: approx. 270 hours are divided into the following parts: Communication: Exchange during the project: 30 h, Final presentation: 10 h; Implementation and thesis: Preparation before development (Problem analysis and solution design): 70 h, Solution implementation: 110 h, Tests and quality assurance: 50 h.

Recommendation

None

M

5.5 Module: Advanced Topics in Public Finance [M-WIWI-101511]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Electives (Election: between 1 and 2 items)			
T-WIWI-108711	Basics of German Company Tax Law and Tax Planning	4,5 CR	Gutekunst, Wigger
T-WIWI-102740	Public Management	4,5 CR	Wigger
Supplementary Courses (Election: between 0 and 1 items)			
T-WIWI-111304	Fundamentals of National and International Group Taxation	4,5 CR	Wigger
T-WIWI-102739	Public Revenues	4,5 CR	Wigger

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

At least one of the courses "Public Management" or "Basics of German Company Tax Law and Tax Planning" is mandatory in the module and must be successfully examined.

Competence Goal

The student

- understands the theory and politics of taxation
- has knowledge in the area of public debt.
- understands efficiency problems of public organizations.
- is able to work on fiscal problems.

Content

As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs.

In the course of the lectures within this module the students achieve knowledge in the areas of public revenues, national and international law of taxation and theory of public sector organizations.

Annotation

The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

Students who successfully passed the exam in „Public Management“ before the introduction of the module “Advanced Topics in Public Finance” in winter term 2014/15 are allowed to take both courses “Public Revenues” and “Specific Aspects in Taxation”.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Basic knowledge in the area of public finance and public management is required.

M

5.6 Module: Advanced Topics in Strategy and Management [M-WIWI-103119]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	1

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-106188	Workshop Current Topics in Strategy and Management	3 CR	Lindstädt
T-WIWI-106189	Workshop Business Wargaming – Analyzing Strategic Interactions	3 CR	Lindstädt
T-WIWI-106190	Strategy and Management Theory: Developments and “Classics”	3 CR	Lindstädt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- are able to analyze business strategies and derive recommendations using appropriate frameworks
- learn to express their position through compelling reasoning in structured discussions
- are qualified to critically examine recent research topics in the field of strategic management
- can derive own conclusions from less structured information by using interdisciplinary knowledge

Content

The module is divided into three main topics:

The students

- analyze and discuss a wide range of business strategies on the basis of collectively selected case studies.
- participate in a business wargaming workshop and analyze strategic interactions.
- write a paper about current topics in the field of strategic management theory.

Annotation

This course is admission restricted. After being admitted to one course of this module, the participation at the other courses will be guaranteed.

Every course of this module will be at least offered every second term. Thus, it will be possible to complete the module within two terms.

Recommendation

None

M

5.7 Module: Algorithm Engineering [M-INFO-100795]

Responsible: Prof. Dr. Peter Sanders
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: Informatics

Credits 5	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German/English	Level 4	Version 3
---------------------	--	---------------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-101332	Algorithm Engineering	4 CR	Sanders, Wagner
T-INFO-111856	Algorithm Engineering Pass	1 CR	Sanders, Wagner

Prerequisites

There are two partial achievements Algorithm Engineering and Algorithm Engineering Exercises. The partial achievement Algorithm Engineering Exercises must be started to be allowed to take the oral examination for Algorithm Engineering.

Competence Goal

The students acquire a systematic understanding of algorithmic problems and solution approaches in the field of Algorithm Engineering, building on existing knowledge in the subject area of algorithms. In addition, they will be able to apply learned techniques to related problems and interpret and comprehend current research topics in the field of Algorithm Engineering.

Upon successful completion of the course, the student will be able to

- Explain terms, structures, basic problem definitions, and algorithms from the lecture;
- select which algorithms and data structures are suitable for solving an algorithmic problem and, if necessary, adapt them to the requirements of a specific problem;
- Execute algorithms and data structures, analyze them mathematically precise and prove the algorithmic properties;
- Explain machine models from the lecture and analyze algorithms and data structures according to these models
- Analyze new problems from applications, reduce them to their algorithmic core and create a suitable abstract model; based on the concepts and techniques learned in the lecture, design and analyze own solutions in this model, and prove algorithmic properties in this model.

Content

- What is Algorithm Engineering, Motivation etc.
- Realistic modeling of machines and applications
- practice-oriented algorithm design
- implementation techniques
- experimental techniques
- evaluation of measurements

The above skills are taught primarily using concrete examples. In the past these were for example the following topics from the area of basic algorithms and data structures:

- linked lists without special cases
- sorting: parallel, external, superscalar,...
- priority queues (cache efficient,...)
- search trees for integer keys
- Full text indexes
- graph algorithms: minimal spanning trees (external,...), route planning

In each of these cases, the focus is on the best known practical and theoretical methods. These usually differ considerably from the methods taught in beginners' lectures.

Workload

Lecture and exercise with a combined 3 semester hours, 5 ECTS

5 ECTS correspond to about 150h of work, split into

about 45h visiting lectures and exercise or block seminar

about 25h preparation and follow-up on lectures

about 40h solving exercise tasks (programming, preparing presentation for mini seminar, etc)

about 40h exam preparation

M

5.8 Module: Algorithmic Graph Theory [M-INFO-100762]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-103588	Algorithmic Graph Theory	5 CR	Wagner

M

5.9 Module: Algorithmic Methods for Network Analysis [M-INFO-102400]

Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-104759	Algorithmic Methods for Network Analysis	5 CR	Ueckerdt, Wagner

Workload
150 h

M

5.10 Module: Algorithms for Ad-Hoc and Sensor Networks [M-INFO-102093]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 5	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-104388	Algorithms for Ad-Hoc and Sensor Networks	5 CR	Wagner

M

5.11 Module: Algorithms for Routing [M-INFO-100031]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-100002	Algorithms for Routing	5 CR	Wagner

M

5.12 Module: Algorithms for Visualization of Graphs [M-INFO-102094]

Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-104390	Algorithms for Visualization of Graphs	5 CR	Wagner

M

5.13 Module: Algorithms II [M-INFO-101173]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-102020	Algorithms II	6 CR	Sanders

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The student has an in-depth insight into the theoretical and practical aspects of algorithms and is able to identify and formally formulate algorithmic problems in various application areas. Furthermore, they know advanced algorithms and data structures from the areas of graph algorithms, algorithmic geometry, string matching, algebraic algorithms, combinatorial optimization, and external memory algorithms. They are able to independently understand algorithms they are unfamiliar with, associate them with the above areas, apply them, determine their running time, evaluate them, and select appropriate algorithms for given applications. Furthermore, the student is able to adapt existing algorithms to related problems. In addition to algorithms for concrete problems, the student knows advanced techniques of algorithmic design. This includes parameterized algorithms, approximation algorithms, online algorithms, randomized algorithms, parallel algorithms, linear programming, and algorithm engineering techniques. For given algorithms, the student is able to identify techniques used to better understand these algorithms. In addition, they are able to select appropriate techniques for a given problem and use them to design their own algorithms.

Content

This module is designed to provide students with the basic theoretical and practical aspects of algorithm design, analysis, and engineering. It teaches general methods for designing and analyzing algorithms for basic algorithmic problems, as well as the basic principles of general algorithmic methods such as approximation algorithms, linear programming, randomized algorithms, parallel algorithms, and parameterized algorithms.

Workload

Lecture with 3 semester hours + 1 semester hour exercise

6 ECTS correspond to about 180 hours

about 45h visiting the lectures

about 15h visiting the exercises

about 90h follow-up of lectures and solving the exercise sheets

about 30h preparation for the exam

M

5.14 Module: Analytics and Statistics [M-WIWI-101637]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Statistics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	4

Compulsory Elective Courses (Election:)			
T-WIWI-106341	Machine Learning 2 - Advanced Methods	4,5 CR	Zöllner
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-103123	Advanced Statistics	4,5 CR	Grothe
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

A Student

- Deepens the knowledge of descriptive and inferential statistics.
- Deals with simulation methods.
- Learns basic and advanced methods of statistical analysis of multivariate and high-dimensional data.

Content

- Deriving estimates and testing hypotheses
- Stochastic processes
- Multivariate statistics, copulas
- Dependence measures
- Dimension reduction
- High-dimensional methods
- Prediction

Annotation

The planned lectures and courses for the next three years are announced online.

Workload

The total workload for this module is approximately 270 hours.

M

5.15 Module: Application Security Lab [M-INFO-103166]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-106289	Application Security Lab	4 CR	Geiselman, Müller-Quade

M

5.16 Module: Applied Strategic Decisions [M-WIWI-101453]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Mandatory			
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Supplementary Courses (Election: between 4,5 and 5 credits)			
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course "Advanced Game Theory" is obligatory. Exception: The course "Introduction to Game Theory" was completed. Even those who have already successfully proven "Advanced Game Theory" in another master module can take the module. In this case you can choose freely from the rest of the offer. However, this choice can only be made by the examination office of the Department of Economics and Management.

Competence Goal

Students

- can model and analyze complex situations of strategic interaction using advanced game theoretic concepts;
- are provided with essential and advanced game theoretic solution concepts on a rigorous level and can apply them to understand real-life problems;
- learn about the experimental method, ranging from designing an economic experiment to data analysis.

Content

The module provides solid skills in game theory and offers a broad range of game theoretic applications. To improve the understanding of theoretical concepts, it pays attention to empirical evidence as well.

Annotation

The course *Predictive Mechanism and Market Design* is not offered each year.

Workload

The total workload for this module is approximately 270 hours. The exact distribution is made according to the credit points of the courses of the module.

Recommendation

Basic knowledge in game theory is assumed.

M

5.17 Module: Artificial Intelligence [M-WIWI-105366]

Responsible: Dr.-Ing. Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	1

Compulsory Elective Courses (Election: at least 2 items)			
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- understands the concepts behind Semantic Web and Linked Data technologies
- develops ontologies to be employed in semantic web-based applications and chooses suitable representation languages,
- is familiar with approaches in the area of knowledge representation and modelling,
- is able to transfer the methods and technologies of semantic web technologies to new application sectors,
- evaluates the potential of semantic web for new application sectors,
- understands the challenges in the areas of Data and system integration on the web is able to develop solutions.
- know the basics of machine learning, data mining and knowledge discovery
- can design, train and evaluate systems that are capable of learning
- carry out knowledge discovery projects, taking into account algorithms, representations and applications.

Content

The focus of the module is on Semantic Web Technologies as well as machine learning and data mining methods for knowledge acquisition from large databases.

The goal of the semantic web is the meaning (semantics) of data on the web for intelligent systems, e.g. in e-commerce and to make Internet portals usable. The representation of knowledge in the form of RDF and ontologies, the provision of data as Linked Data, as well as the request of data using SPARQL. In this lecture the basics of knowledge representation and processing for the corresponding technologies and application examples are presented.

The lecture "Knowledge Discovery" gives an overview of approaches of machine learning and data mining for knowledge extraction from large data sets. These are examined especially with regard to algorithms, applicability to different data representations and the use in real application scenarios.

Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.

The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.

Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Workload

The total workload for this module is approximately 270 hours.

M

5.18 Module: Automated Planning and Scheduling [M-INFO-104447]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-INFO-109085	Automated Planning and Scheduling	5 CR	Sanders

M

5.19 Module: Automated Visual Inspection and Image Processing [M-INFO-100826]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101363	Automated Visual Inspection and Image Processing	6 CR	Beyerer

M

5.20 Module: Biologically Inspired Robots [M-INFO-100814]

Responsible: Prof. Dr.-Ing. Rüdiger Dillmann

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101351	Biologically Inspired Robots	3 CR	Rönnau

M

5.21 Module: Biometric Systems for Person Identification [M-INFO-102968]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-105948	Biometric Systems for Person Identification	3 CR	Stiefelhagen

M

5.22 Module: Business & Service Engineering [M-WIWI-101410]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student should

- learn to develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- learn to restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.
- improve his statistics skills and apply them to appropriate cases
- learn to elaborate solutions in a team

Content

This module addresses the challenges of creating new kinds of products, processes, services, and markets from a service perspective in the context of new developed information and communication technologies and the globalization process. The module describes service competition as a business strategy in the long term that leads to the design of business processes, business models, forms of organization, markets, and competition. This will be shown by actual examples from personalized services, recommender services and social networks.

Annotation

All practical Seminars offered at the IM can be chosen for *Special Topics in Information Systems*. Please update yourself on www.iism.kit.edu/im/lehre.

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.23 Module: Collective Decision Making [M-WIWI-101504]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	4

Compulsory Elective Courses (Election:)			
T-WIWI-102740	Public Management	4,5 CR	Wigger
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- are able to model and assess problems in public economics and to analyze them with respect to positive and normative aspects,
- understand individual incentives and social outcomes of different institutional designs,
- are familiar with the functioning and design of democratic elections and can analyze them with respect to their individual incentives.

Content

The focus of the module is on mechanisms for public decision making including voting and the aggregation of preferences and judgements.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.24 Module: Computational Cartography [M-INFO-100754]

Responsible: Dr. Martin Nöllenburg
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-101291	Computational Cartography	5 CR	Nöllenburg, Wagner

M**5.25 Module: Computational Complexity Theory, with a View Towards Cryptography [M-INFO-101575]****Responsible:** Prof. Dr. Jörn Müller-Quade**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-103014	Computational Complexity Theory, with a View Towards Cryptography	6 CR	Hofheinz, Müller-Quade

M

5.26 Module: Computational Geometry [M-INFO-102110]

Responsible: TT-Prof. Dr. Thomas Bläsius
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German	4	2

Mandatory			
T-INFO-104429	Computational Geometry	6 CR	Wagner

M

5.27 Module: Computer Architecture [M-INFO-100818]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101355	Computer Architecture	6 CR	Karl

M

5.28 Module: Computer Graphics [M-INFO-100856]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101393	Computer Graphics	6 CR	Dachsbacher
T-INFO-104313	Computer Graphics Pass	0 CR	Dachsbacher

M

5.29 Module: Context Sensitive Systems [M-INFO-100728]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-INFO-107499	Context Sensitive Systems	5 CR	Beigl

M

5.30 Module: Critical Digital Infrastructures [M-WIWI-104403]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	4

Mandatory			
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
Compulsory Elective Courses (Election: at most 4,5 credits)			
T-WIWI-112690	Cooperative Autonomous Vehicles	4,5 CR	Vinel
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-110144	Emerging Trends in Digital Health	4,5 CR	Sunyaev
T-WIWI-110143	Emerging Trends in Internet Technologies	4,5 CR	Sunyaev
T-WIWI-109249	Sociotechnical Information Systems Development	4,5 CR	Sunyaev
T-WIWI-111126	Advanced Lab Blockchain Hackathon (Master)	4,5 CR	Sunyaev
T-WIWI-113026	Trustworthy Emerging Technologies	4,5 CR	Sunyaev

Competence Certificate

The assessment is carried out as partial exams according to § 4 paragraph 2 Nr. 1 – Nr. 3 SPO of the examination regulation of the core course and further single courses of this module, whose sum of credits must meet 9 credits.

The learning control is described in each course. The overall score of the module is made up of the sub-scores weighted with creditpoints and is cut off after the first comma point.

Prerequisites

None

Competence Goal

The students ...

- have foundational knowledge about the design and operation of critical digital infrastructures
- have in-depth methodological knowledge in design science research and related scientific domains
- can distinguish between the challenges and opportunities of critical digital infrastructures in different domains
- can evaluate and improve sociotechnical systems
- combine theoretical and practical contents of the courses in the module to solve existing problems in the domain of critical digital infrastructures

Content

Critical digital infrastructures are sociotechnical systems comprising essential software components and information systems with pivotal impact on individuals, organizations, governments, economies, and society. Critical information infrastructures require careful design, development, and evaluation to ensure reliable, secure, and purposeful operation. This module features a strong focus on different subject areas, including, but not limited to, internet technologies, health care, and information privacy. The lectures in the module introduce students to a domain relevant to critical digital infrastructures and the labs allow to gain hands-on experience in this interesting domain.

Workload

30 hours per ECTS

Total workload for 9 ECTS: approx. 270 hours

The exact allocation is made according to the credit points of the courses.

Recommendation

The courses in the module may be held in English. Participants should be well versed in written and spoken English.

The courses can be visited independently. Participants can start the module in the winter as well as in the summer term.

Programming skills may be required in some courses.

Experience in writing scientific papers is helpful but not required.

M

5.31 Module: Cross-Functional Management Accounting [M-WIWI-101510]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	11

Mandatory			
T-WIWI-102885	Advanced Management Accounting	4,5 CR	Wouters
Supplementary Courses (Election: 4,5 credits)			
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102835	Marketing Strategy Business Game	1,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-108651	Extraordinary Additional Course in the Module Cross-Functional Management Accounting	4,5 CR	Wouters

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course "Advanced Management Accounting" is compulsory.

The additional courses can only be chosen after the compulsory course has been completed successfully.

Competence Goal

Students will be able to apply advanced management accounting methods to managerial decision-making problems in marketing, finance, organization and strategy.

Content

The module includes a course on several advanced management accounting methods that can be used for various decisions in operations and innovation management. By selecting another course, each student looks in more detail at one interface between management accounting a particular field in management, namely marketing, finance, or organization and strategy.

Annotation

The module "Cross-functional Management Accounting" always includes the compulsory course "Advanced Management Accounting." Students look at the interface between management accounting and another field in management. Students build the module by adding a course from the specified list. Students can also suggest another suitable course for this module for evaluation by the coordinator.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.32 Module: Cryptographic Voting Schemes [M-INFO-100742]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101279	Cryptographic Voting Schemes	3 CR	Müller-Quade

M

5.33 Module: Curves and Surfaces for Geometric Design [M-INFO-101231]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	English	4	1

Mandatory			
T-INFO-102041	Curves and Surfaces for Geometric Design II	5 CR	Prautzsch

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

Students of this course are knowledgeable about Bézier and B-spline techniques for surfaces and are able to solve typical problems arising in surface design.

Content

Bézier- and B-spline techniques for bi- and multivariate splines, polar forms, de Casteljau algorithm, smooth and geometric smooth joints, subdivision, convexity, various conversions between various surface presentations, patch rendering, intersection algorithms, interpolation and approximation, Powell-Sabin and Clough-Tocher elements, splines over triangulations, Piper's construction, box splines, B-patches and similar topics

Workload

approx. 150h thereof

30h for attending the lecture

30h for post-processing

15h for attending the exercises

45h for solving the exercises

30h for exam preparation

M

5.34 Module: Curves and Surfaces in CAD I [M-INFO-100837]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	English	4	1

Mandatory			
T-INFO-101374	Curves and Surfaces in CAD I	5 CR	Prautzsch

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

Students of this course are knowledgeable about Bézier and B-spline techniques for curves and tensor product surfaces and are able to solve typical problems arising in curve design.

Content

Bézier- and B-spline techniques, polar forms, de Casteljau algorithm, de Boor algorithm, Oslo algorithm, smooth joints (Stark construction), subdivision, variation diminishing property, convexity, various conversions between various curve presentations, curve rendering, intersection algorithms, interpolation and approximation, tensor product splines, T-splines and similar topics.

Workload

approx. 150h thereof:

30h for attending the lecture

30h for post-processing

15h for attending the exercises

45h for solving the exercises

30h for exam preparation

M

5.35 Module: Curves and Surfaces in CAD III [M-INFO-101213]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-102006	Curves and Surfaces in CAD II	5 CR	Prautzsch

M

5.36 Module: Data and Storage Management [M-INFO-100739]

Responsible: Prof. Dr. Bernhard Neumair
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101276	Data and Storage Management	4 CR	Neumair

M

5.37 Module: Data Privacy: From Anonymization to Access Control [M-INFO-104045]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-108377	Data Privacy: From Anonymization to Access Control	3 CR	Böhm

M

5.38 Module: Data Science [M-INFO-106505]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
8	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-INFO-113124	Data Science	8 CR	Böhm

M

5.39 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Compulsory Elective Courses (Election:)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-106187	Business Data Strategy	4,5 CR	Weinhardt
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-110918	Introduction to Bayesian Statistics for Analyzing Data	4,5 CR	Scheibehenne
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-106207	Practical Seminar: Data-Driven Information Systems	4,5 CR	Mädche, Satzger, Setzer, Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites

None.

Competence Goal

The student

- understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems and is capable of comparing and assessing strategic alternatives
- has the core skills to design, model, and control complex, inter-organisational analytical, processes, including various business functions as well as customers and markets
- understands the usage of performance indicators for a variety of controlling and management issues and is able to define models for generating the relevant performance indicators under considerations of data availability
- distinguishes different analytics methods and concepts and learn when to apply to better understand and anticipate business relationships and developments of industrial and in particular service companies to derive fact- and data- founded managerial actions and strategies.
- knows how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in decision support or business intelligence systems and analytical processes as a whole.

Content

The amount of business-related data available in modern enterprise information systems grows exponentially, and the various data sources are more and more integrated, transformed, and analyzed jointly to gain valuable business insights, pro-actively control and manage business processes, to leverage planning and decision making, and to provide appropriate, potentially novel services to customers based on relationships and developments observed in the data.

Also, data sources are more and more connected and single business unit that used to operate on separate data pools are now becoming highly integrated, providing tremendous business opportunities but also challenges regarding how the data should be represented, integrated, preprocessed, transformed, and finally used in analytics planning and decision processes.

The courses of this module equip the students with core skills to understand the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems. Students will be capable to designing, comparing, and evaluating strategic alternatives. Also, students will learn how to design, model, and control complex analytical processes, including various business functions of industrial and service companies including customers and markets. Students learn core skills to understand fundamental strategies for integrating analytic models and operative controlling mechanisms while ensuring the technical feasibility of the resulting information systems..

Furthermore, the student can distinguish different methods and concepts in the realm of data science and learns when to apply. She/he will know the means of characterizing and analyzing heterogeneous, high-dimensional data available data in data warehouses and external data sources to gain additional insights valuable for enterprise planning and decision making. Also, the students know how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in business information and business intelligence systems.

The module offers the opportunity to apply and deepen this knowledge in a seminar and hands-on tutorials that are offered with all lectures.

Texteintrag

Annotation

The course „Business Data Strategy“ can be chosen from winter term 2016 on.

Recommendation

Basic knowledge of Information Management, Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.

M

5.40 Module: Data Science: Data-Driven User Modeling [M-WIWI-103118]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-108765	Practical Seminar: Advanced Analytics	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites

None

Competence Goal

Students of this module

- learn methods for planning empirical studies, in particular laboratory experiments,
- acquire theoretical knowledge and practical skills in analysing empirical data,
- familiarize with different ways of modelling user behaviour, are able to critically discuss, and to evaluate them

Content

Understanding and supporting user interactions with applications better plays an increasingly large role in the design of business applications. This applies both to interfaces for customers and to internal information systems. The data that is generated during user interactions can be channelled straight into business processes, for instance by analysing and decomposing purchase decisions, and by feeding this data into product design processes.

The Crowd Analytics section considers the analysis of data from online platforms, particularly of those following crowd- or peer-to-peer based business models. This includes platforms like Airbnb, Kickstarter and Amazon Mechanical Turk.

Theoretical models of user (decision) behaviour help analyzing the empirically observed user behaviour in a systematic fashion. Testing these models and their predictions in controlled experiments (primarily in the lab) in turn helps refine theory and to generate practically relevant design recommendations. Analyses are carried out using advanced analytic methods.

Students learn fundamental theoretical models for user behaviour in systems and apply them to cases. Students are also taught methods and skills for conceptualizing and planning empirical studies and for analyzing the resulting data.

Recommendation

Basic knowledge of Information Management, Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.

M

5.41 Module: Data Science: Evidence-based Marketing [M-WIWI-101647]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-103139	Marketing Analytics	4,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

Keine.

Competence Goal

Students

- possess advanced knowledge of relevant market research contents
- know many different qualitative and quantitative methods for measuring customer behavior, preparation of strategic decisions, making causal deductions, usage of social media data and sales forecasting
- possess the statistical skills required for working in marketing research

Content

This module provides in-depth knowledge of relevant quantitative and qualitative methods used in market research. Students can attend the following courses:

- The course "Market Research" provides contents of practical relevance for measuring customer attitudes and customer behavior. The participants learn using statistical methods for strategic decision-making in marketing. Students who are interested in writing their master thesis at the Marketing & Sales Research Group are required to take this course.
- The course "Marketing Analytics" is based on "Market Research" and teaches advanced statistical methods for analyzing relevant marketing and market research questions. Please note that a successful completion of "Market Research" is a prerequisite for the completion of "Marketing Analytics".

Workload

The total workload for this module is approximately 270 hours.

Recommendation

None

M

5.42 Module: Data Science: Intelligent, Adaptive, and Learning Information Services [M-WIWI-105661]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-109921	Advanced Machine Learning	4,5 CR	Geyer-Schulz, Nazemi
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-111267	Intelligent Agent Architectures	4,5 CR	Geyer-Schulz
T-WIWI-110915	Intelligent Agents and Decision Theory	4,5 CR	Geyer-Schulz
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- models, analyzes and optimizes the structure and dynamics of complex economic changes.
- designs and develops intelligent, adaptive or learning agents as essential elements of information services.
- knows the essential learning methods for this and can apply them (also on modern architectures) in a targeted manner.
- develops and implements personalized services, especially in the area of recommender systems.
- develops solutions in teams.

Content

The Intelligent Architectures course addresses how to design modern agent-based systems. The focus here is on software architecture and design patterns relevant to learning systems. In addition, important machine learning methods that complete the intelligent system are discussed. Examples of systems presented include key-map architectures and genetic methods.

The impact of management decisions in complex systems is considered in Business Dynamics. Understanding, modeling, and simulating complex systems enables analysis, purposeful design, and optimization of markets, business processes, regulations, and entire enterprises.

Special problems of intelligent systems are covered in Personalization and Services and Recommendersystems. The content includes approaches and methods to design user-oriented services. The measurement and monitoring of service systems is discussed, the design of personalized offers is discussed and the generation of recommendations based on collected data from products and customers is shown. The importance of user modeling and recognition is addressed, as well as data security and privacy.

Annotation

The module replaces from summer semester 2021 M-WIWI-101470 "Data Science: Advanced CRM".

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.43 Module: Database as a Service [M-INFO-105724]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-111400	Database as a Service	5 CR	Böhm

Competence Goal

At the end of the lecture the participants shall be able to explain what is specific to database functionality in the cloud, and what the advantages and disadvantages are. They shall have understood how cloud-enabled database technology differs from conventional technology of this kind, but also where the commonalities reside. Participants shall be able to explain the core ideas and approaches that define cloud-enabled database technology and discern them from each other.

Content

We currently witness owners of large data sets, be they big organizations, be they startups, to rent database functionality to a significant extent, rather than providing it themselves. The total costs of ownership just happen to be much lower in many cases. This lecture features database technology that facilitates exactly this. This concerns you if you want to make use of such services at some time in the future, but is also of interest if you will have to do with 'conventional' database technology.

According to my perspective, the following features of "cloud-enabled" database technology are key, and the lecture will cover them:

- Fully automated tuning of individual database – the option to interact with a database administrator does not exist any more!
- Approximate query results suddenly are attractive. The monetary costs of evaluating a query are commensurate with the necessary effort – on the other side, high fixed costs that typically occur with owner-operated databases do not incur any more.
- Multi-tenancy. I.e., how to ensure tenants that are completely independent from each other to have a DBMS for their applications available, not only without interfering with each other, but also with performance guarantees for each tenant individually?
- Secure storage. Administering data and evaluating queries shall take place in the cloud. At the same time, the cloud provider must not be allowed to see the data. Both objectives in full beauty currently are incompatible – we will discuss possible compromises.

In this setting, conventional, established concepts like distributed transactions and distributed data management and query processing play an important role as well, and the lecture will address them equally.

Literature

Will be made available in the lecture. The following books cover foundations and specifics of at least some chapters of the lecture:

- Database Systems Implementation, by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom.
- Concurrency Control and Recovery in Database Systems, by Philip A. Bernstein, Vassos Hadzilacos, and Nathan Goodman.
- Principles of Distributed Database Systems Tamer Özsu, Patrick Valduriez

M

5.44 Module: Decentralized Systems: Fundamentals, Modeling, and Applications [M-INFO-105334]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	English	4	3

Mandatory			
T-INFO-110820	Decentralized Systems: Fundamentals, Modeling, and Applications	6 CR	Hartenstein

Competence Goal**1. Fundamentals & Modeling**

1. The student is able to recognize and distinguish distributed, federated, and decentralized systems.
2. The student understands consensus, consistency and coordination within the context of networked and decentralized systems.
3. The student understands the concept of Sybil attacks.
4. The student is familiar with decentralized algorithms for leader election and mutual exclusion for execution contexts with various guarantees.
5. The student understands the formally proven limits of fault tolerance and their underlying assumptions. This includes an understanding of synchronous and asynchronous network models which underpin the respective proofs. The student also understands several models for fault tolerance, notably silent and noisy crash as well as byzantine fault tolerance within the context of decentralized and distributed systems.
6. The student has a basic understanding of state machine replication.
7. The student knows various models for and levels of consistency.

2. Applications

1. The student understands conflict-free replicated data types and their use in decentralized systems like Matrix.
2. The student has a fundamental understanding of blockchain-based cryptocurrencies (e.g. Bitcoin/Ethereum), Payment Channels, and decentralized communication systems like Matrix.
3. The student understands trust relations in distributed and decentralized systems and applications.
4. The student is able to understand how the previously introduced theoretical foundations relate to networked and decentralized systems in practice.
5. The student understands concepts of decentralized storage systems.

Content

Decentralized Systems (like blockchain-based systems) represent distributed systems that are controlled by multiple parties who make their own independent decisions. In this course, we cover fundamental theoretical aspects as well as up-to-date decentralized systems and connect theory with current practice. We thereby address fault tolerance, security & trust, as well as performance aspects at the example of applications like Bitcoin, Ethereum Smart Contracts, and Matrix.

The lecture covers the following topics:

- Fundamentals
 - o Peer-to-Peer Overlay Networks, Sybil and Eclipse Attacks
 - o Formalization of decentralized systems, including models for their computation, communication, faults, and timing.
 - o Leader election and mutual exclusion in decentralized systems based on different models for node identities and timing.
 - o Byzantine consensus in synchronous and asynchronous settings, including Bracha's fundamental algorithm for reliable broadcast, Practical Byzantine Fault Tolerant consensus, and the fundamental limits.
 - o Consistency models and protocols, up to and including Conflict-Free Replicated Data Types.
- Applications
 - o Matrix
 - o Distributed Ledgers, Blockchain, and Bitcoin
 - o Payment Channel Networks
 - o Ethereum as a smart contract platform
 - o Decentralized storage systems

Workload

1. Attendance time (Course, exercise, etc.)

Lecture: 3 SWS: 3,0h x 15 = 45h

Exercise: 1 SWS: 1,0h x 15 = 15h

2. Self-study (e.g. independent review of course material, work on homework assignments)

Weekly preparation and follow-up of the lecture: 15 x 1h x 3 = 45h

Weekly preparation and follow-up of the exercise: 15 x 2h = 30h

3. Preparation for the exam: 45 h

$\Sigma = 180h = 6$ ECTS

Recommendation

Prior knowledge in Foundations of IT-Security and Computer Networks is recommended.

M

5.45 Module: Deep Learning and Neural Networks [M-INFO-104460]

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-109124	Deep Learning and Neural Networks	6 CR	Waibel

M

5.46 Module: Deep Learning for Computer Vision I: Basics [M-INFO-105753]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-INFO-111491	Deep Learning for Computer Vision I: Basics	3 CR	Stiefelhagen

Competence Goal

Students should be able to grasp the underlying concepts in the field of deep learning and its various applications.

- Understand the theoretical basis of deep learning
- Understand the Convolutional Neural Networks (CNN)
- Develop basis for the concepts and algorithms used in building and training the CNNs.
- Able to apply deep learning in different computer vision applications.

Content

In recent years tremendous progress has been made in analysing and understanding image and video content. The dominant approach in Computer Vision today are deep learning approaches, in particular the usage of Convolutional Neural Networks.

The lecture introduces the basics, as well as advanced aspects of deep learning methods and their application for a number of computer vision tasks. The following topics will be addressed in the lecture:

- Introduction to Deep Learning
- Convolutional Neural Networks (CNN): Background
- CNNs: basic architectures and learning algorithms
- Object Recognition with CNN
- Image Segmentation with CNN
- Recurrent Neural Networks
- Generating image descriptions (Image Captioning)
- Automatic question answering (Visual Question Answering)
- Generative Adversarial Networks (GAN) and their applications
- Deep Learning platforms and tools

Annotation

The course is partially given in German and English.

M**5.47 Module: Deep Learning for Computer Vision II: Advanced Topics [M-INFO-105755]****Responsible:** Prof. Dr.-Ing. Rainer Stiefelhagen**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German/English	4	3

Mandatory			
T-INFO-111494	Deep Learning for Computer Vision II: Advanced Topics	3 CR	Stiefelhagen

M

5.48 Module: Deployment of Database Systems [M-INFO-100780]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101317	Deployment of Database Systems	5 CR	Böhm

M

5.49 Module: Design and Architectures of Embedded Systems (ES2) [M-INFO-100831]

Responsible: Prof. Dr.-Ing. Jörg Henkel

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101368	Design and Architectures of Embedded Systems (ES2)	3 CR	Henkel

M

5.50 Module: Design Principles for Interactive Real-Time Systems [M-INFO-100753]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101290	Design Principles for Interactive Real-Time Systems	3 CR	Beyerer

M

5.51 Module: Designing Interactive Information Systems [M-WIWI-104080]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	4

Compulsory Elective Courses (Election: at least 1 item)			
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	Mädche
Supplementary Courses (Election: at most 1 item)			
T-WIWI-111109	KD ² Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites

In this module, the courses "Designing Interactive Systems" or "Engineering Interactive Systems" must be compulsorily taken.

Competence Goal

The student

- has a comprehensive understanding of conceptual and theoretical foundations of interactive systems
- knows design processes for interactive systems
- is aware of the most important techniques and tools for designing interactive systems and knows how to apply them to real-world problems
- is able to apply design principles for the design of most important classes of interactive systems,
- creates new solutions of interactive systems teams

Content

Advanced information and communication technologies make interactive systems ever-present in the users' private and business life. They are an integral part of smartphones, devices in the smart home, mobility vehicles as well as at the working place in production and administration (e.g. in the form of dashboards).

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This module focuses on design processes and principles for interactive systems. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for the design of interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

Each lecture in the module is accompanied with a capstone project that is carried out with an industry partner.

Annotation

See <http://issd.iism.kit.edu/305.php> for further information.

Workload

The total workload for this module is approximately 270 hours.

M

5.52 Module: Development of Business Information Systems [M-WIWI-101477]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	6

Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
Supplementary Courses (Election: at most 1 item)			
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-112599	Management of IT-Projects	4,5 CR	Schätzle
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-112914	Advanced Lab Realization of Innovative Services (Master)	4,5 CR	Oberweis
T-WIWI-102669	Strategic Management of Information Technology	4,5 CR	Wolf

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course *Datenbanksysteme und XML* or the course *Software Quality Management* must be examined.

Competence Goal

Students

- describe the structure and the components of enterprise information systems,
- explain functionality and architecture of the enterprise information system components,
- choose and apply relevant components to solve given problems in a methodic approach,
- describe roles, activities and products in the field of software engineering management,
- compare process and quality models and choose an appropriate model in a concrete situation,
- write scientific theses in the areas of enterprise information system components and software engineering management and find own solutions for given problems and research questions.

Content

An enterprise information system contains the complete application software to store and process data and information in an organisation including design and management of databases, workflow management and strategic information planning.

Due to global networking and geographical distribution of enterprises as well as the increasing acceptance of eCommerce the application of distributed information systems becomes particular important.

This module teaches concepts and methods for design and application of information systems.

Annotation

The course T-WIWI-102759 "Requirements Analysis and Requirements Management" will no longer be offered in the module as of winter semester 2018/2019.

Workload

See German version

M

5.53 Module: Digital Accessibility and Assistive Technologies [M-INFO-105882]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-INFO-111830	Digital Accessibility and Assistive Technologies	3 CR	Stiefelhagen

Content

Digital accessibility is a topic that affects us all. Accessing information digitally, from childhood to old age. Assistive technologies, such as smartphones, tablets, smartwatches, wearables in general have become a part of our everyday life. Exactly these things should be operable and usable by all people. Regardless of any barriers.

But what are the details behind this? What are the rights and foundations for this? What all has to be done to be "barrier-free"?

This can all be best illustrated by the example of "visual impairment".

According to the World Health Organization, there are approximately 285 million people with visual impairments worldwide, including approximately 39 million people who are blind. The partial or complete loss of vision significantly restricts blind and visually impaired people in their working and social lives. It is difficult for blind and visually impaired people to orient themselves and move around in public spaces without assistance. The reasons for this are problems in perceiving obstacles and landmarks as well as the resulting fear of accidents and orientation difficulties. Other problems in everyday life are: reading texts, recognizing banknotes, food, clothes or finding objects in the household.

For support, blind and visually impaired people can already rely on a number of technical aids. For example, digitized texts can be made accessible through speech output or Braille output devices. There are also various devices made specifically for the blind. The most important aid for improving mobility is by far the cane for the blind. In recent years, some electronic aids for obstacle detection or orientation support have also been developed, but these offer only very limited functionality at a relatively high price and are therefore rather rarely in use.

The lecture gives an overview of IT-based Assistive Technologies (AT) by example and includes the following topics:

- Legal basics
- Basics of visual impairments, their causes and effects
- Existing assistive technologies for different fields of application
- AT for information access
- Accessible software development
- Accessible design of websites
- Accessible documents
- Use of machine learning methods
- Feedback systems and their basics
- Insights into current research topics around the topic of digital accessibility

For the latest information, visit <http://cvhci.anthropomatik.kit.edu/>

M

5.54 Module: Digital Marketing [M-WIWI-106258]

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	1

Mandatory			
T-WIWI-112693	Digital Marketing	4,5 CR	Kupfer
Supplementary Courses (Election: at most 1 item)			
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Klarmann, Konhäuser
T-WIWI-111099	Judgement and Decision Making	4,5 CR	Scheibehenne
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-112711	Media Management	4,5 CR	Kupfer
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann

Competence Certificate

The assessment is carried out as partial exams of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course, weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know current fundamental principles and latest trends in the field of digital marketing
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- are able to critically discuss and question theoretical concepts and current practices in marketing
- have theoretical knowledge that is fundamental for writing a master thesis in the field of marketing
- have gained insight into scientific research that prepares them to independently write a master's thesis
- have the theoretical knowledge and skills necessary to work in or collaborate with the marketing department of a company

Content

The aim of this module is to deepen central marketing contents in different areas.

Workload

Total effort for 9 credit points: approx. 270 hours.

The exact distribution is done according to the credit points of the courses of the module.

M

5.55 Module: Digital Service Systems in Industry [M-WIWI-102808]

Responsible: Prof. Dr. Wolf Fichtner
Prof. Dr. Stefan Nickel

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-102872	Challenges in Supply Chain Management	4,5 CR	Mohr
T-WIWI-107043	Liberalised Power Markets	5,5 CR	Fichtner
T-WIWI-106200	Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-106563	Practical Seminar Digital Service Systems	4,5 CR	Mädche, Satzger
T-WIWI-102641	Service Innovation	4,5 CR	Satzger

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal

Prerequisites

This module can only be assigned as an elective module.

Competence Goal

Students

- understand the basics of the management of digital services applied on an industrial context
- gain an industry-specific insight into the importance and most relevant characteristics of information systems as key components of the digitalization of business processes, products and services
- are able to transfer and apply the models and methods introduced on practical scenarios and simulations.
- understand the control and optimization methods in the sector of service management and are able to apply them properly.

Content

This module aims at deepening the fundamental knowledge of digital service management in the industrial context. Various mechanisms and methods to shape and control connected digital service systems in different industries are discussed and demonstrated with real life application cases.

Annotation

This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M 5.56 Module: Distributed Computing [M-INFO-100761]

Responsible: Prof. Dr. Achim Streit
Organisation: KIT Department of Informatics
Part of: Informatics

Credits 4	Grading scale Grade to a tenth	Recurrence Each winter term	Duration 1 term	Language English	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	----------------------------	-------------------	---------------------

Mandatory			
T-INFO-101298	Distributed Computing	4 CR	Streit

Competence Certificate
 See partial achievements (Teilleistung)

Prerequisites
 See partial achievements (Teilleistung)

Competence Goal
 Students understand the basic concepts of distributed systems, in particular Grid and Cloud Computing as well as the management and analysis of big and distributed data. They apply underlying paradigms and services to given examples. Students analyze methods and technologies of Grid and Cloud Computing as well as distributed data management, which are suitable for use in everyday and industrial application areas or which are used today by Google, Facebook, Amazon, etc. For this purpose, students will compare web/grid services, elementary grid functionalities, data lifecycles, metadata, archiving, cloud service types (IaaS, SaaS, PaaS) and public/private clouds using real-world examples.

Content
 The lecture introduces the world of distributed computing with a focus on fundamentals and technologies from Grid and Cloud Computing as well as the handling of Big Data. The lecture combines theory and application with the help of relevant examples from science and industry.

First, an introduction to the main characteristics of distributed systems is given. Then the topic of Grid Computing is discussed in more detail and the close relationship between Grid computing and distributed data management is illustrated using the example of the WLCG, the infrastructure for distributing, storing and analyzing data from the particle accelerator at CERN.

Subsequently, the topic of cloud computing is discussed and compared with the preceding. After the definition of basic terms and concepts, virtualization is introduced as one of the key technologies of Cloud Computing; finally, common architectures, services and components in the Cloud context are discussed using examples and in general.

Next, common methods for authorization and authentication in distributed environments will be discussed. The lecture includes the description of the basics of Authentication and Authorization Infrastructures (AAI) as well as different technologies, for example certificate- or token-based procedures.

In a further block of topics, concepts for the management and analysis of large or distributed data are presented. In this context tools and frameworks, as well as the lifecycle of data, its metadata and data storage are explained.

- Workload**
 2 SWS = 120 h per semester
- 30 h in the weekly lecture during the semester
 - 90 h post-processing of lectures and self-learning of the content due to its complexity

M

5.57 Module: Econometrics and Statistics I [M-WIWI-101638]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Statistics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	5

Mandatory			
T-WIWI-111388	Applied Econometrics	4,5 CR	Schienle
Supplementary Courses (Election: between 4,5 and 5 credits)			
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course "Applied Econometrics" [2520020] is compulsory and must be examined.

Competence Goal

The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data. He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

Content

The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the art data analysis.

Workload

The total workload for this module is approximately 270 hours.

M

5.58 Module: Econometrics and Statistics II [M-WIWI-101639]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Statistics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	4

Election notes

+++++

This module will not count towards the degree until the module "Econometrics and Statistics I" has also been successfully completed. If the module "Econometrics and Statistics I" is booked out to the additional examinations, the "Econometrics and Statistics II" module loses its curricular validity/valuation for the degree.

+++++

Compulsory Elective Courses (Election: between 9 and 10 credits)			
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-103128	Portfolio and Asset Liability Management	4,5 CR	Safarian
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-103129	Stochastic Calculus and Finance	4,5 CR	Safarian
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

This module can only be passed if the module "Econometrics and Statistics I" has been finished successfully before.

Competence Goal

The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data. He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

Content

This module builds on prerequisites acquired in Module "Econometrics and Statistics I". The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the-art data analysis.

Workload

The total workload for this module is approximately 270 hours.

M

5.59 Module: Economic Theory and its Application in Finance [M-WIWI-101502]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: 1 item)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Supplementary Courses (Election:)			
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

One of the courses T-WIWI-102861 "Advanced Game Theory" and T-WIWI-102609 "Advanced Topics in Economic Theory" is compulsory.

Competence Goal

The students

- have learnt the methods of formal economic modeling, particularly of General Equilibrium Theory and contract theory
- will be able to apply these methods to the topics in Finance, specifically the areas of financial markets and institutions and corporate finance
- have gained many useful insights into the relationship between firms and investors and the functioning of financial markets

Content

The mandatory course "Advanced Topics in Economic Theory" is devoted in equal parts to General Equilibrium Theory and to contract theory. The course "Asset Pricing" will apply techniques of General Equilibrium Theory to valuation of financial assets. The courses "Corporate Financial Policy" and "Finanzintermediation" will apply the techniques of contract theory to issues of corporate finance and financial institutions.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.60 Module: eEnergy: Markets, Services and Systems [M-WIWI-103720]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None.

Competence Goal

The student

- is aware of design options for energy and especially electricity markets and can derive implications for the market results from the market design,
- knows about current trends regarding the Smart Grid and understands affiliated modelling approaches,
- can evaluate business models of electricity grids according to the regulation regime
- is prepared for scientific contributions in the field of energy system analysis.

Content

The module conveys scientific and practical knowledge to analyse energy markets and according business models. To do so the scientific discussion on energy market designs is evaluated and analysed. Different energy market models are presented and their design implications are evaluated. Furthermore, the electricity system is analysed with regards to being a network industry and resulting regulation and business models are discussed. Besides these traditional areas of energy economics we will look at methods and models of digitalisation in the energy sector.

Annotation

The lecture Smart Grid Applications will be available starting in the winter term 2018/19.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.61 Module: Electronic Markets [M-WIWI-101409]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	8

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
T-WIWI-105946	Price Management	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-113147	Telecommunications and Internet – Economics and Policy	4,5 CR	Mitusch

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- knows coordination and motivation methods and analyzes them regarding their efficiency,
- classifies markets and describes the roles of the participants in a formal way,
- knows the conditions for market failure and knows and develops countermeasures,
- knows institutions and market mechanisms, their fundamental theories and empirical research results,
- knows the design criteria of market mechanisms and a systematical approach for creating new markets,
- models, analyzes and optimizes the structure and dynamics of complex business applications.

Content

What are the conditions that make electronic markets develop, and how can one analyze and optimize such markets?

In this module, the selection of the type of organization as an optimization of transaction costs is treated. Afterwards, the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure are described. Finally, motivational issues like bounded rationality and information asymmetries (private information and moral hazard), as well as the development of incentive schemes, are presented. Regarding the market design, especially the interdependencies of market organization, market mechanisms, institutions and products are described, and theoretical foundations are lectured.

Electronic markets are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics, such markets can be modelled. Simulations of complex systems allow the analysis and optimization of markets, business processes, policies, and organizations.

Topics include

- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.62 Module: Empirical Software Engineering [M-INFO-100798]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101335	Empirical Software Engineering	4 CR	Gerking

M

5.63 Module: Energy Economics and Energy Markets [M-WIWI-101451]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 8
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-WIWI-107043	Liberalised Power Markets	5,5 CR	Fichtner
Supplementary Courses (Election: at least 6 credits)			
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-112151	Energy Trading and Risk Management	3,5 CR	N.N.
T-WIWI-108016	Simulation Game in Energy Economics	3,5 CR	Genoese
T-WIWI-107446	Quantitative Methods in Energy Economics	3,5 CR	Plötz
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitsch

Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The lecture Liberalised Power Markets has to be examined.

Competence Goal

The student

- gains detailed knowledge about the new requirements of liberalised energy markets,
- describes the planning tasks on the different energy markets,
- knows solution approaches to respective planning tasks.

Content

Liberalised Power Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power

Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management

Simulation Game in Energy Economics: Simulation of the German electricity system

Workload

The total workload for this module is approximately 270 hours.

Recommendation

The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.

M

5.64 Module: Energy Economics and Technology [M-WIWI-101452]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102793	Efficient Energy Systems and Electric Mobility	3,5 CR	Jochem
T-WIWI-102650	Energy and Environment	4,5 CR	Karl
T-WIWI-113073	Machine Learning and Optimization in Energy Systems	3,5 CR	Fichtner
T-WIWI-107464	Smart Energy Infrastructure	5,5 CR	Ardone, Pustisek
T-WIWI-102695	Heat Economy	3,5 CR	Fichtner

Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- gains detailed knowledge about present and future energy supply technologies (focus on final energy carriers electricity and heat),
- knows the techno-economic characteristics of plants for energy provision, for energy transport as well as for energy distribution and demand,
- is able to assess the environmental impact of these technologies.

Content

Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions

Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics

Energy and Environment: emission factors, emission reduction measures, environmental impact

Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.65 Module: Energy Informatics 1 [M-INFO-101885]

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-INFO-103582	Energy Informatics 1	5 CR	Hagenmeyer
T-INFO-110356	Energy Informatics 1 - Preliminary Work	0 CR	Hagenmeyer

M

5.66 Module: Energy Informatics 2 [M-INFO-103044]

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	4	3

Mandatory			
T-INFO-106059	Energy Informatics 2	5 CR	Hagenmeyer

M

5.67 Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	12

Mandatory part (Election: 1 item)			
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-102833	Entrepreneurial Leadership & Innovation Management	3 CR	Terzidis
T-WIWI-113151	Entrepreneurship Seasonal School	3 CR	Terzidis
T-WIWI-102865	Business Planning	3 CR	Terzidis
T-WIWI-110374	Firm creation in IT security	3 CR	Terzidis
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-109064	Joint Entrepreneurship Summer School	6 CR	Terzidis
T-WIWI-111561	Startup Experience	6 CR	Terzidis
Supplementary Courses (Election: between 0 and 1 items)			
T-WIWI-102894	Entrepreneurship Research	3 CR	Terzidis
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
T-WIWI-102612	Managing New Technologies	3 CR	Reiß
T-WIWI-102853	Roadmapping	3 CR	Koch

Competence Certificate

See German version.

Prerequisites

None

Competence Goal

Students are familiar with the basics and contents of entrepreneurship and ideally are able to start a company during or after their studies. The courses are therefore structured sequentially in modules, although in principle they can also be attended in parallel. In this way, the skills are taught to generate business ideas, to develop inventions into innovations, to write business plans for start-ups and to successfully establish a company. In the lecture, the basics of entrepreneurship will be developed, in the seminars, individual contents will be deepened. The overall learning objective is to enable students to develop and implement business ideas.

Content

The lectures form the basis of the module and give an overview of the overall topic. The seminars deepen the phases of the foundation processes, in particular the identification of opportunities, the development of a value proposition (especially based on inventions and technical innovations), the design of a business model, business planning, the management of a start-up, the implementation of a vision as well as the acquisition on resources and the handling of risks. The lecture Entrepreneurship provides an overarching and connecting framework for this.

Annotation

Please note: Seminars offered by Prof. Terzidis (or the members of his research group) are not eligible for crediting in a seminar module of the WiWi degree programs. Exception: Seminar "Entrepreneurship Research".

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.68 Module: Environmental Economics [M-WIWI-101468]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102650	Energy and Environment	4,5 CR	Karl
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102615	Environmental Economics and Sustainability	3 CR	Walz
T-WIWI-102616	Environmental and Resource Policy	4 CR	Walz
T-BGU-111102	Environmental Law	3 CR	Smeddinck

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The students

- understand the treatment of non-market resources as well as future resource shortages
- are able to model markets of energy and environmental goods
- are able to assess the results of government intervention
- know legal basics and are able to evaluate conflicts with regard to legal situation

Content

Environmental degradation and increasing resource use are global challenges, which have to be tackled on a worldwide level. The module addresses these challenges from the perspective of economics, and imparts the fundamental knowledge of environmental and sustainability economics, and environmental and resource policy to the students. Additional courses address environmental law, environmental pressure, and applications to the transport sector.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Knowledge in the area of microeconomics and of the content of the course *Economics I: Microeconomics*[2600012], respectively, is required.

M

5.69 Module: Experimental Economics [M-WIWI-101505]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Compulsory Elective Courses (Election: 2 items)			
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-102863	Topics in Experimental Economics	4,5 CR	Reiß

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None.

Competence Goal

Students

- are acquainted with the methods of Experimental Economics along with its strengths and weaknesses;
- understand how theory-guided research in Experimental Economics interacts with the development of theory;
- are provided with foundations in data analysis;
- design an economic experiment and analyze its outcome.

Content

The module Experimental Economics offers an introduction into the methods and topics of Experimental Economics. It also fosters and extends knowledge in theory-guided experimental economics and its interaction with theory development. Throughout the module, readings of selected papers are required.

Annotation

The course "Predictive Mechanism and Market Design" is offered every second winter semester, e.g. WS2013 / 14, WS2015 / 16, ...

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Basic knowledge in mathematics, statistics, and game theory is assumed.

M

5.70 Module: Explainable Artificial Intelligence [M-INFO-106302]

Responsible: TT-Prof. Dr. Rudolf Lioutikov
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-112774	Explainable Artificial Intelligence	3 CR	Lioutikov

Competence Certificate

See Partial Achievements (Teilleistung).

Competence Goal

- Students are able to understand problems and challenges of XAI
- Students can identify and differentiate different types and approaches of XAI
- Students can implement various XAI approaches
- Students understand current research questions and directions of XAI

Content

Recent advances in Machine Learning and Deep Learning in particular have lead to the imminent introduction of AI agents into a wide variety of applications. However, the apparent “black-box” nature of these approaches hinders their application in both critical systems and close human-robot interactions. The sub-field of eXplainable Artificial Intelligence (XAI) aims to address this shortcoming. This lecture will introduce and discuss various concepts and methods of XAI and consider them from perspective of Robot Learning and Human-Robot Interaction.

The lecture will start with a (brief) introduction into relevant deep learning approaches, before discussing interpretable scene, task and behavior representations. Afterward the lecture will consider itself with Data-Driven and Goal-Driven AI. Finally, first approaches that incorporate XAI and XAI-based human feedback directly into the learning process itself will be discussed. An exemplary list of topics is given below:

- Introduction to XAI
 - Interpretable Machine Learning vs Explainable Machine Learning
- Primer / Introduction to relevant Deep Learning Concepts
 - MLPs and CNNs
 - Graph Neural Networks
 - Transformers
 - Diffusion Models
 - Score Based Methods
- Interpretable Structures
 - Scene Representations
 - Task Representations
 - Behavior Representations
- Data-Driven Explainable AI: XAI Methods for
 - Shapley Values
 - Saliency Maps
 - Concept Activation Vectors
 - Linguistic Neuron Annotation
- Goal-Driven Explainable AI: XAI Methods for
 - Generative Explaining Models
 - Behavior Verbalization
 - Behavior Visualization
- Interactive Learning
 - Integrating Human Feedback
 - Explanatory Interactive Learning

Workload

Arbeitsaufwand = 90h = 3 ECTS

- ca 30h Vorlesungsbesuch
- ca 30h Nachbearbeitung
- ca 30h Prüfungsvorbereitung

Recommendation

- Experience in Machine Learning is recommended, e.g. through prior coursework.
 - The Computer Science Department offers several great lectures e.g., “Maschinelles Lernen - Grundlagen und Algorithmen” and “Deep Learning”
- A good mathematical background will be beneficial
- Python / PyTorch experience could be beneficial when we discuss practical examples/implementations.

M

5.71 Module: Finance 1 [M-WIWI-101482]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	1

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- has core skills in economics and methodology in the field of finance
- assesses corporate investment projects from a financial perspective
- is able to make appropriate investment decisions on financial markets

Content

The courses of this module equip the students with core skills in economics and methodology in the field of modern finance. Securities which are traded on financial and derivative markets are presented, and frequently applied trading strategies are discussed. A further focus of this module is on the assessment of both profits and risks in security portfolios and corporate investment projects from a financial perspective.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.72 Module: Finance 2 [M-WIWI-101483]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Election notes

+++++

This module will not count towards the degree until the module *Finance 1* has also been successfully completed. If the module Finance 1 is booked out to the additional examinations, the *Finance 2* module loses its curricular validity/valuation for the degree.

+++++

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102626	Business Strategies of Banks	3 CR	Müller
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technology Change	1,5 CR	Ruckes
T-WIWI-102621	Valuation	4,5 CR	Ruckes

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

It is only possible to choose this module in combination with the module *Finance 1*. The module is passed only after the final partial exam of *Finance 1* is additionally passed.

Competence Goal

The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

Content

The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

Annotation

The courses *eFinance: Information Engineering and Management for Securities Trading* [2540454] and *Financial Analysis* [2530205] can be chosen from summer term 2015 on.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.73 Module: Finance 3 [M-WIWI-101480]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 8
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Election notes

+++++

This module will not count towards the degree until the modules *Finance 1* and *Finance 2* have also been successfully completed. If the modules *Finance 1* and/or *Finance 2* are booked out to the additional examinations, the *Finance 3* module loses its curricular validity/valuation for the degree.

+++++

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102626	Business Strategies of Banks	3 CR	Müller
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technology Change	1,5 CR	Ruckes
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-110933	Web App Programming for Finance	4,5 CR	Thimme

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

It is only possible to choose this module in combination with the module *Finance 1* and *Finance 2*. The module is passed only after the final partial exams of *Finance 1* and *Finance 2* are additionally passed.

Competence Goal

The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

Content

The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M**5.74 Module: Formal Systems [M-INFO-100799]**

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101336	Formal Systems	6 CR	Beckert

M**5.75 Module: Formal Systems II: Application [M-INFO-100744]**

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101281	Formal Systems II: Application	5 CR	Beckert

M**5.76 Module: Formal Systems II: Theory [M-INFO-100841]**

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101378	Formal Systems II: Theory	5 CR	Beckert

M

5.77 Module: Foundations for Advanced Financial -Quant and -Machine Learning Research [M-WIWI-105894]

Responsible: Prof. Dr. Maxim Ulrich

Organisation: KIT Department of Economics and Management

Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	see Annotations	1 term	English	4	1

Mandatory			
T-WIWI-111846	Fundamentals for Financial -Quant and -Machine Learning Research	9 CR	Ulrich

Competence Certificate

Due to the professor's research sabbatical, the BSc module "Financial Data Science" and MSc module "Foundations for Advanced Financial -Quant and -Machine Learning Research" and the MSc module "Advanced Machine Learning and Data Science" along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The module examination is an alternative exam assessment with a maximum score of 100 points to be achieved. These points are distributed over 4 worksheets to be submitted during the semester. The worksheets cover the respective material of the module and are handed out, worked on and assessed in lecture weeks 3 (10 points), 6 (20 points), 9 (30 points) and 12 (40 points).

The module-wide exam (all 4 worksheets) must be taken in the same semester.

The worksheets are a mixture of analytical tasks and programming tasks with financial data.

Competence Goal

This MSc module teaches students fundamental stats and analytics concepts, as well necessary financial economic intuition, necessary to identify, design and execute interesting research questions in quant finance and financial machine learning.

Topics include: Maximum Likelihood learning of arma-garch models, expectation maximization learning applied to stochastic volatility and valuation models, Kalman filter techniques to learn latent states, estimation of affine jump diffusion models with options and higher-order moments, stochastic calculus, dynamic modeling of asset markets (bond, equity, options), equilibrium determination of risk premiums, risk premiums for higher moment risk, risk decomposition (fundamental vs idiosyncratic), option-implied return distributions, mixture-density-networks and neural nets.

Content

Learning Objectives: Skills and understanding of how to successfully set-up, execute and interpret financial data driven research with the following methods: MLE, Kalman Filter, Expectation Maximization, Option Pricing, dynamic asset pricing theory, backward-looking historical return densities, forward-looking options-implied return densities, mixture-density-network, neural networks. Programming is not taught in this course, yet, some graded and non-graded exercises might make heavy use of software based data analysis. See the course's pre-requisites and comments in the modul handbook.

Annotation

- Strongly recommended to have good knowledge in financial econometrics (MLE, OLS, GLS, ARMA-GARCH), mathematics (differential equations, difference equations and optimization), investments (CAPM, factor models), asset pricing (SDF, SDF pricing), derivatives (Black-Scholes, risk-neutral pricing), and programming of statistical concepts (Java or R or Python or Matlab or C or ...)
- Strongly recommended to have a strong interest for interdisciplinary research work in statistics, programming, applied math and financial economics.
- Students lacking the prior knowledge might find the resources of the Chair helpful: www.youtube.com/c/cram-kit.

Workload

The total workload for this course is approximately 270 hours. This is for a student with the appropriate prior knowledge in financial econometrics, finance, mathematics and programming. Students without programming experience of statistical concepts will need to invest extra time. Students who have struggled in math- or programming- or finance- oriented classes, will find this course very challenging. Please check the pre-requisites and comments in the module handbook.

M

5.78 Module: Fuzzy Sets [M-INFO-100839]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101376	Fuzzy Sets	6 CR	Hanebeck

M**5.79 Module: Geometric Optimization [M-INFO-100730]**

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101267	Geometric Optimzation	3 CR	Prautzsch

M

5.80 Module: Graph Partitioning and Graph Clustering in Theory and Practice [M-INFO-100758]

Responsible: Prof. Dr. Peter Sanders
Dr. rer. nat. Torsten Ueckerdt

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-INFO-101295	Graph Partitioning and Graph Clustering in Theory and Practice	4 CR	Sanders, Ueckerdt
T-INFO-110999	Graph Partitioning and Graph Clustering in Theory and Practice - Practical	1 CR	Sanders, Ueckerdt

M

5.81 Module: Growth and Agglomeration [M-WIWI-101496]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-112816	Growth and Development	4,5 CR	Ott
T-WIWI-103107	Spatial Economics	4,5 CR	Ott

Competence Certificate

The assessment is carried out as partial written exams (see the lectures descriptions).

The overall grade for the module is the average of the grades for each course weighted by the credits.

Prerequisites

None

Competence Goal

The student

- gains deepened knowledge of micro-based general equilibrium models
- understands how based on individual optimizing decisions aggregate phenomena like economic growth or agglomeration (cities / metropolises) result
- is able to understand and evaluate the contribution of these phenomena to the development of economic trends
- can derive policy recommendations based on theory

Content

The module includes the contents of the lectures *Endogenous Growth Theory*, *Spatial Economics* and *Dynamic Macroeconomics*. While the first lecture focuses on dynamic programming in modern macroeconomics, the other two lectures are more formal and analytical.

The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Attendance of the course *Introduction Economic Policy* [2560280] is recommended.

Successful completion of the courses *Economics I: Microeconomics* and *Economics II: Macroeconomics* is required.

M

5.82 Module: Hands-on Bioinformatics Practical [M-INFO-101573]

Responsible: Prof. Dr. Alexandros Stamatakis

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-103009	Hands-on Bioinformatics Practical	3 CR	Stamatakis

M

5.83 Module: Heterogeneous Parallel Computing Systems [M-INFO-100822]

Responsible: Prof. Dr. Wolfgang Karl

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101359	Heterogeneous Parallel Computing Systems	3 CR	Karl

M**5.84 Module: Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy [M-INFO-100725]**

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-101262	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy	3 CR	Asfour, Spetzger

M

5.85 Module: Human Computer Interaction [M-INFO-100729]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101266	Human-Machine-Interaction	6 CR	Beigl
T-INFO-106257	Human-Machine-Interaction Pass	0 CR	Beigl

M

5.86 Module: Human Factors in Security and Privacy [M-WIWI-104520]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	2

Mandatory			
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer

Competence Certificate

The module examination is carried out in the form of partial examinations on the selected courses of the module, with which the minimum requirement at creditpoints is fulfilled. The learning control is described in each course. The overall score of the module is made up of the sub-scores weighted with creditpoints and is cut off after the first comma point.

Prerequisites

None

Competence Goal

Students ...

- know why many existing security and privacy mechanisms are not usable and why many awareness/education/training approaches are not effective
- can explain for concrete examples why these are not usable / not effective including why people are likely to face problems with these
- can explain what mental models are, why they are important and how they can be identified
- know how to conduct a cognitive walkthrough to identify problems with existing mechanisms and approaches
- know how to conduct semi-structured interviews
- know how user studies in the security context differ from those conducted in other contexts
- can explain the process of human centered security / privacy by design
- know the advantages and disadvantages of various graphical password schemes
- know concepts such as just in time and place security interventions

Content

The history of information security and privacy has taught us that it takes more than technological innovation to develop effective security and privacy mechanisms: Many aspects of information security and privacy actually depend on both technical and human factors. As a result of focusing on the technical factors, we are seeing a persistent gap between theoretical security and actual security in real world which becomes an increasing problem in the age of digitalization. The gap is mainly caused by strong and actually unrealistic assumptions regarding the users' knowledge and behavior.

Human factors in security and privacy research addresses several types of security and privacy mechanisms, e.g., authentication mechanisms including text and graphical passwords, security and privacy indicators (such as the icons in the address bar of nowadays web browsers) and security and privacy interventions like warning messages, permission dialogs and security and privacy policies as well as corresponding configuration interfaces. Besides security and privacy mechanisms, human factors in security and privacy researchers deal with security and privacy awareness, education, and training approaches.

'Human factors in security & privacy' research areas are:

- identifying users' mental models using techniques such as (semi-)structured interviews or focus groups,
- evaluating existing approaches regarding their effectiveness in supporting their users in making secure decisions / informed decisions in the context of privacy using techniques such as cognitive walkthroughs, lab user studies or even field studies,
- proposing improved / new approaches and evaluating their effectiveness using the so called human-centered security / privacy by design approach.

This module discusses the various problems of existing security and privacy mechanisms and security and privacy awareness/education/training approaches. The lecture addresses relevant psychological and sociological aspects which are important to know and to consider when developing more usable security/privacy mechanisms and more effective awareness/education/training approaches. The human centered security and privacy by design approach is introduced. Furthermore, some of the methodologies used in this area are explained and a subset of them is applied. Finally, positive examples, such as graphical passwords, are introduced and discussed. Note, the main part of the exercise is replicating an interview based study. The main focus of the lab will be to replicate a quantitative based user study.

Annotation

This new module can be chosen from winter term 2018/2019.

Workload

The total workload for this module is approximately 270 hours.

M**5.87 Module: Human-Machine-Interaction in Anthropomatics: Basics [M-INFO-100824]**

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101361	Human-Machine-Interaction in Anthropomatics: Basics	3 CR	Beyerer, Geisler

M

5.88 Module: Humanoid Robotics Laboratory [M-INFO-105792]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-INFO-111590	Humanoid Robotics Laboratory	6 CR	Asfour

Competence Goal

- Students will be able to independently understand, structure, analyze, and solve a complex humanoid robotics problem using existing programming skills, alone or in a small team.
- Students can convey complex technical content in a presentation.

Content

In this practical course, a is worked on alone or in small teams with up to 3 students. Questions of humanoid robotics are dealt with, such as semantic scene interpretation, active perception, planning of grasping and manipulation tasks, action representation with motion primitives, and programming by demonstration.

The project work (alone or in groups) is performed largely independently but supported by scientific staff of the H2T. At the end of the practical course, the work has to be documented and presented in a scientific talk.

Annotation

- Internship dates are always by arrangement with the supervising staff member.
- An extension work of the topic as a master thesis is possible in principle.
- The number of participants in this practical course is generally **limited** and varies with the number of available research projects at the institute.

Workload

Practical course with 4 SWS, 6 LP.

6 LP corresponds to ca. 180 hours, thereof

ca. 10h Attendance time in project discussion meetings

ca. 10h Preparation and follow-up of the above

ca. 150h Self-study to work on the topic

ca. 10h Preparation and giving of a scientific presentation

Recommendation

- Very good programming skills in at least one high-level programming language are strongly recommended.
- Attendance of the lectures Robotics 1, Robotics 2, Robotics 3, as well as the robotics practical course are recommended.
- Project-specific recommendations (knowledge of C++, Python, ...) will be announced in the individual project descriptions

M

5.89 Module: Incentives, Interactivity & Decisions in Organizations [M-WIWI-105923]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	1

Elective Offer (Election:)			
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-111912	Advanced Topics in Digital Management	3 CR	Nieken
T-WIWI-111913	Advanced Topics in Human Resource Management	3 CR	Nieken
T-WIWI-111806	Behavioral Lab Exercise	4,5 CR	Nieken, Scheibehenne
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
T-WIWI-111099	Judgement and Decision Making	4,5 CR	Scheibehenne
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams of the courses in this module. The assessment procedures are described for each course in the module separately.

The overall grade of the module is the average of grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

Please refer to the course descriptions for potential restrictions regarding an individual course.

Competence Goal

The student

- understands and analyses challenges and objectives within organizations
- applies economic models and empirical methods to analyze and solve challenges with a focus on the workplace and future of work
- understands the impact of digitalization and new information and communication technology on the work life and management decisions
- knows how to apply scientific research methods and understands the underlying problems

Content

The module „Incentives, Interactivity & Decisions in Organizations” offers an interdisciplinary approach to study incentive structures, the role of interactivity in information systems, and decision making in organizations. The module specifically focuses on topics related to the workplace and the future of work in organizations. The topics range from designing incentive systems and interactive systems to leadership, decision making, as well as understanding human behavior. All courses in the module foster active participation and allow students to learn state-of-the-art research methods and apply them to real-world challenges.

Workload

Total workload for 9 credits: approx. 270 hours.

Recommendation

Knowledge of Human Resource Management, microeconomics, game theory, and statistics is recommended.

M

5.90 Module: Industrial Production II [M-WIWI-101471]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German/English	4	5

Mandatory			
T-WIWI-102631	Planning and Management of Industrial Plants	5,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann
T-WIWI-102828	Supply Chain Management in the Automotive Industry	3,5 CR	Heupel, Lang
T-WIWI-103134	Project Management	3,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-112103	Global Manufacturing	3,5 CR	Sasse
T-WIWI-113107	Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context	3,5 CR	Schultmann

Competence Certificate

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Planning and Managing of Industrial Plants* [2581952] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course *Planning and Managing of Industrial Plants* [2581952] and at least one additional activity are compulsory and must be examined.

Competence Goal

- Students shall be able to describe the tasks of tactical production management with special attention drawn upon industrial plants.
- Students shall understand the relevant tasks in plant management (projection, realisation and supervising tools for industrial plants).
- Students shall be able to describe the special need of a techno-economic approach to solve problems in the field of tactical production management.
- Students shall be proficient in using selected techno-economic methods like investment and cost estimates, plant layout, capacity planning, evaluation principles of production techniques, production systems as well as methods to design and optimize production systems.
- Students shall be able to evaluate techno-economical approaches in planning tactical production management with respect to their efficiency, accuracy and relevance for industrial use.

Content

- Planning and Management of Industrial Plants: Basics, circulation flow starting from projecting to techno-economic evaluation, construction and operating up to plant dismantling.

Annotation

Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.

Workload

Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.

M

5.91 Module: Industrial Production III [M-WIWI-101412]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German/English	4	5

Mandatory			
T-WIWI-102632	Production and Logistics Management	5,5 CR	Schultmann
Supplementary Courses from Module Industrial Production II (Election: at most 1 item)			
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-112103	Global Manufacturing	3,5 CR	Sasse
T-WIWI-113107	Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context	3,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann
T-WIWI-102828	Supply Chain Management in the Automotive Industry	3,5 CR	Heupel, Lang
T-WIWI-103134	Project Management	3,5 CR	Schultmann

Competence Certificate

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Production and Logistics Management* [2581954] and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

The course *Production and Logistics Management* [2581954] and at least one additional activity are compulsory and must be examined.

Competence Goal

- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the main goals and set-up of software supporting tools in production and logistics management (i.e. APS, PPS-, ERP- and SCM Systems).
- Students discuss the scope of these software tools and their general disadvantages.

Content

- Planning tasks and exemplary methods of production planning and control in supply chain management.
- Supporting software tools in production and logistics management (APS, PPS- and ERP Systems).
- Project management in the field of production and supply chain management.

Annotation

Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production II.

Workload

The total amount of work for this module is approx. 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module.

The total number of hours per course results from the effort required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M**5.92 Module: Information Processing in Sensor Networks [M-INFO-100895]**

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-101466	Information Processing in Sensor Networks	6 CR	Hanebeck

M

5.93 Module: Information Systems in Organizations [M-WIWI-104068]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	4

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- has a comprehensive understanding of conceptual and theoretical foundations of information systems in organizations
- is aware of the most important classes of information systems used in organizations: process-centric, information-centric and people-centric information systems.
- knows the most important activities required to execute in the pre-implementation, implementation and post-implementation phase of information systems in organizations in order to create business value
- has a deep understanding of key capabilities of business intelligence systems and/or interactive information systems used in organizations

Content

During the last decades we witnessed a growing importance of Information Technology (IT) in the business world along with faster and faster innovation cycles. IT has become core for businesses from an operational company-internal and external customer perspective. Today, companies have to rethink their way of doing business, from an internal as well as an external digitalization perspective.

This module focuses on the internal digitalization perspective. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for information systems in organizations. The students get the necessary knowledge to guide the successful digitalization of organizations. Each lecture in the module is accompanied with a capstone project that is carried out in cooperation with an industry partner.

Annotation

New module starting summer term 2018.

Workload

The total workload for this module is approximately 270 hours.

M

5.94 Module: Information Systems: Analytical and Interactive Systems [M-WIWI-104814]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Prof. Dr. Alexander Mädche

Organisation: KIT Department of Economics and Management

Part of: [Information Systems](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Compulsory Elective Area (Election:)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-INFO-111622	Data Science 1	5 CR	Böhm, Fouché
T-INFO-101317	Deployment of Database Systems	5 CR	Böhm
T-INFO-111400	Database as a Service	5 CR	Böhm
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
T-WIWI-111267	Intelligent Agent Architectures	4,5 CR	Geyer-Schulz
T-WIWI-110915	Intelligent Agents and Decision Theory	4,5 CR	Geyer-Schulz
T-INFO-107499	Context Sensitive Systems	5 CR	Beigl
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl

Competence Certificate

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.

The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

Competence Goal

The students

- are familiar with design principles of selected classes of modern analytical and interactive information systems and associated technologies
- know modern database concepts and application scenarios of modern database systems, understand the necessity of concepts for data analysis and can assess and compare approaches for the administration and analysis of large databases with regard to their effectiveness and applicability.
- know methods and techniques for designing analytical systems in the specific area of customer relationship management
- have knowledge of the basics and advanced methods and techniques of interactive information systems, especially context-sensitive and ubiquitous systems.

Content

In the module "[Information Systems: Analytical and Interactive Systems](#)" students learn about central design principles of selected classes of modern information systems and associated technologies. The module focuses on analytical and interactive information systems.

Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 5.95 Module: Information Systems: Engineering and Transformation [M-WIWI-104812]

Responsible: Prof. Dr. Sebastian Abeck
 Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: Information Systems

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 2 terms	Language German	Level 4	Version 4
---------------------	--	--------------------------------	----------------------------	---------------------------	-------------------	---------------------

Compulsory Elective Area (Election:)			
T-INFO-112775	Access Control Systems: Models and Technology	5 CR	Böhm
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	Mädche
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-INFO-101337	Internet of Everything	4 CR	Zitterbart
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart
T-INFO-101381	Software Architecture and Quality	3 CR	Reussner
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
T-INFO-101271	Web Applications and Service-Oriented Architectures (II)	4 CR	Abeck

Competence Certificate

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.
 The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

Competence Goal

The student

- learns techniques and procedures for the systematic development of high-quality software.
- can apply software quality assessment methods, evaluate results, and compare certification models.
- can reflect the content of the key concepts and technologies required to develop service-oriented Web applications and model appropriate architectures, implement Web applications and assess their service characteristics.
- knows proven and novel concepts for the evaluation and analysis of (critical) IT infrastructures.
- knows methods and tools to successfully shape the digital transformation of companies under pursuit of a socio-technical paradigm.

Content

The module "Information Systems: Engineering and Transformation" deals with the systematic development and management of software, information systems/infrastructures and Internet-based services.

Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M

5.96 Module: Information Systems: Internet-Based Markets and Services [M-WIWI-104813]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Information Systems

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Compulsory Elective Area (Election:)			
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	Mädche
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt

Competence Certificate

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.

The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

Competence Goal

The student

- understands the importance and potential of digitizing products and services
- can design digital markets and services with the associated business models.
- knows methods and tools to successfully design the digital transformation of products and services.
- acquires specific competencies for the digitization of domain-specific services, including healthcare and energy.

Content

The module "Information Systems: Internet-based Markets and Services" focuses on the design of Internet-based services and markets from an economic and technical point of view.

Annotation

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M

5.97 Module: Innovation and Growth [M-WIWI-101478]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: between 9 and 10 credits)			
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-112822	Economics of Innovation	4,5 CR	Ott
T-WIWI-112816	Growth and Development	4,5 CR	Ott

Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students shall be given the ability to

- know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of micro- and macroeconomic theories
- understand the important role of innovation to the overall economic growth and welfare
- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Content

The module includes courses that deal with issues of innovation and growth in the context of micro- and macroeconomic theories. The dynamic analysis makes it possible to analyze the consequences of individual decisions over time, and sheds light on the tension between static and dynamic efficiency in particular. In this context is also analyzed, which policy is appropriate to carry out corrective interventions in the market and thus increase welfare in the presence of market failure.

Workload

Total expenditure of time for 9 credits: 270 hours

Attendance time per lecture: 3x14h

Preparation and wrap-up time per lecture: 3x14h

Rest: Exam Preparation

The exact distribution is subject to the credits of the courses of the module.

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

M

5.98 Module: Innovation Economics [M-WIWI-101514]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 2 terms	Language German/English	Level 4	Version 3
---------------------	--	--------------------------------	----------------------------	-----------------------------------	-------------------	---------------------

Compulsory Elective Courses (Election: between 9 and 10 credits)			
T-WIWI-112822	Economics of Innovation	4,5 CR	Ott
T-WIWI-102906	Methods in Economic Dynamics	1,5 CR	Ott
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
T-WIWI-102789	Seminar in Economic Policy	3 CR	Ott

Competence Certificate

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students shall be given the ability to

- understand the important role of innovation for economic growth and welfare
- understand the relevance of alternative incentive mechanisms for the emergence and dissemination of innovations
- know basic terms of product and innovation concepts
- know fundamental concepts of innovation management
- work with fundamental theoretical innovation models and to implement them in appropriate computer algebra systems
- query appropriate data sources and to analyse and visualise them using statistical methods

Content

The module provides students with knowledge about implications of technological and organizational changes.

Addressed economic issues are incentives for developing innovations, diffusion processes, and associated effects. In this context the module analyses appropriate policies in the presence of market failures to take corrective action on the market process and thus to increase the dynamic efficiency of economies.

Furthermore, the module offers the possibility to learn about different aspects of theoretical modelling of innovation-based growth as a part of the seminar and the methods-workshop. This includes the implementation of formal models in computer algebra systems as well as recording, processing and econometric analysis of related data from relational databases (concerning for example patents or trademarks). Moreover, methods of network theory are applied.

Finally, the module emphasises the business perspective: Issues of all stages of innovation processes will be discussed, from innovation strategies up to the market commercialisation.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantitative-mathematical methods.

M

5.99 Module: Innovation Management [M-WIWI-101507]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	10

Mandatory			
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
Compulsory Elective Courses (Election: 1 item)			
T-WIWI-108875	Digital Transformation and Business Models	3 CR	Koch
T-WIWI-112143	Development of Sustainable Business Models	3 CR	Weissenberger-Eibl
T-WIWI-111823	Successful Transformation Through Innovation	3 CR	Busch
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-110263	Methods in Innovation Management	3 CR	Koch
T-WIWI-102853	Roadmapping	3 CR	Koch
T-WIWI-102858	Technology Assessment	3 CR	Koch
T-WIWI-102854	Technologies for Innovation Management	3 CR	Koch
Supplementary Courses (Election: 1 item)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-108875	Digital Transformation and Business Models	3 CR	Koch
T-WIWI-102833	Entrepreneurial Leadership & Innovation Management	3 CR	Terzidis
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
T-WIWI-111823	Successful Transformation Through Innovation	3 CR	Busch
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-110263	Methods in Innovation Management	3 CR	Koch
T-WIWI-102853	Roadmapping	3 CR	Koch
T-WIWI-102854	Technologies for Innovation Management	3 CR	Koch
T-WIWI-102858	Technology Assessment	3 CR	Koch

Competence Certificate

See German version.

Prerequisites

The lecture "Innovation Management: Concepts, Strategies and Methods" and one of the seminars of the chair for Innovation and Technology Management are compulsory. The third course can be chosen from the courses of the module.

Competence Goal

Students develop a comprehensive understanding of the innovation process and its conditionality. There is an additional focus on the concepts and processes which are of particular relevance with regard to shaping the entire process. Various strategies and methods are then taught based on this.

After completing the module, students should have developed a systemic understanding of the innovation process and be able to shape this by developing and applying suitable methods.

Content

The Innovation Management: Concepts, Strategies and Methods lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.

Annotation

Seminars offered by Prof. Terzidis (or the members of his research group) are not eligible for crediting in a seminar module of the WiWi degree programs. Exception: Seminar "Entrepreneurship Research".

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M**5.100 Module: Innovative Concepts for Programming Industrial Robots [M-INFO-100791]****Responsible:** Prof. Dr.-Ing. Björn Hein**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101328	Innovative Concepts for Programming Industrial Robots	4 CR	Hein

M

5.101 Module: Integrated Network and Systems Management [M-INFO-100747]

Responsible: Prof. Dr. Bernhard Neumair
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101284	Integrated Network and Systems Management	4 CR	Neumair

Recommendation
 Siehe Teilleistung

M

5.102 Module: Intellectual Property Law [M-INFO-101215]

Responsible: N.N.

Organisation: KIT Department of Informatics

Part of: Law

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Intellectual Property Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-101308	Copyright	3 CR	N.N.
T-INFO-101313	Trademark and Unfair Competition Law	3 CR	Matz
T-INFO-101307	Internet Law	3 CR	N.N.
T-INFO-108462	Selected Legal Issues of Internet Law	3 CR	N.N.
T-INFO-101310	Patent Law	3 CR	Werner

Prerequisites

None

M

5.103 Module: Intelligent Systems and Services [M-WIWI-101456]

Responsible: Dr.-Ing. Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 8
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Compulsory Elective Courses (Election: between 9 and 10 credits)			
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-112685	Modeling and Simulation	4,5 CR	Lazarova-Molnar
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Algorithms for Internet Applications [T-WIWI-102658]: The examination will be offered latest until summer term 2017 (repeaters only).

Prerequisites

None

Competence Goal

Students

- know the different machine learning procedures for the supervised as well as the unsupervised learning,
- identify the pros and cons of the different learning methods,
- apply the discussed network learning methods in specific scenarios,
- compare the practicality of methods and algorithms with alternative approaches.

Content

In the broader sense learning systems are understood as biological organisms and artificial systems which are able to change their behavior by processing outside influences. Network learning methods based on symbolic, statistic and neuronal approaches are the focus of Computer Sciences.

In this module the most important network learning methods are introduced and their applicability is discussed with regard to different information sources such as data texts and images considering especially procedures for knowledge acquirement via data and text mining, natural analogue procedures as well as the application of organic learning procedures within the finance sector.

Annotation

Detailed information on the recognition of examinations in the field of Informatics can be found at <http://www.aifb.kit.edu/web/Auslandsaufenthalt>.

M

5.104 Module: Interactive Computer Graphics [M-INFO-100732]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-INFO-101269	Interactive Computer Graphics	5 CR	Dachsbacher

M

5.105 Module: Internet of Everything [M-INFO-100800]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101337	Internet of Everything	4 CR	Zitterbart

M**5.106 Module: Introduction to Bioinformatics for Computer Scientists [M-INFO-100749]****Responsible:** Prof. Dr. Alexandros Stamatakis**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101286	Introduction to Bioinformatics for Computer Scientists	3 CR	Stamatakis

M**5.107 Module: Introduction to Hybrid Quantum Machine Learning Algorithms [M-INFO-106189]****Responsible:** Prof. Dr. Achim Streit**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-112571	Introduction to Hybrid Quantum Machine Learning Algorithms	3 CR	Fischer, Kühn

M**5.108 Module: Introduction to Video Analysis [M-INFO-100736]**

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101273	Introduction to Video Analysis	3 CR	Beyerer

M

5.109 Module: IT Security [M-INFO-106315]

Responsible: Prof. Dr. Hannes Hartenstein
 Prof. Dr. Jörn Müller-Quade
 Prof. Dr. Thorsten Strufe
 TT-Prof. Dr. Christian Wressnegger

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-INFO-112818	IT Security	6 CR	Hartenstein, Müller-Quade, Strufe, Wressnegger

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

Students

- have in-depth knowledge of cryptography and IT security
- know and understands sophisticated techniques and security primitives to achieve the protection goals
- know and understand scientific evaluation and analysis methods of IT security (game-based formalization of confidentiality and integrity, security and anonymity notions)
- have a good understanding of types of data, personal data, legal and technical fundamentals of privacy protection
- know and understand the fundamentals of system security (buffer overflow, return-oriented programming, ...)
- know different mechanisms for anonymous communication (TOR, Nym, ANON) and can assess their effectivity

Content

Based on the content of the compulsory lecture "Informationssicherheit", this module deepens different topics of IT security. These include in particular:

- Elliptic curve cryptography
- Threshold cryptography
- Zero-knowledge proofs
- Secret sharing
- Secure multi-party computation and homomorphic encryption
- Methods of IT security (game-based analysis and the UC model)
- Crypto-currencies and consensus through proof-of-work/stake
- Anonymity on the Internet, anonymity with online payments
- Privacy-preserving machine learning
- Security of machine learning
- System security and exploits
- Threat modeling and quantification of IT security

Workload

Course workload:

1. Attendance time: 56 h
2. Self-study: 56 h
3. Preparation for the exam: 68 h

Recommendation

Students should be familiar with the content of the compulsory lecture "Informationssicherheit".

Literature

Literature:

- Katz/Lindell: Introduction to Modern Cryptography (Chapman & Hall)
- Schäfer/Roßberg: Netzsicherheit (dpunkt)
- Anderson: Security Engineering (Wiley, and online)
- Stallings/Brown: Computer Security (Pearson)
- Pfleeger, Pfleeger, Margulies: Security in Computing (Prentice Hall)

M

5.110 Module: IT-Security Management for Networked Systems [M-INFO-100786]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein

M

5.111 Module: Lab Course Heterogeneous Computing [M-INFO-104072]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German/English	4	1

Mandatory			
T-INFO-108447	Lab Course Heterogeneous Computing	6 CR	Karl

Prerequisites

None

M**5.112 Module: Lab Project: Speech Translation [M-INFO-105997]**

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-112175	Lab Project: Speech Translation	6 CR	Niehues

M

5.113 Module: Lab: Efficient Parallel C++ [M-INFO-103506]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	English	4	1

Mandatory			
T-INFO-106992	Lab: Efficient Parallel C++	6 CR	Sanders

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

The students

- can use the methods of algorithm engineering in order to implement and evaluate given algorithmic problems and data structures in C++.
- recognize factors that lead to inefficient code and can, if possible, replace them with more efficient constructions.
- understand how to use the presented techniques for parallelization and to generate thread-safe codes with the given means.
- know the features of the standard library and are able to use them selectively.
- can test the codes generated by them for correctness and performance, furthermore they can represent and analyze the obtained results.

Content

In this practical course students solve multiple programming tasks in C++. The main focus is on the efficient implementation and their evaluation through extensive experiments. The programming tasks are motivated by scientific work in the field of algorithm engineering. They cover complex algorithms as well as advanced data structures, furthermore advanced programming techniques and parallelization (thread management capabilities of the standard library).

Workload

- ~ 10h attendance time
- ~ 10h discussion/assessment of the regular solutions (with preparation)
- ~ 15h designing the individual final assignment
- ~ 25h presentation of the individual final task
- ~ 120h working on the tasks (implementation and evaluation)

M

5.114 Module: Lab: Graph Visualization in Practice [M-INFO-103302]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-106580	Lab: Graph Visualization in Practice	5 CR	Wagner

M

5.115 Module: Lab: Internet of Things (IoT) [M-INFO-103706]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-107493	Lab: Internet of Things (IoT)	4 CR	Henkel

Prerequisites

None

M

5.116 Module: Lab: Low Power Design and Embedded Systems [M-INFO-104031]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each term	1 term	English	4	2

Mandatory			
T-INFO-108323	Lab: Low Power Design and Embedded Systems	4 CR	Henkel

M

5.117 Module: Laboratory Course Algorithm Engineering [M-INFO-102072]

Responsible: Prof. Dr. Peter Sanders
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German/English	4	1

Mandatory			
T-INFO-104374	Laboratory Course Algorithm Engineering	6 CR	Sanders, Ueckerdt, Wagner

M

5.118 Module: Laboratory in Cryptoanalysis [M-INFO-101559]

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-102990	Laboratory in Cryptoanalysis	3 CR	Hofheinz, Müller-Quade

M

5.119 Module: Laboratory in Cryptography [M-INFO-101558]

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-102989	Laboratory in Cryptography	3 CR	Hofheinz, Müller-Quade

M

5.120 Module: Laboratory in Security [M-INFO-101560]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-102991	Laboratory in Security	4 CR	Hofheinz, Müller-Quade

M

5.121 Module: Localization of Mobile Agents [M-INFO-100840]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101377	Localization of Mobile Agents	6 CR	Hanebeck

M 5.122 Module: Logical Foundations of Cyber-Physical Systems [M-INFO-106102]

Responsible: Prof. Dr. André Platzer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 4	Grading scale Grade to a tenth	Recurrence Each winter term	Duration 1 term	Language English	Level 4	Version 2
---------------------	--	---------------------------------------	---------------------------	----------------------------	-------------------	---------------------

Mandatory			
T-INFO-112360	Logical Foundations of Cyber-Physical Systems	4 CR	Platzer

Competence Certificate
 See partial achievements (Teilleistung)

Prerequisites
 See partial achievements (Teilleistung)

Competence Goal
In modeling and control, successful students will

- understand core principles behind CPS. A solid understanding of these principles is important for anyone who wants to integrate cyber and physical components to solve problems that no part could solve alone.
- develop models and controls. In order to understand, design, and analyze CPS, it is important to be able to develop models for the relevant aspects of a CPS design and to design controllers for the intended functionalities based on appropriate specifications, including modeling with differential equations.
- identify relevant dynamical aspects. It is important to be able to identify which types of phenomena influence a property of a system. These allow us to judge, for example, where it is important to manage adversarial effects, or where a nondeterministic model is sufficient.

In computational thinking, successful students should be able to

- identify safety specifications and critical properties. In order to develop correct CPS designs, it is important to identify what "correctness" means, how a design may fail to be correct, and how to make it correct.
- understand abstraction in system designs. The power of abstraction is essential for the modular organization of CPS, and the ability to reason about separate parts of a system independently.
- express pre- and post-conditions and invariants for CPS models. Pre- and post-conditions allow us to capture under which circumstance it is safe to run a CPS or a part of a CPS design, and what safety entails. They allow us to achieve what abstraction and hierarchies achieve at the system level: decompose correctness of a full CPS into correctness of smaller pieces. Invariants achieve a similar decomposition by establishing which relations of variables remain true no matter how long and how often the CPS runs.
- reason rigorously about CPS models. Reasoning is required to ensure correctness and find flaws in CPS designs. Both informal and formal reasoning in a logic are important objectives for being able to establish correctness, which includes rigorous reasoning about differential equations.

In CPS skills, successful students will be able to

- understand the semantics of a CPS model. What may be easy in a classical isolated program becomes very demanding when that program interfaces with effects in the physical world.
- develop an intuition for operational effects. Intuition for the joint operational effect of a CPS is crucial, e.g., about what the effect of a particular discrete computer control algorithm on a continuous plant will be.
- understand opportunities and challenges in CPS and verification. While the beneficial prospects of CPS for society are substantial, it is crucial to also develop an understanding of their inherent challenges and of approaches for minimizing the impact of potential safety hazards. Likewise, it is important to understand the ways in which formal verification can best help improve the safety of system designs.

Content

Cyber-physical systems (CPSs) combine cyber capabilities (computation and/or communication) with physical capabilities (motion or other physical processes). Cars, aircraft, and robots are prime examples, because they move physically in space in a way that is determined by discrete computerized control algorithms. Designing these algorithms to control CPSs is challenging due to their tight coupling with physical behavior. At the same time, it is vital that these algorithms be correct, since we rely on CPSs for safety-critical tasks like keeping aircraft from colliding. In this course we will strive to answer the fundamental question posed by Jeannette Wing:

“How can we provide people with cyber-physical systems they can bet their lives on?”

The cornerstone of this course design are hybrid programs (HPs), which capture relevant dynamical aspects of CPSs in a simple programming language with a simple semantics. One important aspect of HPs is that they directly allow the programmer to refer to real-valued variables representing real quantities and specify their dynamics as part of the HP.

This course will give you the required skills to formally analyze the CPSs that are all around us—from power plants to pacemakers and everything in between—so that when you contribute to the design of a CPS, you are able to understand important safety-critical aspects and feel confident designing and analyzing system models. It will provide an excellent foundation for students who seek industry positions and for students interested in pursuing research.

Annotation

Course web page: <https://fcps.org/course/fcps.html>

Workload

4 ECTS from 120h of coursework consisting of

- 22.5h = 15 * 1.5h from 3 SWS lectures
- 12h = 8 * 1.5h from 1 SWS exercises
- 70h preparation, reading textbook, studying
- 15h exam preparation

Recommendation

The course assumes prior exposure to basic computer programming and mathematical reasoning. This course covers the basic required mathematical and logical background of cyber-physical systems. You will be expected to follow the textbook as needed: André Platzer. Logical Foundations of Cyber-Physical Systems. Springer 2018. DOI:10.1007/978-3-319-63588-0

M

5.123 Module: Low Power Design [M-INFO-100807]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101344	Low Power Design	3 CR	Henkel

M

5.124 Module: Machine Learning [M-WIWI-103356]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 3
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Compulsory Elective Courses (Election:)			
T-WIWI-106340	Machine Learning 1 - Basic Methods	4,5 CR	Zöllner
T-WIWI-106341	Machine Learning 2 - Advanced Methods	4,5 CR	Zöllner
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	5 CR	Zöllner

Competence Certificate

The module examination is carried out in the form of partial examinations on the selected courses of the module, with which the minimum requirement at creditpoints is fulfilled. The learning control is described in each course. The overall score of the module is made up of the sub-scores weighted with creditpoints and is cut off after the first comma point.

Prerequisites

None

Competence Goal

Students

- Gain knowledge of basic methods in the field of machine learning.
- Understand advanced machine learning concepts and their possible applications.
- Can classify, formally describe and evaluate machine learning methods.
- Can apply their knowledge for the selection of suitable models and methods for selected problems in the field of machine learning.

Content

The topic of machine learning considering real-world challenges of complex application domains is a rapidly expanding field of knowledge and the subject of numerous research and development projects. Large parts of modern AI methods are based on machine-learned models.

The Machine Learning 1 course introduces students to the rapidly evolving field of machine learning by providing a solid foundation that covers the major concepts and techniques in the field. Students will explore various methods of supervised, unsupervised, and reinforcement learning, as well as associated model types ranging from simple linear classifiers to more complex models, such as Deep Neural Networks.

The lecture "Machine Learning 2" covers advanced and modern machine learning methods. Modern learning methods like Self-Supervised-Learning and Contrastive Learning as well as model architectures like Diffusion Models, Transformers, Graph Neural Networks, are introduced.

In the practical courses, scientific tasks in the field of autonomous driving or robotics are solved with modern machine learning methods. There, the techniques of machine learning are practically oriented.

Workload

The total workload for this module is approximately 270 hours.

M

5.125 Module: Machine Learning - Foundations and Algorithms [M-INFO-105778]

Responsible: Prof. Dr. Gerhard Neumann
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-111558	Machine Learning - Foundations and Algorithms	5 CR	Neumann

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

- Students acquire knowledge of the basic methods of Machine Learning
- Students acquire the mathematical knowledge to understand the theoretical foundations of Machine Learning
- Students can categorize, formally describe and evaluate methods of Machine Learning
- Students can apply their knowledge to select appropriate models and methods for selected problems in the field of Machine Learning.

Content

The field of Machine Learning has made enormous progress in recent years and good knowledge of Machine Learning is becoming increasingly in demand on the job market. Machine Learning describes the acquisition of knowledge by an artificial system based on experience or data. Rules or certain calculations no longer have to be manually coded but can be extracted from data by intelligent systems.

This lecture provides an overview of essential and current methods of Machine Learning. After reviewing the necessary mathematical background, the lecture primarily deals with algorithms for classification, regression, and density estimation, with a focus on the mathematical understanding of probabilistic methods and neural networks.

Examples of topics include:

- Linear Regression and Classification
- Model Selection, Overfitting, and Regularization
- Bayesian Learning and Gaussian Processes
- Neural Networks, Backpropagation and Optimization
- Graphical Models and Sampling
- Expectation Maximization
- Variational Inference
- Variational Auto-Encoders and Diffusion Models
- Bayesian Neural Networks
- Transfer and Meta Learning
- Hyperparameter Tuning and Auto-ML

Workload

150h

Recommendation

See partial achievements (Teilleistung)

M

5.126 Module: Machine Translation [M-INFO-100848]

Responsible: Prof. Dr. Jan Niehues
Prof. Dr. Alexander Waibel

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101385	Machine Translation	6 CR	Niehues, Waibel

M

5.127 Module: Management Accounting [M-WIWI-101498]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	3

Mandatory			
T-WIWI-102800	Management Accounting 1	4,5 CR	Wouters
T-WIWI-102801	Management Accounting 2	4,5 CR	Wouters

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

Students

- are familiar with various management accounting methods,
- can apply these methods for cost estimation, profitability analysis, and product costing,
- are able to analyze short-term and long-decisions with these methods,
- have the capacity to devise instruments for organizational control.

Content

The module consists of two courses "Management Accounting 1" and "Management Accounting 2". The emphasis is on structured learning of management accounting techniques.

Annotation

The following courses are part of this module:

- The course Management Accounting 1, which is offered in every sommer semester
- The course Management Accounting 2, which is offered in every winter semester

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.128 Module: Market Engineering [M-WIWI-101446]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Mandatory			
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
Supplementary Courses (Election: 4,5 credits)			
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD ² Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

The students

- know the design criterias of market mechanisms and the systematic approach to create new markets,
- understand the basics of the mechanism design and auction theory,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

Content

This module explains the dependencies between the design von markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. the approaches for a systematic analysis are explained in the mandatory course *Market Engineering* [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.129 Module: Marketing and Sales Management [M-WIWI-105312]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Business Administration)

Credits 9	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German/English	Level 4	Version 7
---------------------	--	---------------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Compulsory Elective Courses (Election:)			
T-WIWI-112693	Digital Marketing	4,5 CR	Kupfer
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Klarmann, Konhäuser
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-111099	Judgement and Decision Making	4,5 CR	Scheibehenne
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann
T-WIWI-102883	Pricing	4,5 CR	Klarmann
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- know several qualitative and quantitative approaches to prepare decisions in Marketing
- have the theoretical knowledge to write a master thesis in Marketing
- have the theoretical knowledge to work in/together with the Marketing department

Content

The aim of this module is to deepen central marketing contents in different areas.

Workload

The total workload for this module is approximately 270 hours.

M

5.130 Module: Mathematical Programming [M-WIWI-101473]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Operations Research)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Compulsory Elective Courses (Election: at most 2 items)			
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102726	Global Optimization I	4,5 CR	Stein
T-WIWI-103638	Global Optimization I and II	9 CR	Stein
T-WIWI-102856	Convex Analysis	4,5 CR	Stein
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-102724	Nonlinear Optimization I	4,5 CR	Stein
T-WIWI-103637	Nonlinear Optimization I and II	9 CR	Stein
T-WIWI-102855	Parametric Optimization	4,5 CR	Stein
Supplementary Courses (Election: at most 2 items)			
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-102727	Global Optimization II	4,5 CR	Stein
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102725	Nonlinear Optimization II	4,5 CR	Stein
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

At least one of the courses "Mixed Integer Programming I", "Multicriteria Optimization", "Convex Analysis", "Parametric Optimization", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

Competence Goal

The student

- names and describes basic notions for advanced optimization methods, in particular from continuous and mixed integer programming,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to make suggestions to adapt them to practical problems.

Content

The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables.

Annotation

The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Workload

The total workload for this module is approximately 270 hours.

M

5.131 Module: Meshes and Point Clouds [M-INFO-100812]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-101349	Meshes and Point Clouds	3 CR	Prautzsch

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

Students of this course will have a basic understanding about discrete surface representations and are able to handle basic geometry processing problems for shape design.

Content

Thanks to various imaging techniques, discrete, i.e. piecewise constant or linear, representations of surfaces and solids are commonly used to represent surfaces and solids alongside established representations of higher degree and smoothness.

In this course, methods are presented (1) to represent surfaces by point clouds, octrees, hierarchical sphere clouds, triangle fans, Delaunay meshes, and meshes of planar quadrilaterals, (2) methods to obtain triangle meshes from point clouds and distance functions, (3) to simplify or compress meshes, (4) to smooth meshes and remove noise, (5) to segment meshes according to different criteria, (6) to subdivide and refine meshes, (7) to complete shape by neuronal nets, (8) to animate and deform meshes, and others.

Workload

90h of which about

30h for attending the lecture

30h for post-processing

30h for exam preparation

M

5.132 Module: Microeconomic Theory [M-WIWI-101500]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 4
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-113264	Matching Theory	4,5 CR	Puppe
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- are able to model practical microeconomic problems mathematically and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs.

Here is an example of a positive question: what firm decisions does a specific regulatory policy result in under imperfect competition? An example of a normative question would be: which voting rule has appealing properties?

Content

The module teaches advanced concepts and content in microeconomic theory. Thematically, it offers a formally rigorous treatment of game theory and exemplary applications, such as strategic interaction on markets and non-/cooperative bargaining ("Advanced Game Theory"), as well as specialized courses dedicated to auctions ("Auktionstheorie") and incentive systems in organizations ("Incentives in Organizations"). Moreover, it offers the opportunity to delve deeper into the mathematical theory of voting and collective decision making, i.e. the systematic aggregation of preferences and judgments ("Social Choice Theory").

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.133 Module: Mobile Communication [M-INFO-100785]

Responsible: Prof. Dr. Oliver Waldhorst
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101322	Mobile Communication	4 CR	Waldhorst, Zitterbart

M

5.134 Module: Model-Driven Software Development [M-INFO-100741]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101278	Model Driven Software Development	3 CR	Reussner

Prerequisites

None

M

5.135 Module: Module Master's Thesis [M-WIWI-104833]

Responsible: Studiendekan der KIT-Fakultät für Informatik
Studiendekan des KIT-Studienganges

Organisation: KIT Department of Economics and Management

Part of: [Master's Thesis](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
30	Grade to a tenth	Each term	1 term	German	3	1

Mandatory			
T-WIWI-103142	Master's Thesis	30 CR	Studiendekan der KIT-Fakultät für Informatik, Studiendekan des KIT-Studienganges

Competence Certificate

At least one of the examiners must be a member of one of the two KIT departments Economics and Management or Informatics. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.

Prerequisites

Regulated in §14 of the examination regulation.

Competence Goal

The student can independently handle a complex and unfamiliar subject based on scientific criteria and the current state of research.

He/she is in a position to critically analyze and structure the researched information as well as derive principles and regularities. He/she knows how to apply the thereby achieved results to solve the task at hand. Taking into account this knowledge and his/her interdisciplinary knowledge, he/she can draw own conclusions, derive improvement potentials, propose and implement science-based decisions.

This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to sensibly structure a research paper, document results and clearly communicate the results in scientific form.

Content

- The master thesis shows that the candidate can autonomously investigate a problem from his discipline with scientific methods according to the state-of-the-art of the discipline within a specified time period.
- The master thesis can be written in German or English.
- The topic of a master thesis can be accepted or chosen by each of the examiners according to examination regulation. The examiner accepting a topic for a master thesis acts as the first supervisor of this thesis.
- Writing a master thesis with a supervisor who is not a member of the two faculties participating in the degree programme (Department of Informatics, Department of Economics and Management) requires acceptance by the examination board of the degree programme. The candidate must have an opportunity to make suggestions for the topic of the master thesis.
- Candidates can write a master thesis in teams. However, this requires that the contribution and performance of each candidate to the thesis is identifiable according to objective criteria which allow a unique delineation of each candidate's contribution. The contribution of each candidate regarded in isolation must fulfill the requirements a individual master thesis.
- In exceptional cases and upon request of the candidate, the chairman of the examination board chooses a supervisor and requests that this supervisor provides the candidate with a topic for the master thesis within 4 weeks after the request. In this case, the candidate is informed by the chairman of the examination board about the topic selected.
- Topic, specification of research tasks and the volume of the master thesis should be limited by the supervisor, so that the master thesis can be written with the assigned workload of 30 credits (750-900h).
- The master thesis must contain the following declaration of the candidate: "I truthfully assure that I have autonomously written this master thesis. I have quoted all sources used precisely and completely. I have labelled everything which has been taken from the work of others with or without change." A master thesis without this declaration will not be accepted.
- The date of the assignment of the topic to a candidate as well as the date of delivery of the master thesis should be registered at the examination board. The candidate can return a topic for the master thesis only one time and only within a period of two month after he has received the topic. Upon a request of the candidate with reasons supporting an extension, the examination board may extend the deadline for the delivery of the master thesis by a maximum of three months. A master thesis not delivered within time is graded as "fail" except when the candidate is not responsible for this delay (e.g. protection of motherhood).
- The master thesis is reviewed and graded by the supervisor and the additional examiner. The team of supervisor and examiner must represent both faculties participating in the degree programme (Department of Informatics, Department of Economics and Management). At least one of the two must be professor or junior professor. If the grades of the supervisor and the examiner differ, the examination board sets the mark within this limit.
- Reviewing and grading should be done within 8 weeks after delivery of the master thesis.

Workload

The total workload for this module is approximately 900 hours. For further information see German version.

M

5.136 Module: Natural Language Dialog Systems [M-INFO-102414]

Responsible: Prof. Dr. Jan Niehues
Prof. Dr. Alexander Waibel

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German	4	2

Mandatory			
T-INFO-104780	Practical Course Natural Language Dialog Systems	6 CR	Niehues, Waibel

M

5.137 Module: Natural Language Processing [M-INFO-105999]

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-112177	Natural Language Processing	6 CR	Niehues

M**5.138 Module: Natural Language Processing and Software Engineering [M-INFO-100735]****Responsible:** Prof. Dr.-Ing. Anne Kozirolek**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101272	Natural Language Processing and Software Engineering	3 CR	Kozirolek

M

5.139 Module: Network Economics [M-WIWI-101406]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	3

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-100005	Competition in Networks	4,5 CR	Mitusch
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitusch
T-WIWI-113147	Telecommunications and Internet – Economics and Policy	4,5 CR	Mitusch

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The students

- have acquired the basic knowledge for a future job in a network company or in a regulatory agency, ministry etc.
- recognize the specific characterizations of network sectors, know fundamental methods for an economic analysis of network sectors and recognize the interfaces for an interdisciplinary cooperation of economists, engineers and lawyers
- understand the interactions between infrastructures, control systems, and the users of networks, especially concerning their implications on investments, price setting and competitive behavior, and they can model or simulate exemplary applications
- can assess the necessity of regulation of natural monopolies and identify regulatory measures that are important for networks.

Content

The module is concerned with network or infrastructure industries in the economy, e.g. telecommunication, traffic and energy sectors. These sectors are characterized by close interdependencies of operators and users of infrastructure as well as on states. States intervene in various forms, by the public and regulation authorities, due to the importance of network industries and due to limited abilities of markets to work properly in these industries. The students are supposed to develop a broad knowledge of these sectors and of the political options available.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

M

5.140 Module: Network Security: Architectures and Protocols [M-INFO-100782]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 4	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart

M

5.141 Module: Next Generation Internet [M-INFO-100784]

Responsible: Dr.-Ing. Roland Bless
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101321	Next Generation Internet	4 CR	Bless, Zitterbart

M

5.142 Module: Operations Research in Supply Chain Management [M-WIWI-102832]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Operations Research\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	8

Election notes

At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and "Special Topics of Stochastic Optimization (elective)" has to be taken. Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106200	Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
Supplementary Courses (Election: at most 1 item)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Spieckermann
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and "Special Topics of Stochastic Optimization (elective)" has to be taken.

Competence Goal

The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of SCM and their respective optimization problems,
- is acquainted with classical location problem models (in planes, in networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

Content

Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Supply Chain Management, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

Annotation

Some lectures and courses are offered irregularly.

The planned lectures and courses for the next three years are announced online.

Workload

Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours

Recommendation

Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

M**5.143 Module: Optimization and Synthesis of Embedded Systems (ES1) [M-INFO-100830]****Responsible:** Prof. Dr.-Ing. Jörg Henkel**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101367	Optimization and Synthesis of Embedded Systems (ES1)	3 CR	Henkel

M

5.144 Module: Parallel Algorithms [M-INFO-100796]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	English	4	3

Mandatory			
T-INFO-101333	Parallel Algorithms	4 CR	Sanders
T-INFO-111857	Parallel Algorithms Pass	1 CR	Sanders

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

The students acquire a systematic understanding for algorithmic problems and their solutions in the field of parallel algorithms, building on existing knowledge in algorithmics. Additionally, they are able to apply learned techniques to related problems and to interpret and comprehend current research topics.

After successful attendance of the course, the students are able to

- explain terms, structures, basic problem definitions and algorithms from the lecture;
- decide which algorithms and data structures are suitable for solving a given problem and, if necessary, adapt them to the requirements of a specific problem;
- execute algorithms and data structures, conduct a mathematically precise analysis, and prove their algorithmic properties;
- explain machine models from the lecture and analyze algorithms and data structures in them;
- analyze new problems from application contexts, reduce them to their algorithmic core and design an abstract model; design own solutions in this model using concepts and techniques from the lecture, analyze them and prove the algorithmic properties.

Content

Models and their relation to real machines:

- shared memory - PRAM
- message passing - BSP
- circuits

Analysis: speedup, efficiency, scalability

Basic techniques:

- SPMD
- parallel divide-and-conquer
- collective communication
- load balancing

Concrete algorithms (examples):

- collective communication (including large data volumes): broadcast,
- reduce, prefix sums, all-to-all exchange
- matrix computations
- sorting
- list ranking
- minimum spanning trees
- load balancing: master worker with adaptive problem size, random
- polling, random distribution

Workload

Lecture and exercise with 3 semester hours per week, 5 ECTS correspond to approx. 150 working hours, consisting of

- approx. 30 h attendance of the lecture and exercise session / block seminar
- approx. 60 h preparation and follow-up work
- approx. 30 h working on exercise sheets / preparation of seminar presentation
- approx. 30 h exam preparation

Recommendation

The partial achievement **Parallel Algorithms Exercise** must be started before.

M**5.145 Module: Parallel Computer Systems and Parallel Programming [M-INFO-100808]****Responsible:** Prof. Dr. Achim Streit**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101345	Parallel Computer Systems and Parallel Programming	4 CR	Streit

M

5.146 Module: Pattern Recognition [M-INFO-100825]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 2
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101362	Pattern Recognition	6 CR	Beyerer, Zander

M

5.147 Module: Penetration Testing Lab [M-INFO-104895]

Responsible: Dr.-Ing. Ingmar Baumgart
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-109929	Penetration Testing Lab	4 CR	Baumgart, Müller-Quade

M

5.148 Module: Photorealistic Rendering [M-INFO-100731]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-INFO-101268	Photorealistic Rendering	5 CR	Dachsbacher

M

5.149 Module: Practical Course Applied Telematics [M-INFO-101889]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	2

Mandatory			
T-INFO-103585	Practical Course Applied Telematics	3 CR	Zitterbart

M

5.150 Module: Practical Course Automatic Speech Recognition [M-INFO-102411]

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-104775	Practical Course Automatic Speech Recognition	3 CR	Waibel

M**5.151 Module: Practical Course Computer Vision for Human-Computer Interaction [M-INFO-102966]****Responsible:** Prof. Dr.-Ing. Rainer Stiefelhagen**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	3

Mandatory			
T-INFO-105943	Practical Course Computer Vision for Human-Computer Interaction	6 CR	Stiefelhagen

M**5.152 Module: Practical Course Decentralized Systems and Network Services [M-INFO-103047]**

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-106063	Practical Course Decentralized Systems and Network Services	4 CR	Hartenstein

M

5.153 Module: Practical Course FPGA Programming [M-INFO-102661]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-105576	Practical Course FPGA Programming	3 CR	Tahoori

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

Students will learn to design and to simulate digital circuits with FPGA.

Content

This lab emphasizes on the practical aspects of Field Programmable Gate Arrays (FPGAs). In the beginning, a short background introduction on FPGAs is given, followed by a tutorial on the workflow of configuring and programming an FPGA. This lab includes FPGA design using schematic layouts as well as several example of VHDL/Verilog programming to implement some sample digital circuits. Students will learn to design and to simulate digital circuits with FPGA. The design will be compiled on run a FPGA. The lab is designed around the DE2-115 prototyping board, which provides a programmer, program memory, and array of switches, buttons, LEDs, an LCD, and several I/O ports.

Workload

4 SWS / 3 CP = 90 h/week

Recommendation

Knowledge of "Dependable Computing" and "Fault Tolerant Computing" and Computer Architecture is helpful.

M**5.154 Module: Practical Course Model-Driven Software Development [M-INFO-101579]****Responsible:** Prof. Dr. Ralf Reussner**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-103029	Practical Course Model-Driven Software Development	6 CR	Reussner

M

5.155 Module: Practical Course on Network Security Research [M-INFO-105413]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-110938	Practical Course on Network Security Research	3 CR	Hock, Zitterbart

M

5.156 Module: Practical Course Protocol Engineering [M-INFO-102092]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-104386	Practical Course Protocol Engineering	4 CR	Zitterbart

M**5.157 Module: Practical Course Software Defined Networking [M-INFO-101891]**

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-103587	Practical Course Software Defined Networking	6 CR	Zitterbart

M

5.158 Module: Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics [M-INFO-105870]

Responsible: Prof. Dr. Achim Streit
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-111803	Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics	6 CR	Streit

Competence Certificate

See partial achievements (Teilleitung)

Competence Goal

Students know and can apply tools and techniques in the fields of high-performance computing, data management and data analysis. They acquire the possibility to analyze complex scenarios and develop solutions for this. Besides working on the content, students improve their competences in communication and presentation.

Content

Participants will have the chance to deepen their knowledge of high-performance computing, data management and data analysis and to apply it in a practical way. The tasks to be worked on come from the subfields:

- HPC simulations (e.g., parallelization, MPI, performance engineering)
- HPC systems and operating environment (e.g., On Demand File Systems, Infiniband Networks, Job Scheduling)
- Machine Learning and Data Mining (e.g., RapidMiner, scikit)
- Data-Intensive Computing (e.g., Hadoop, Spark).
- HPC and data analysis with Python (e.g., Numpy, Scipy, Pandas, Dask, Parsl)
- Distributed & Parallel File Systems (e.g., glusterFS, BeeGFS)
- Object Storage (e.g., S3, CEPH)
- Data Management System (e.g., dCache, iRods)
- Databases (e.g., SQL, NoSQL)
- Workflow management systems for HPC and data analysis (e.g., FireWorks, AiiDA, SimStack)
- Opportunistic resource integration and utilization (e.g., using COBalD/TARDIS)
- Authentication and authorization infrastructure (e.g., OpenID, SAML)

Students are individually supervised by scientific staff of the Steinbuch Centre for Computing and can apply their skills in a practical and research-oriented way by being involved in current research tasks (e.g., Helmholtz program, BMBF and EU projects).

Workload

3 SWS = 150 h per semester

- 12 h in meetings during the semester (kick-off, regular meetings with the supervisor, final meeting including presentation)
- 18 h preparation of meetings
- 120 h working on the topic and preparation of the exam

Recommendation

Knowledge in the area of databases, data management, data analytics, parallel computing is helpful.

M

5.159 Module: Practical Course: Biologically Inspired Robots [M-INFO-105495]

Responsible: Prof. Dr.-Ing. Rüdiger Dillmann

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-111039	Practical Course: Biologically Inspired Robots	6 CR	Rönnau

M

5.160 Module: Practical Course: Current Topics of Quantum Computing [M-INFO-106286]

Responsible: Prof. Dr.-Ing. Ina Schaefer
Prof. Dr. Achim Streit

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	English	4	2

Mandatory			
T-INFO-112741	Practical Course: Current Topics of Quantum Computing	6 CR	Schaefer, Streit

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

Students can understand scientifically motivated problems and process relevant literature to address the problem and possible solutions in cooperation with their supervisors. Using current quantum software frameworks, students can implement and evaluate practical solutions. Using the acquired knowledge and referring to current research results, students are able to interpret and comprehend their results. At regular meetings, progress is presented and possible obstacles are explained. Students can document the theory behind the solutions they have developed and present them in a comprehensible way.

Content

This practical course focuses on the theoretical analysis and practical implementation of current topics in quantum computing. The introduction covers necessary mathematical foundations of quantum systems and their representation by qubits and quantum circuits before delving into the specifics of the topics offered. Possible topics include quantum algorithms, optimization of quantum systems, quantum software engineering, or quantum machine learning.

There are fixed dates for topic assignment and lectures to introduce the topic of quantum computing. Additional face-to-face meetings to discuss individual progress are coordinated individually between the participants and supervisors. Participants work on separate tasks that are defined on the basis of current research work and thus offer realistic problems from practice and research. Assignments are graded individually, group work is possible. Prior knowledge and areas of interest of the participants are taken into account when assigning the topics.

Workload

- Attendance time 20h (Kick-off, introduction to theoretical aspects and topical areas, supervision meetings, closing event)
- Familiarization 20h
- Preparation of report and presentation 20h
- Independent work on the topic 120h
- Total 180h / 30 = 6 ECTS

Recommendation

- Knowledge of linear algebra is recommended
- Programming experience is helpful.

M**5.161 Module: Practical Course: Customized Embedded Processor Design [M-INFO-105740]****Responsible:** Prof. Dr.-Ing. Jörg Henkel**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-111457	Practical Course: Customized Embedded Processor Design	4 CR	

M

5.162 Module: Practical Course: Data Science [M-INFO-105632]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	pass/fail	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-111262	Practical Course: Data Science	6 CR	Böhm

M

5.163 Module: Practical Course: Data Science for Scientific Data [M-INFO-106329]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale pass/fail	Recurrence Irregular	Duration 1 term	Language English	Level 4	Version 1
---------------------	-----------------------------------	--------------------------------	---------------------------	----------------------------	-------------------	---------------------

Mandatory			
T-INFO-112844	Practical Course: Data Science for Scientific Data	6 CR	Böhm

M**5.164 Module: Practical Course: Database Systems [M-INFO-101662]**

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	pass/fail	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-103201	Practical Course: Database Systems	4 CR	Böhm

M 5.165 Module: Practical Course: Digital Design & Test Automation Flow [M-INFO-102570]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-105565	Practical Course Digital Design & Test Automation Flow	3 CR	Tahoori

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The objective of this lab is to have a hands-on practice on major steps in digital design and test automation flow, from system-level specification to physical design and verification.

Content

Electronic Design Automation (EDA) is used to develop nearly all novel electronic systems that we use in our daily lives, such as smartphones or laptops. In order to manage the high complexity of these systems, all steps in the design and verification phases are done automatically with the help of EDA tools.

The objective of this lab is to have a hands-on practice on major steps in digital design and test automation flow, from system-level specification to physical design and verification, using industrial EDA toolsets which are predominantly used in the industry and academia.

The students will work on some sample designs and go through all major design and test steps, one by one, in different sessions of the lab. So, by the end of this lab, they become familiar with the steps and tool chain in the digital design and test automation flow. The topics include system-level specification and simulation; high-level synthesis; logic-level synthesis and simulation; design for testability; test pattern generation and fault simulation; physical design and verification; timing analysis and closure; area, delay, and power estimation and analysis.

Workload

4 SWS / 3 CP = 90 h/week

Recommendation

Knowledge of “Dependable Computing” and “Fault Tolerant Computing” and Computer Architecture is helpful.

M

5.166 Module: Practical Course: Discrete Freeform Surfaces [M-INFO-101667]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-INFO-103208	Practical Course: Discrete Freeform Surfaces	6 CR	Prautzsch

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

The students of this course understand selected geometry processing problems with discrete representations (meshes and point clouds) and are able to develop and implement algorithms for their solutions.

Content

Current techniques to design, analyze and handle shapes given by point clouds and meshes for various applications.

Workload

180 h

M**5.167 Module: Practical Course: General-Purpose Computation on Graphics Processing Units [M-INFO-100724]****Responsible:** Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German	Level 4	Version 2
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-109914	Practical Course: General-Purpose Computation on Graphics Processing Units	3 CR	

M

5.168 Module: Practical Course: Geometric Modeling [M-INFO-101666]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-INFO-103207	Practical Course: Geometric Modeling	3 CR	Prautzsch

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

The students of this course understand selected geometry modelling problems and are able to develop and implement algorithms for their solutions.

Content

Current CAD-techniques to design, represent, modify and analyze shapes given as solids or by their boundary surfaces.

Workload

90 h

M

5.169 Module: Practical Course: Graphics and Game Development [M-INFO-105384]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German/English	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-110872	Practical Course: Graphics and Game Development	6 CR	Dachsbacher

M**5.170 Module: Practical Course: Hot Research Topics in Computer Graphics [M-INFO-104699]****Responsible:** Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German/English	4	1

Mandatory			
T-INFO-109577	Practical Course: Hot Research Topics in Computer Graphics	6 CR	Dachsbacher

Competence Goal

Students study scientific publications on currently hot topics of computer graphics, implement and evaluate state of the art methods, and compare them to newly developed approaches. The results of the practical course will be documented in the form of a scientific paper.

Content

Students in this practical course are introduced to theoretical and practical aspects of current research topics at the chair of computer graphics.

M**5.171 Module: Practical Course: Machine Learning and Intelligent Systems [M-INFO-105958]**

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
8	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-112104	Practical Course: Machine Learning and Intelligent Systems	8 CR	Fennel, Hanebeck

M**5.172 Module: Practical Course: Neural Network Exercises [M-INFO-103143]**

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-106259	Practical Course: Neural Network Exercises	3 CR	Waibel

M**5.173 Module: Practical Course: Programme Verification [M-INFO-101537]**

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German/English	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-102953	Practical Course: Programme Verification	3 CR	Beckert

M**5.174 Module: Practical Course: Scientific Data Management [M-INFO-106312]**

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	pass/fail	Irregular	1 term	German	4	1

Mandatory			
T-INFO-112810	Practical Course: Scientific Data Management	4 CR	Böhm

M**5.175 Module: Practical Course: Smart Data Analytics [M-INFO-103235]**

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-106426	Practical Course: Smart Data Analytics	6 CR	Beigl

M**5.176 Module: Practical Course: Smart Energy System Lab [M-INFO-105955]**

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-112030	Practical Course: Smart Energy System Lab	6 CR	Waczowicz

M**5.177 Module: Practical Course: Visual Computing [M-INFO-101567]****Responsible:** Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-103000	Practical Course: Visual Computing	6 CR	Dachsbacher

M**5.178 Module: Practical Course: Web Applications and Service-Oriented Architectures (II) [M-INFO-101635]****Responsible:** Prof. Dr. Sebastian Abeck**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-INFO-103121	Practical Course: Web Applications and Service-Oriented Architectures (II)	5 CR	Abeck

M

5.179 Module: Practical Introduction to Hardware Security [M-INFO-104357]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-INFO-108920	Practical Introduction to Hardware Security	6 CR	Tahoori

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The goal of this course, which is a combination of lectures and lab assignments, is to have a hands-on experience on basic concepts and new developments in hardware security, by combining both theory and practice in a coherent course. The theoretical concepts for each topic will be presented to the students in form of lectures, followed by a set of lab assignments on both hardware and software platforms to be performed by the students for each topic.

Content

1. Hardware security primitives (PUF, TRNG)
2. Hardware Implementation of encryption modules (AES)
3. Passive Attack with side channel (on AES)
4. Active fault attack (on AES)

Workload

4 SWS / 6 ECTS = 180h

2 SWS lecture (1,5h) + 2 SWS practical course (1,5h) / week

Recommendation

Knowledge of Digital Design (lecture TI)

Practical Course "FPGA Programming"

M**5.180 Module: Practical Project Robotics and Automation I (Software) [M-INFO-102224]**

Responsible: Prof. Dr.-Ing. Björn Hein
Prof. Dr.-Ing. Thomas Längle

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-104545	Practical Project Robotics and Automation I (Software)	6 CR	Hein, Längle

M**5.181 Module: Practical Project Robotics and Automation II (Hardware) [M-INFO-102230]**

Responsible: Prof. Dr.-Ing. Björn Hein
Prof. Dr.-Ing. Thomas Längle

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-104552	Practical Project Robotics and Automation II (Hardware)	6 CR	Hein, Längle

M

5.182 Module: Practical SAT Solving [M-INFO-102825]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	English	4	3

Mandatory			
T-INFO-105798	Practical SAT Solving	5 CR	Balyo, Iser, Sanders, Schreiber

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

Students are able to evaluate combinatorial problems, assess their complexity, and solve them using computers.

Students learn how to solve combinatorial problems efficiently using SAT Solving. Students are able to assess the practical complexity of decision and optimization problems, encode problems as SAT problems, and implement efficient solution procedures for combinatorial problems.

Students gain insight into state-of-the-art solution methods for SAT and related problems and their implementations in SAT solvers.

Content

The problem of propositional satisfiability (SAT) is an outstanding problem of computer science from a theoretical as well as practical perspective. Being the first problem proven to be NP-complete, it serves as a fundamental tool for research in complexity theory. Moreover, SAT solving has been established as one of the most important fundamental methods in hardware and software verification, and is used to solve hard combinatorial problems in industrial practice as well. This module aims to provide students with the theoretical and practical aspects of SAT-Solving. Covered are:

1. basics, historical development
2. encodings, e.g. cardinality constraints
3. phase transitions in random problems
4. local search (GSAT, WalkSAT, ..., ProbSAT)
5. resolution, Davis-Putnam algorithm, DPLL algorithm, look-ahead algorithm
6. efficient implementations, data structures
7. heuristics in the DPLL algorithm
8. CDCL algorithm, clause learning, implication graphs
9. restarts and heuristics in the CDCL algorithm
10. preprocessing, inprocessing
11. generation of proofs and their checking
12. parallel SAT solving (guiding paths, portfolios, cube-and-conquer)
13. related problems: MaxSAT, MUS, #SAT, QBF
14. advanced applications: Bounded model checking, planning, satisfiability-modulo-theories

Workload

Lecture (2 SWS) + exercise (1 SWS)

(Preparation and follow-up: 4h/week, exercises: 2h/week, preparation for exam: 15h)

Total workload: (2 SWS + 1 SWS + 4 SWS + 2 SWS) x 15 h + 15h preparation = 9x15h + 15h = 150h = 5 ECTS

M**5.183 Module: Practical: Course Engineering Approaches to Software Development [M-INFO-104254]****Responsible:** Prof. Dr. Ralf Reussner**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each term	1 term	German	4	1

Mandatory			
T-INFO-108791	Practical Course Engineering Approaches to Software Development	6 CR	Reussner

M**5.184 Module: Principles of Automatic Speech Recognition [M-INFO-100847]**

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101384	Principles of Automatic Speech Recognition	6 CR	Waibel

M

5.185 Module: Private Business Law [M-INFO-101216]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: Law

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Private Business Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-111405	Seminar: Commercial and Corporate Law in the IT Industry	3 CR	Nolte
T-INFO-101288	Corporate Compliance	3 CR	Herzig
T-INFO-102036	Computer Contract Law	3 CR	Menk
T-INFO-111436	Employment Law	3 CR	Hoff
T-INFO-111437	Tax Law	3 CR	Dietrich

Prerequisites

None

Competence Goal

The student

- has gained in-depth knowledge of German company law, commercial law and civil law;
- is able to analyze, evaluate and solve complex legal and economic relations and problems;
- is well grounded in individual labour law, collective labour law and commercial constitutional law, evaluates and critically assesses clauses in labour contracts;
- recognizes the significance of the parties to collective labour agreements within the economic system and has differentiated knowledge of labour disputes law and the law governing the supply of temporary workers and of social law;
- possesses detailed knowledge of national earnings and corporate tax law and is able to deal with provisions of tax law in a scientific manner and assesses the effect of these provisions on corporate decision-making.

Content

The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.

M

5.186 Module: Probability and Computing [M-INFO-106469]

Responsible: TT-Prof. Dr. Thomas Bläsius
Prof. Dr. Peter Sanders

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-113082	Probability and Computing	5 CR	Bläsius, Katzmann, Sanders

M

5.187 Module: Project Lab Applied Machine Learning [M-WIWI-106491]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each term	1 term	German	4	1

Election regulations

Elections in this module must be complete. Election is only possible until the lower bounds are reached.

Compulsory Elective Courses (Election:)			
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	5 CR	Zöllner

Competence Certificate

The module examination takes the form of an examination on the selected project lab. The control of success is described for each project lab.

Competence Goal

Students

- Are able to solve real-world scientific problems using modern machine learning approaches.
- Are able to specify, adapt, and implement learning-based models to problems.
- Know advantages of learning-based algorithms over traditional solution strategies.

Content

The module is to be regarded as a practice-oriented supplement to theoretical lectures on machine learning.

In the practical course, groups of two to four students each are given scientific tasks in the field of autonomous driving or robotics to be solved using modern ML-based methods. The tasks are of applied nature and mostly additionally require an integrating of the learned methods into existing systems provided by the chair and scientific partners. Due to the application reference, additional conditions are imposed on the learned procedures.

Students analyze the task, research the current state of the art, specify, implement and evaluate their own learning-based methods and present their results in a lecture and final report.

Annotation

The main difference of the internships within the module differ by the rotation in which they are held.

- Project Lab Cognitive Automobile every winter semester.
- Project Lab Machine Learning every summer semester.

Workload

The workload of 5 credit points consists of attendance time at the experimental site for the practical implementation of the selected solution, as well as time for literature research and planning/specification of the selected solution. In addition, a short report and presentation of the work carried out will be prepared.

Recommendation

Theoretical knowledge about machine learning methods is necessary. This can be acquired e.g. by lectures "Machine Learning 1: Basic Methods", or "Machine Learning 2: Advanced Methods". Also lectures of other research groups like "Machine Learning - Basics and Algorithms", "Deep Learning for Computer Vision 1/2" or "Deep Learning and Neural Networks" lay good theoretical foundations for the project lab.

First experiences with deep learning frameworks in Python like PyTorch/Jax/Tensorflow are an advantage.

M**5.188 Module: Project Lab: Image Analysis and Fusion [M-INFO-102383]**

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-104746	Project Lab: Image Analysis and Fusion	6 CR	Beyerer

M

5.189 Module: Public Business Law [M-INFO-101217]

Responsible: N.N.

Organisation: KIT Department of Informatics

Part of: Law

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Public Business Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-101309	Telecommunications Law	3 CR	
T-INFO-101312	European and International Law	3 CR	Brühann
T-INFO-111404	Seminar: IT- Security Law	3 CR	Schallbruch

Competence Certificate

see course description.

M**5.190 Module: Rationale Splines [M-INFO-101857]**

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-103544	Rationale Splines	3 CR	Prautzsch

M**5.191 Module: Rationale Splines [M-INFO-101853]**

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-103543	Rationale Splines	5 CR	Prautzsch

Prerequisites
 one

M

5.192 Module: Real-Time Systems [M-INFO-100803]

Responsible: Prof. Dr.-Ing. Thomas Längle
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101340	Real-Time Systems	6 CR	Längle

M

5.193 Module: Reconfigurable and Adaptive Systems [M-INFO-100721]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101258	Reconfigurable and Adaptive Systems	3 CR	Henkel

M

5.194 Module: Reliable Computing I [M-INFO-100850]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-INFO-101387	Reliable Computing I	3 CR	Tahoori

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The objective of this course is to become familiar with general and state of the art techniques used in design and analysis of fault-tolerant digital systems.

Content

The objective of this course is to become familiar with general and state of the art techniques used in design and analysis of fault-tolerant digital systems. The students will study and investigate existing fault-tolerant systems. Both Hardware and software methods will be studied and new research topics will be investigated.

This course overviews reliable (fault-tolerant) computing and the design and evaluation of dependable systems, and provides a base for research in reliable systems. Models and methods are used in the analysis and design of fault-tolerant and highly reliable computer systems will be taught in this course. Topics include faults and their manifestations, fault/error modeling, reliability, availability and maintainability analysis, system evaluation, performance-reliability trade-offs, system level fault diagnosis, hardware and software redundancy techniques, and fault-tolerant system design methods.

Workload

2 SWS: 🇩🇪(2 SWS + 1,5 x 2 SWS) x 15 + 15 h preparation for the exam = 90 h = 3 ECTS 🇩🇪

M**5.195 Module: Requirements Engineering [M-INFO-100763]**

Responsible: Prof. Dr.-Ing. Anne Koziolk
Organisation: KIT Department of Informatics
Part of: [Informatics](#) (Usage until 3/31/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-101300	Requirements Engineering	3 CR	Koziolk

M**5.196 Module: Research Focus Class: Blockchain & Payment Channel Networks [M-INFO-105620]****Responsible:** Prof. Dr. Hannes Hartenstein**Organisation:** KIT Department of Informatics**Part of:** Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German/English	4	1

Mandatory			
T-INFO-111251	Research Focus Class: Blockchain & Payment Channel Networks	3 CR	Hartenstein
T-INFO-111252	Research Focus Class: Blockchain & Payment Channel Networks - Seminar	3 CR	Hartenstein

M

5.197 Module: Research Project (Project, 1st Semester) [M-INFO-105037]

Responsible: Prof. Dr. Bernhard Beckert
 Prof. Dr.-Ing. Michael Beigl
 Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
10	Grade to a tenth	Each term	2 terms	German	4	2

Mandatory			
T-INFO-110218	Research Project (Project, 1st Semester) - Oral Exam	3 CR	Beckert
T-INFO-110219	Research Project (Project, 1st Semester) - Presentation	3 CR	Beckert
T-INFO-110220	Research Project (Project, 1st Semester) - Project Proposal	4 CR	Beckert

M

5.198 Module: Research Project (Project, 2nd Semester) [M-INFO-105038]

Responsible: Prof. Dr. Bernhard Beckert
 Prof. Dr.-Ing. Michael Beigl
 Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
10	Grade to a tenth	Each term	2 terms	German	4	1

Mandatory			
T-INFO-110221	Research Project (Project, 2nd Semester) - Oral Exam	3 CR	Beckert
T-INFO-110222	Research Project (Project, 2nd Semester) - Presentation	3 CR	Beckert
T-INFO-110223	Research Project (Project, 2nd Semester) - Scientific Report	4 CR	Beckert

M

5.199 Module: Research Project Autonomous Learning Robots [M-INFO-105378]

Responsible: Prof. Dr. Gerhard Neumann
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-110861	Research Project Autonomous Learning Robots	6 CR	Neumann

M

5.200 Module: Robotics - Practical Course [M-INFO-102522]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	English	4	3

Mandatory			
T-INFO-105107	Robotics - Practical Course	6 CR	Asfour

Competence Certificate

See partial Achievements (Teilleistung)

Prerequisites

See partial Achievements (Teilleistung)

Competence Goal

The student knows concrete solutions for different problems in robotics. He/she uses methods of inverse kinematics, grasp and motion planning, and visual perception. The student can implement solutions in the programming language C++ with the help of suitable software frameworks.

Content

The practical course is offered as an accompanying course to the lectures Robotics I-III. Every week, a small team of students will work on solving a given robotics problem. The list of topics includes robot modeling and simulation, inverse kinematics, robot programming via state charts, collision-free motion planning, grasp planning, robot vision and robot learning.

Workload

Practical course with 4 SWS, 6 LP
 6 LP corresponds to 180 hours, including
 2 hours introductory event
 18 hours initial familiarization with the software framework
 120 hours group work
 40 hours attendance time

Recommendation

Attending the lectures Robotics I – Introduction to Robotics, Robotics II: Humanoid Robotics, Robotics III - Sensors and Perception in Robotics and Mechano-Informatics and Robotics is recommended.

M 5.201 Module: Robotics I - Introduction to Robotics [M-INFO-100893]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits 6	Grading scale Grade to a tenth	Recurrence Each winter term	Duration 1 term	Language German/English	Level 4	Version 3
---------------------	--	---------------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-108014	Robotics I - Introduction to Robotics	6 CR	Asfour

Competence Certificate
 See partial achievements (Teilleistung)

Prerequisites
 See partial achievements (Teilleistung)

Competence Goal
 The student is able to apply the presented concepts to simple and realistic tasks from robotics. This includes mastering and deriving the mathematical concepts relevant for robot modeling. Furthermore, the student masters the kinematic and dynamic modeling of robot systems, as well as the modeling and design of simple controllers. The student knows the algorithmic basics of motion and grasp planning and can apply these algorithms to problems in robotics. He/she knows algorithms from the field of image processing and is able to apply them to problems in robotics. He/she is able to model and solve tasks as a symbolic planning problem. The student has knowledge about intuitive programming procedures for robots and knows procedures for programming and learning by demonstration.

Content
 The lecture provides an overview of the fundamentals of robotics using the examples of industrial robots, service robots and autonomous humanoid robots. An insight into all relevant topics is given. This includes methods and algorithms for robot modeling, control and motion planning, image processing and robot programming. First, mathematical basics and methods for kinematic and dynamic robot modeling, trajectory planning and control as well as algorithms for collision-free motion planning and grasp planning are covered. Subsequently, basics of image processing, intuitive robot programming especially by human demonstration and symbolic planning are presented.

In the exercise, the theoretical contents of the lecture are further illustrated with examples. Students deepen their knowledge of the methods and algorithms by independently working on problems and discussing them in the exercise. In particular, students can gain practical programming experience with tools and software libraries commonly used in robotics.

Workload
 Lecture with 3 SWS + 1 SWS Tutorial, 6 LP
 6 LP corresponds to 180 hours, including
 15 * 3 = 45 hours attendance time (lecture)
 15 * 1 = 15 hours attendance time (tutorial)
 15 * 6 = 90 hours self-study and exercise sheets
 30 hours preparation for the exam

M

5.202 Module: Robotics II - Humanoid Robotics [M-INFO-102756]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	3

Mandatory			
T-INFO-105723	Robotics II - Humanoid Robotics	3 CR	Asfour

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The students have an overview of current research topics in autonomous learning robot systems using the example of humanoid robotics. They are able to classify and evaluate current developments in the field of cognitive humanoid robotics.

The students know the essential problems of humanoid robotics and are able to develop solutions on the basis of existing research.

Content

The lecture presents current work in the field of humanoid robotics that deals with the implementation of complex sensorimotor and cognitive abilities. In the individual topics different methods and algorithms, their advantages and disadvantages, as well as the current state of research are discussed.

The topics addressed are: Applications and real world examples of humanoid robots; biomechanical models of the human body, biologically inspired and data-driven methods of grasping, imitation learning and programming by demonstration; semantic representations of sensorimotor experience as well as cognitive software architectures of humanoid robots.

Workload

Vorlesung mit 2 SWS, 3 LP.

3 LP entspricht ca. 90 Stunden, davon

ca. 15 * 2h = 30 Std. Präsenzzeit Vorlesung

ca. 15 * 2h = 30 Std. Vor- und Nachbereitungszeit Vorlesung

ca. 30 Std. Prüfungsvorbereitung und Präsenz in selbiger

Recommendation

Robotik I - Einführung in die Robotik and *Mechano-Informatik in der Robotik* is recommended.

M

5.203 Module: Robotics III - Sensors and Perception in Robotics [M-INFO-104897]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-109931	Robotics III - Sensors and Perception in Robotics		3 CR Asfour

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The student can name the main sensor principles used in robotics.

The student can explain the data flow from physical measurement through digitization to the use of the recorded data for feature extraction, state estimation and semantic scene understanding.

The student is able to propose and justify suitable sensor concepts for common tasks in robotics.

Content

The lecture supplements the lecture Robotics I with a broad overview of sensors used in robotics. The lecture focuses on visual perception, object detection, simultaneous localization and mapping (SLAM) and semantic scene interpretation. The lecture is divided into two parts:

In the first part a comprehensive overview of current sensor technologies is given. A basic distinction is made between sensors for the perception of the environment (exteroceptive) and sensors for the perception of the internal state (proprioceptive).

The second part of the lecture concentrates on the use and interpretation of exteroceptive sensors in robotics. The topics covered include tactile exploration and visual data processing, including advanced topics such as feature extraction, object detection, simultaneous localization and mapping (SLAM) and semantic scene understanding.

Workload

Lecture with 2 SWS, 3 LP

3 LP corresponds to 90 hours, including

15 * 2 = 30 hours attendance time

15 * 2 = 30 hours self-study

30 hours preparation for the exam

Recommendation

Attending the lecture Robotics I – Introduction to Robotics is recommended.

M **5.204 Module: Scientific Methods to Design and Analyze Secure Decentralized Systems [M-INFO-105780]**

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: Informatics

Credits 5	Grading scale Grade to a tenth	Recurrence Each winter term	Duration 1 term	Language English	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	----------------------------	-------------------	---------------------

Mandatory			
T-INFO-111568	Scientific Methods to Design and Analyze Secure Decentralized Systems	5 CR	Hartenstein

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

1. Philosophy of Science: The student understands epistemological principles like the scientific and mathematical process, within the context of networked and decentralized systems. The student knows about the current limits of scientific research, especially in regards to the security of a given decentralized system.
2. Empirical Methods: Observation / Monitoring: The student is able to construct setups to monitor system properties related to performance or security. The student knows how to observe a decentralized system like an overlay network without interference, i.e., without impact on the behavior to measure as well as the overall system functionality.
3. Combined Empirical / Formal Methods: The student has a fundamental understanding of Discrete Event Simulations, as well as stochastic modelling and random number generation. The student is able to conduct a simulation study consisting of observation, modelling, simulation, validation, and result analysis.
4. Formal Methods: The student knows how to apply formal methods like formal verification / model checking and model comparison / simulation-based proofs to decentralized systems. The student understands tradeoffs between empirical and formal methods, and can choose suitable methods for given research tasks.
5. Applications in Research: The student understands how the methods of this lecture are applied to practical examples, and knows how to apply the methods on problems of a researcher’s everyday life.

Content

Decentralized Systems (like peer-to-peer- or blockchain-based systems) are systems controlled by multiple parties who make their own independent decisions to reach a common goal. However, not knowing which parties are trustworthy and which are betrayers requires a radically different way of thinking. Based on the lecture “Decentralized Systems: Fundamentals, Modeling, and Applications”, in this lecture, we cover the necessary scientific methods to analyze existing and to create new decentralized systems. We treat both, selected empirical and formal methods and their tradeoffs, as well as the overarching philosophy of science behind the research process. Together with its practical parts, this lecture provides the foundational scientific toolbox to work on the decentralized systems of the future.

Workload

1. Attendance time (Course, exercise,): 3 SWS: 15 x 3h = 45h
 2. Self-study (e.g. independent review of course material, work on homework assignments)
 Weekly preparation and follow-up of the lecture/exercise: 15 x 3 SWS x 1,5h = 67,5hh
 3. Preparation for the exam: 37,5h
- $\Sigma = 150h = 5$ ECTS

Recommendation

Prior knowledge on the abstract concepts as well as concrete use cases of decentralized systems is strongly recommended. The “Decentralized Systems: Fundamentals, Modeling, and Applications” lecture covers all necessary aspects, but equivalent lectures and / or self-study can also be sufficient.

M

5.205 Module: Seminar Information Systems [M-WIWI-104815]

Responsible: Studiendekan der KIT-Fakultät für Informatik
Studiendekan des KIT-Studienganges

Organisation: KIT Department of Economics and Management

Part of: Seminars

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German	1	1

Mandatory			
T-WIWI-109827	Seminar in Information Systems (Master)		3 CR Studiendekan der KIT-Fakultät für Informatik, Studiendekan des KIT-Studienganges

Competence Certificate

The assessment is done by a seminar with at least 3 CP.

The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

Prerequisites

None.

Competence Goal

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Content

The module consists of a seminar, that is related to the research field of economic sciences. A complete list of available seminars is published in the internet.

Annotation

The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.

Workload

The total workload for this module is approximately 90 hours.

M

5.206 Module: Seminar Laboratory: Machine Learning and Intelligent Systems [M-INFO-105959]**Responsible:** Prof. Dr.-Ing. Uwe Hanebeck**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-112105	Seminar Laboratory: Machine Learning and Intelligent Systems	3 CR	Fennel, Hanebeck

M

5.207 Module: Seminar Module Economic Sciences [M-WIWI-102736]

Responsible: Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: [Seminars](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German	1	1

Compulsory Elective Courses (Election: 1 item)			
T-WIWI-103474	Seminar in Business Administration A (Master)	3 CR	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
T-WIWI-103478	Seminar in Economics A (Master)	3 CR	Professorenschaft des Fachbereichs Volkswirtschaftslehre
T-WIWI-103481	Seminar in Operations Research A (Master)	3 CR	Nickel, Rebennack, Stein
T-WIWI-103483	Seminar in Statistics A (Master)	3 CR	Grothe, Schienle

Competence Certificate

The assessment is done by a seminar with at least 3 CP.

The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

Prerequisites

None.

Competence Goal

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.
- Students are familiar with the DFG's Code of Conduct "Guidelines for Safeguarding Good Research Practice" and base their scientific work on it.

Content

The module consists of a seminar, that is related to the research field of economic sciences. A complete list of available seminars is published in the internet.

The teaching of the DFG Code "Guidelines for Safeguarding Good Research Practice" takes place within the [online course "Good Scientific Practice"](#) of the KIT Library, which can be completed in self-study.

Annotation

The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.

Workload

The total workload for this module is approximately 90 hours.

M

5.208 Module: Seminar Module Informatics [M-INFO-102822]

Organisation: KIT Department of Informatics
KIT Department of Economics and Management

Part of: Seminars

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German/English	1	2

Compulsory Elective Seminar in Informatics (Election: 1 item)			
T-INFO-104336	Seminar Informatics A	3 CR	Abeck
T-WIWI-103480	Seminar in Informatics B (Master)	3 CR	Professorenschaft des Instituts AIFB
T-INFO-111205	Seminar Informatics Master	3 CR	

M**5.209 Module: Seminar Module Law [M-INFO-101218]****Responsible:** N.N.**Organisation:** KIT Department of Informatics**Part of:** [Seminars](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German	1	1

Mandatory			
T-INFO-101997	Seminar: Legal Studies I	3 CR	N.N.

M

5.210 Module: Service Analytics [M-WIWI-101506]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	9

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-112152	Practical Seminar: Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

Content

The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data “Big Data” and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

Annotation

This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

The course Service Analytics A [2595501] should be taken.

M

5.211 Module: Service Design Thinking [M-WIWI-101503]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	English	4	1

Mandatory			
T-WIWI-102849	Service Design Thinking	12 CR	Satzger, Terzidis

Competence Certificate

The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Prerequisites

None

Competence Goal

- Deep knowledge of the innovation method Design Thinking, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one's ideas, to test and iteratively develop them, and to converge on a solution
- Learn to apply the method to a real innovation projects issued by industry partners.

Content

- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (intern. Design Thinking network).
- Design Space Exploration: Exploring the problem space through customer and user observation as well as desk research.
- Critical Function Prototype: Identification of critical features from the customer's perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are in the focus of this phase.
- Funky Prototype: Integration of the individually tested and successful functions to several complete solution scenarios, which are further tested and developed.
- Functional Prototype: Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is laid out in detail and tested with users.
- Final Prototype: Implementing the functional prototype and presenting it to the customer.

Annotation

Due to practical project work as a component of the program, access is limited.

The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.

For more information on the application process and the program itself are provided in the module component description and the program's website (<http://sdt-karlsruhe.de>).

Furthermore, the KSRI conducts an information event for applicants every year in May.

This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.

Workload

The total amount of work for this module is approx. 270 hours (9 credits). The workload for this course is comparably high as the course runs in cooperation with partner universities from around the world as well as partner companies. This causes overhead.

Recommendation

This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

M

5.212 Module: Service Economics and Management [M-WIWI-102754]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [Economics and Management \(Business Administration\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	6

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

Students

- understand the scientific basics of the management of digital services and corresponding systems
- gain a comprehensive insight in the importance and the most important features of information systems as an central component of the digitalization of business processes, products and services
- know the most relevant concepts and theories to shape the digital transformation process of service systems successfully
- understand the OR methods in the sector of service management and apply them adequately
- are able to use large amounts of available data systematically for the planning, operation and improvement of complex service offers and to design and control information systems
- are able to develop market-oriented coordination mechanisms and apply service systems.

Content

This module provides the foundation for the management of digital services and corresponding systems. The courses in this module cover the major concepts for a successful management of service systems and their digital transformation. Current examples from the research and practice enhance the relevance of the discussed topics.

Annotation

This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.213 Module: Service Innovation, Design & Engineering [M-WIWI-102806]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	4

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	Mädche
T-WIWI-102639	Business Models in the Internet: Planning and Implementation	4,5 CR	Weinhardt
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

Dependencies between courses:

The course Practical Seminar Service Innovation cannot be applied in combination with the course Practical Seminar Digital Service Design.

Competence Goal

Students

- know about the challenges, concepts, methods and tools of service innovation management and are able to use them successfully.
- have a profound comprehension of the development and design of innovative services and are able to apply suitable methods and tools on concrete and specific issues.
- are able to embed the concepts of innovation management, development and design of services into organisations
- are aware of the strategic importance of services, are able to present value creation in the context of services systems and to strategically exploit the possibilities of their digital transformation
- elaborate concrete and problem-solving solutions for practical tasks in teams.

Content

This module is designed to constitute the basis for the development of successful ICT supported innovations thus including the methods and tools for innovation management, for the design and the development of digital services and the implementation of new business models. Current examples from science and practice enhance the relevance of the topics addressed.

Annotation

This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

Attending the course Practical Seminar Service Innovation [2595477] is recommended in combination with the course Service Innovation [2595468].

Attending the course Practical Seminar Digital Service Design [new] is recommended in combination with the course Digital Service Design [new].

M

5.214 Module: Service Management [M-WIWI-101448]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	11

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger

Competence Certificate

The assessment is carried out as partial exams, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal

The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Content

The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Annotation

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

None

M

5.215 Module: Service Operations [M-WIWI-102805]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Operations Research\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	7

Election notes

At least one of the four courses Operations Research in Supply Chain Management, Operations Research in Health Care Management, Practical seminar: Health Care Management or Discrete-Event Simulation in Production and Logistics has to be assigned.

Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

Compulsory Elective Courses (Election: at most 2 items)			
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Spieckermann
T-WIWI-102884	Operations Research in Health Care Management	4,5 CR	Nickel
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-102716	Practical Seminar: Health Care Management (with Case Studies)	4,5 CR	Nickel
Supplementary Courses (Election: at most 1 item)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-WIWI-102872	Challenges in Supply Chain Management	4,5 CR	Mohr
T-WIWI-110971	Demand-Driven Supply Chain Planning	4,5 CR	Packowski

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

At least one of the four courses "Operations Research in Supply Chain Management", "Operations Research in Health Care Management", "Practical seminar: Health Care Management" or "Discrete-Event Simulation in Production and Logistics" has to be assigned.

Competence Goal

Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

Content

The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data "Big Data" and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

Annotation

This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation

The course Practical Seminar Health Care should be combined with the course OR in Health Care Management.

M

5.216 Module: Signals and Codes [M-INFO-100823]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Irregular	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	--------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101360	Signals and Codes	3 CR	Müller-Quade

M

5.217 Module: Software Architecture and Quality [M-INFO-100844]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101381	Software Architecture and Quality	3 CR	Reussner

M

5.218 Module: Software Engineering II [M-INFO-100833]

Responsible: Prof. Dr.-Ing. Anne Koziolk
Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101370	Software Engineering II	6 CR	Koziolk, Reussner

Content

Requirements engineering, software development processes, software quality, software architectures, MDD, Enterprise Software Patterns software maintainability, software security, dependability, embedded software, middleware, domain-driven design

M

5.219 Module: Software Lab Parallel Numerics [M-INFO-102998]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 6	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 2
---------------------	--	--------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-105988	Software Lab Parallel Numerics	6 CR	Karl

M**5.220 Module: Software Product Line Engineering [M-INFO-105471]**

Responsible: Prof. Dr.-Ing. Ina Schaefer
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-111017	Software Product Line Engineering	3 CR	Schaefer

M

5.221 Module: Software Security Engineering [M-INFO-106344]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German/English	4	1

Mandatory			
T-INFO-112862	Software Security Engineering	3 CR	Gerking, Reussner

M

5.222 Module: Software-Evolution [M-INFO-100719]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits
3

Grading scale
Grade to a tenth

Recurrence
Each winter term

Duration
1 term

Level
4

Version
1

Mandatory			
T-INFO-101256	Software-Evolution	3 CR	Reussner

Prerequisites

None

M

5.223 Module: Statistics and Econometrics II [M-WIWI-105414]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)
[Economics and Management \(Statistics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	5

Compulsory Elective Courses (Election:)			
T-WIWI-103063	Analysis of Multivariate Data	4,5 CR	Grothe
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle
T-WIWI-112153	Microeconometrics	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller

Competence Certificate

The assessment is carried out as partial exams of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None.

Competence Goal

The student

- shows an advanced understanding of Econometric techniques and statistical model building.
- is able to develop advanced Econometric models for applied problems based on available data
- is able to apply techniques and models efficiently with statistical software, to interpret results and to judge on different approaches with appropriate statistical criteria.

Content

The courses provide foundations of advanced Econometric and statistical techniques for regression, time series and multivariate analysis.

Workload

The total workload for this module is approximately 270 hours.

M

5.224 Module: Stochastic Information Processing [M-INFO-100829]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-101366	Stochastic Information Processing	6 CR	Hanebeck

M

5.225 Module: Stochastic Optimization [M-WIWI-103289]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Operations Research\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	10

Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-106545	Optimization under Uncertainty	4,5 CR	Rebennack
T-WIWI-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate

The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

At least one of the courses "Advanced Stochastic Optimization", "Large-scale Optimization" or "Introduction to Stochastic Optimization" has to be taken.

Competence Goal

The student

- names and describes basic notions for advanced stochastic optimization methods, in particular, ways to algorithmically exploit the special model structures,
- knows the indispensable methods and models for quantitative analysis of stochastic optimization problems,
- models and classifies stochastic optimization problems and chooses the appropriate solution methods to solve also challenging stochastic optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to make suggestions to adapt them to practical problems.

Content

The module focuses on the modeling as well as the imparting of theoretical principles and solution methods for optimization problems with special structure, which occur for example in the stochastic optimization.

Annotation

The courses are sometimes offered irregularly. The curriculum, planned for three years in advance, can be found on the Internet at <http://sop.ior.kit.edu/28.php>.

Workload

The total workload for this module is approximately 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module. The total number of hours per course is determined by the amount of time spent attending the lectures and exercises, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.

Recommendation

It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.

M

5.226 Module: Subdivision Algorithms [M-INFO-101863]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-103551	Subdivision Algorithms	3 CR	Prautzsch

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

Students of this course are knowledgeable about subdivision algorithms and are able to analyze the smoothness of subdivision algorithms.

Content

Chaikin algorithm, Lane-Riesenfeld algorithm, stationary subdivision for curves, regular quadrilateral, triangular and hexagonal meshes, the subdivision symbol, stencils, difference and derivative schemes, convergence theorems, four-point scheme, box spline subdivision, half box spline subdivision, stationary subdivision of arbitrary meshes with extraordinary points, the midpoints scheme, subdivision matrix, characteristic map, differentiability at extraordinary points, the simplest subdivision scheme, Doo-Sabin algorithm, Catmull-Clark algorithm, WAVE schemes including Loop's scheme, butterfly scheme, sqrt 3 scheme, 4-8 scheme, Ck subdivision algorithms, corner cutting and similar topics.

Workload

90h of which about

30h for attending the lecture

30h for post-processing

30h for exam preparation

M**5.227 Module: Symmetric Encryption [M-INFO-100853]**

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits 3	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	---------------------------	-------------------	---------------------

Mandatory			
T-INFO-101390	Symmetric Encryption	3 CR	Müller-Quade

M

5.228 Module: Telematics [M-INFO-100801]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-101338	Telematics	6 CR	Zitterbart

Competence Certificate

See partial achievement.

Prerequisites

See partial achievement.

Competence Goal

Students

- master protocols, architectures, and methods and algorithms that are used on the Internet for routing and for establishing a reliable end-to-end connection, as well as various media allocation procedures in local networks.
- have an understanding of the systems and the problems that appear in a global, dynamic network as well as the mechanisms used to remedy them.
- are familiar with current developments such as SDN and data center networking.
- know methods to manage and administrate networks.

Students master the basic protocol mechanisms for establishing reliable end-to-end communication. Students have detailed knowledge of the mechanisms used in TCP for congestion and flow control and can discuss the issue of fairness with multiple parallel transport streams. Students can analytically determine the performance of transport protocols and know methods that fulfill special requirements of TCP, such as high data rates and short latencies. Students are familiar with current topics such as problems introduced by utilization of middle boxes in the Internet, the use of TCP in data centers and multipath TCP. Students can use transport protocols in practice.

Students know the functions of routers in the Internet and can reproduce and apply common routing algorithms. Students can reproduce the architecture of a router and know different approaches to buffer placement as well as their advantages and disadvantages.

Students understand the distinction of routing protocols into interior and exterior gateway protocols and have detailed knowledge of the functionality and properties of common protocols such as RIP, OSPF and BGP. The students are familiar with current topics such as SDN.

Students know the function of media allocation and can classify and analytically evaluate media allocation processes. Students have in-depth knowledge of Ethernet and are familiar with various Ethernet forms and their differences, especially current developments such as real-time Ethernet and data center Ethernet. Students can reproduce and apply the spanning tree protocol. Students can reproduce the technical characteristics of DSL. Students are familiar with the concept of label switching and can compare existing approaches such as MPLS.

Content

- Introduction
- End-to-end data transport
- Routing protocols and architectures
- Media allocation
- Bridges
- Data transmission
- Further selected examples
- Network management

Workload

180 hrs.

M 5.229 Module: Testing Digital Systems I [M-INFO-100851]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: Informatics

Credits 3	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language English	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	----------------------------	-------------------	---------------------

Mandatory			
T-INFO-101388	Testing Digital Systems I	3 CR	Tahoori

Competence Certificate
 See partial achievements (Teilleistung)

Prerequisites
 See partial achievements (Teilleistung)

Competence Goal
 The course provides the basic techniques for testing digital circuits

Content
 Testing of digital circuits plays a critical role during the design and manufacturing cycles. It also ensures the quality of parts shipped to the customers. Test generation and design for testability are integral parts of automated design flow of all electronics products. The objective of this course is to provide the foundations for developing test methods for digital systems and provides the techniques necessary to practice design for testability.

This course encompasses the theoretical and practical aspects of digital systems testing and the design of easily testable circuits. Topics include Introduction to Testing (testing definition, types of test, automatic test equipment, test economics, and quality models), Failures and Errors (definitions, failure modes, failure mechanisms, reliability defects), Faults (fault models, stuck-at faults, bridging faults, timing faults, transistor-level faults, functional-level faults, effectiveness of different fault models based on real data), Logic and Fault Simulation (fault equivalence and fault collapsing, true-value simulation, fault simulation algorithms, statistical methods), Test Generation for Combinational Circuits (algebraic methods, path-tracing (D-alg, PODEM, FAN), testability metrics, test file compression), Digital Design-For-Testability and Internal Scan Design (ad-hoc methods, scan architectures, scan-based test methodology).

Workload
 2 SWS (2 SWS + 1,5 x 2 SWS) x 15 + 15 h preparation for the exam = 90 h = 3 ECTS

M 5.230 Module: Testing Digital Systems II [M-INFO-102962]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-INFO-105936	Testing Digital Systems II	3 CR	Tahoori

Competence Certificate
 See partial achievements (Teilleistung)

Prerequisites
 See partial achievements (Teilleistung)

Competence Goal
 The objective of this course is to provide more advanced topics on testing of digital systems and complement the foundation covered in Testing Digital Systems I.

Content
 Testing of digital circuits plays a critical role during the design and manufacturing cycles. It also ensures the quality of parts shipped to the customers. Test generation and design for testability are integral parts of automated design flow of all electronic products. The objective of this course is to provide more advanced topics on testing of digital systems and complement the foundation covered in Testing Digital Systems I.
 Topics include Functional and Structural Testing (design verification vectors, exhaustive test, pseudo-exhaustive test, pseudo-random testing), Essentials of Test Generation for Sequential Circuits (state-machine initialization, time-frame expansion method), Built-in Self Test (test economics of BIST, test pattern generation, output response analysis, BIST architectures), Boundry Scan (Boundry scan architectures, BS test methodology), Delay Testing (path delay test, hazard-free, robust, and non-robust delay tests), transition faults, delay test schemes), Current-Based Testing (motivation, test vectors for IDDQ, variations of IDDQ), Memory Test (memory test algorithm, memory BIST, memory repair), and DFT for System-on-Chip.

Workload
 2 SWS: (2 SWS + 1,5 x 2 SWS) x 15 + 15 h Klausurvorbereitung = 90 h = 3 ECTS

Recommendation
 Knowledge of Digital Design and Computer Architecture is helpful.

M

5.231 Module: Theoretical Foundations of Cryptography [M-INFO-105584]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-111199	Theoretical Foundations of Cryptography	6 CR	Müller-Quade

M

5.232 Module: Transport Infrastructure Policy and Regional Development [M-WIWI-101485]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [Economics and Management \(Economics\)](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	2

Compulsory Elective Courses (Election: 2 items)			
T-WIWI-103107	Spatial Economics	4,5 CR	Ott
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The students

- understand the economic issues related to transport and regional development with a main focus on economic policy issues generated by the relationship of transport and regional development with the public sector
- are able to compare different considerations of politics, regulation and the private sector and to analyse and assess the respective decision problems both qualitatively and by applying appropriate methods from economic theory
- are prepared for careers in the public sector, particularly for public companies, politics, regulatory agencies, related consultancies, mayor construction companies or infrastructure project corporations

Content

The development infrastructure (e.g. transport, energy, telecommunications) has always been one of the most relevant factors for economic development and particularly influences the development of the regional economy. From the repertoire of state actions, investments into transport infrastructure are often regarded the most important measure to foster regional economic growth. Besides the direct effects of transport policy on passenger and freight transport, a variety of individual economic activities is significantly dependent on the available or potential transport options. Decisions on the planning, financing and realization of mayor infrastructure projects require a solid and far-reaching consideration of direct and indirect growth effects with the occurring costs.

Through its combination of lectures the module reflects the complex interdependencies between infrastructure policy, transport industry and regional policy and provides its participants with a comprehensive understanding of the functionalities of one of the most important sectors of the economy and its relevance for economic policy.

Annotation

The courses *Assessment of Public Policies and Projects I* (winter term) and *Assessment of Public Policies and Projects II* (summer term) will no longer be part of this module. Student who have already had exams in this courses can integrate these exams in this module.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M

5.233 Module: Ubiquitous Computing [M-WIWI-101458]

Responsible: N.N.
Prof. Dr. Hartmut Schreck

Organisation: KIT Department of Economics and Management

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Mandatory			
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl
Supplementary Courses (Election: between 4 and 5 credits)			
T-WIWI-102761	Advanced Lab in Ubiquitous Computing	4 CR	Beigl, Schreck
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites

See German version

Competence Goal

The student

- gets comprehensive knowledge about topics in the area of Ubiquitous Computing
- can design and evaluate ubiquitous systems in different application areas
- acquires appropriate knowledge for addressing specialized aspects in the area of ubiquitous computing

Content

Ubiquitous information technology (Ubiquitous Computing) addresses the ubiquitous (or pervasive) availability of information processing. The availability of these systems has the objective to facilitate the operational environment in technical scenarios or in daily life of humans and to enrich it with new capabilities. This module provides fundamentals of ubiquitous computing and further topics like network and Internet technologies, security aspects, the analysis of autonomously operating systems in Organic Computing and also the utilisation of information and communication technologies in highly decentralized energy systems.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

M**5.234 Module: Ubiquitous Computing [M-INFO-100789]**

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German/English	4	1

Mandatory			
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl

M**5.235 Module: Visualization [M-INFO-100738]****Responsible:** Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits 5	Grading scale Grade to a tenth	Recurrence Each summer term	Duration 1 term	Language German/English	Level 4	Version 1
---------------------	--	---------------------------------------	---------------------------	-----------------------------------	-------------------	---------------------

Mandatory			
T-INFO-101275	Visualization	5 CR	Dachsbacher

M

5.236 Module: Wearable Robotic Technologies [M-INFO-103294]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Prof. Dr.-Ing. Michael Beigl

Organisation: KIT Department of Informatics

Part of: [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	English	4	2

Mandatory			
T-INFO-106557	Wearable Robotic Technologies	4 CR	Asfour, Beigl

Competence Certificate

See partial achievements (Teilleistung)

Prerequisites

See partial achievements (Teilleistung)

Competence Goal

The student has received fundamental knowledge about wearable robotic technologies and understands the requirements for the design, the interface to the human body and the control of wearable robots. He/she is able to describe methods for modelling the human neuromusculoskeletal system, the mechatronic design, fabrication and composition of interfaces to the human body. The student understands the symbiotic human-machine interaction as a core topic of Anthropomatics and has knowledge of state-of-the-art examples of exoskeletons, orthoses and prostheses.

Content

The lecture provides an overview of wearable robot technologies (exoskeletons, prostheses and orthoses) and their potentials. It starts with the basics of wearable robotics and introduces different approaches to the design of wearable robots and their related actuator and sensor technology. The lecture focuses on modeling the neuromusculoskeletal system of the human body, the interfaces of wearable robots to the human body and the physical and cognitive human-robot interaction for tightly-coupled hybrid human-robot systems. Examples of current research and various applications of lower, upper and full body exoskeletons as well as prostheses are presented.

Workload

Lecture with 2 SWS, 4 LP
4 LP corresponds to 120 hours, including
15 * 2 = 30 hours attendance time
15 * 3 = 45 self-study
45 hours preparation for the exam

Recommendation

Attending the lecture Mechano-Informatics and Robotics is recommended.

M

5.237 Module: Web and Data Science [M-WIWI-105368]

Responsible: Dr.-Ing. Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	2

Compulsory Elective Courses (Election: at least 2 items)			
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- know the basics of machine learning, data mining and knowledge discovery
- can design, train and evaluate systems that are capable of learning
- carry out knowledge discovery projects, taking into account algorithms, representations and applications.
- will look at current research topics in the field of Web Science and
- learn about the topics Small World Problem, Network Theory, Social Network Analysis, Bibliometrics, Link Analysis and Search,
- apply interdisciplinary thinking and
- apply technological approaches to social science problems.

Content

The module focuses on machine learning and data mining methods for knowledge acquisition from large databases as well as web phenomena and the available technologies.

The lecture Knowledge Discovery gives an overview of approaches of machine learning and data mining for knowledge acquisition from large data sets. These are examined especially with respect to algorithms, applicability to different data representations and the use in real application scenarios.

Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.

The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.

Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

The lecture "Web Science" offers an insight into the analysis of social networks and the metrics used in this context. Thereby especially web phenomena and the available technologies.

Web Science is the emerging study of the people and technologies, applications, processes and practices that make the world Wide Web and are shaped and embodied. Web Science aims to develop theories, methods and findings from the entire academic disciplines and work with industry, business, politics and civil society to create an understanding of the Web: The largest socio-technical infrastructure in the history of mankind.

The lecture gives an introduction to the basic concepts of Web Science. Essential theoretical foundations, Phenomena and methods are presented and explained. This lecture aims to give students a basic knowledge and understanding of the structure and analysis of selected web phenomena and technologies. The topics include the small world problem, Network theory, social network analysis, graph-based search and technologies / standards / architectures.

Workload

The total workload for this module is approximately 270 hours.

M**5.238 Module: Web Applications and Service-Oriented Architectures (II) [M-INFO-100734]****Responsible:** Prof. Dr. Sebastian Abeck**Organisation:** KIT Department of Informatics**Part of:** [Informatics](#)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101271	Web Applications and Service-Oriented Architectures (II)	4 CR	Abeck

Competence Certificate

Siehe Teilleistung

M

5.239 Module: Web Data Management [M-WIWI-101455]

Responsible: Dr.-Ing. Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: 2 items)			
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

Competence Certificate

The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Competence Goal

Students

- develop ontologies for semantic web technologies und choose suitable representation languages,
- are able to provide data and applications via a cloud-based infrastructure
- transfer the methods and technologies of semantic web technologies and cloud computing to new application sectors,
- evaluate the potential of semantic web technologies and the cloud computing approaches for new application sectors.

Content

The module Web Data Management covers the basic principles, methods and applications for intelligent systems in the World Wide Web. Cloud Services are essential for the decentralized, scalable provision of data and applications as well as the methods of semantic web based on the description of data and services via metadata in form of so called ontologies.

Formal principles and practical aspects such as knowledge modeling and available representation language tools for ontologies are covered in detail. Methods for the realization of intelligent systems within the World Wide Web are treated and applications as in Web 2.0 or Service Science are discussed and evaluated.

Furthermore the application of modern Cloud technologies for the use of software and hardware as a service via internet is introduced. Cloud technologies allow the efficient implementation of applications on distributed computer clusters and permit a high scalability as well as new business models in the internet.

Workload

The total workload for this module is approximately 270 hours (9 credits). The allocation is based on the credits of the courses of the module. The workload for courses with 4.5 credits is about 135 hours.

The total number of hours per course results from the effort required to attend the lectures and exercises as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

6 Courses

T


6.1 Course: Access Control Systems: Models and Technology [T-INFO-112775]





Responsible: Prof. Dr.-Ing. Klemens Böhm

Organisation: KIT Department of Informatics

Part of: M-INFO-106303 - Access Control Systems: Models and Technology
M-WIWI-104812 - Information Systems: Engineering and Transformation

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2023	2400147	Access Control Systems: Models and Technology	3 SWS	Lecture / Practice / 	Hartenstein, Leinweber
Exams					
ST 2023	7500097	Access Control Systems: Models and Technology			Hartenstein
WT 23/24	7500192	Access Control Systems: Models and Technology			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 Nr. 1 SPO) lasting 60 minutes.

Depending on the number of participants, it will be announced six weeks before the examination (§ 6 Abs. 3 SPO) whether the success control

- in the form of an oral examination pursuant to § 4 Abs. 2 Nr. 2 SPO or
- in the form of a written examination in accordance with § 4 Abs. 2 Nr. 1 SPO takes place.

Prerequisites

None.

Recommendation


Basics according to the lectures "IT Security Management for Networked Systems" and "Telematics" are recommended.





T

6.2 Course: Advanced Artificial Intelligence [T-INFO-112768]

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: [M-INFO-106299 - Advanced Artificial Intelligence](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	2400141	Advanced Artificial Intelligence	4 SWS	Lecture / 	Waibel, Niehues, Asfour
Exams					
ST 2023	7500052	Advanced Artificial Intelligence			Niehues

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites

None.

Below you will find excerpts from events related to this course:

V

Advanced Artificial Intelligence

2400141, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

AI systems are increasingly integrated into our everyday lives. These are, for example, systems that can understand and generate language or analyze images and videos. In addition, AI systems are essential in robotics in order to be able to develop the next generation of intelligent robots.

Based on the knowledge of the lecture "Einführung in der KI", the students learn to understand, develop and evaluate these systems. In order to bring this knowledge closer to the students, the lecture is divided into 4 parts. First, the methods of perception using different modalities are treated. The second part deals with advanced methods of learning that go beyond supervised learning. Then methods are discussed that are required for the representation of knowledge in AI systems. Finally, methods are presented that enable AI systems to generate content.

-

Requirements:

None

Recommendations:

- "Einführung in der KI"
- Good basic knowledge of mathematics

Workload:

- approx. 180 hours, of which
- approx. 45 hours lecture attendance
- approx. 15 hours exercise visit
- approx. 90 hours post-processing and processing of the exercise sheets
- approx. 30 hours exam preparation

Learning goals:

- The students know the relevant elements of a technical cognitive system and their tasks.
- The students understand the algorithms and methods of AI to model technically cognitive systems.
- The students are able to understand the different sub-components to develop and analyze a system.
- The students can transfer this knowledge to new applications, as well as analyze and compare different methods.

success control:


See the module manual!





T

6.3 Course: Advanced Data Structures [T-INFO-105687]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-102731 - Advanced Data Structures](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Events					
ST 2023	2400164	Advanced Data Structures	3 SWS	Lecture / 	Kurpicz, Sanders
Exams					
ST 2023	7500538	Advanced Data Structures			Sanders

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

The examination takes place in the form of an oral examination and a project/experiment as an examination of success of a different kind

Weighting: 80% oral examination, 20% project/experiment.

Prerequisites

none.

Recommendation


The lecture builds on parts of the contents of the lectures Algorithms I and Algorithms II. Corresponding knowledge is therefore helpful.




T

6.4 Course: Advanced Data Structures Project/Experiment [T-INFO-111849]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-102731 - Advanced Data Structures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1	Grade to a third	Each summer term	1

Events					
ST 2023	2400164	Advanced Data Structures	3 SWS	Lecture / 	Kurpicz, Sanders
Exams					
ST 2023	7500354	Advanced Data Structures Project/Experiment			Sanders

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 120 minutes.

The examination takes place in the form of an oral examination and a project/experiment as an examination of success of a different kind

Weighting: 80% oral examination, 20% project/experiment.

Prerequisites

none.

Recommendation

The lecture builds on parts of the contents of the lectures Algorithms I and Algorithms II. Corresponding knowledge is therefore helpful.

T

6.5 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

Responsible: TT-Prof. Dr. Julian Thimme
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2530569	Advanced Empirical Asset Pricing	2 SWS	Lecture / 🔄	Thimme
WT 23/24	2530570	Übung zu Advanced Empirical Asset Pricing	1 SWS	Practice / 🔄	Thimme
Exams					
ST 2023	7900321	Advanced Empirical Asset Pricing			Thimme
WT 23/24	7900319	Advanced Empirical Asset Pricing			Thimme

Legend: 🟩 Online, 🔄 Blended (On-Site/Online), 🟦 On-Site, ✖ Cancelled

Competence Certificate

The success control takes place in form of a written examination (60 min) during the semester break. If the number of participants is low, an oral examination may also be offered. The examination is offered every semester and can be repeated at any regular examination date.

A bonus can be acquired by submitting exercise solutions to 80% of the assigned exercise tasks. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Recommendation

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course. In addition, prior participation in the Asset Pricing Master course is strongly recommended.

Annotation

New course from winter semester 2019/2020.

Below you will find excerpts from events related to this course:

V

Advanced Empirical Asset Pricing

2530569, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

In this course we will discuss the fundamentals of Asset Pricing and how to test them. Although this is an Empirical Asset Pricing course, we deal with some concepts from Asset Pricing Theory that we can test afterwards (CAPM, ICAPM, CCAPM, recursive utility). Besides, the course will cover the most important empirical methods to do so. For that purpose, we will discuss the overarching tool *Generalized Method of Moments*, and the special cases of OLS and FMB regressions. Every second week, we will meet for a programming session, in which we will look at the data to draw our own conclusions. An introduction to the software MATLAB will be given at the beginning of the course. Students should bring a laptop to these sessions. Programming skills are not required but helpful.

We start with a review of the Stochastic Discount Factor, which is already known from the course „Asset Pricing“. We then derive the CAPM and the Consumption-CAPM as special cases from the general consumption-savings optimization problem of the rational investor. In the first part of the course we discuss the CAPM and, as natural extensions, models with multiple factors. Prominent phenomena such as the value premium and momentum are discussed. In the second part of the lecture we will study extensions of Consumption-CAPM and study the implications of exotic preferences.

Organizational issues

Die Veranstaltung findet montags um 9:45-11:15 im Raum 209 am Campus B (Geb. 09.21) statt und endet nach ersten Semesterhälfte.

Literature**Basisliteratur**

Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.

zur Vertiefung/ Wiederholung

Investments and Portfolio Management / Bodie, Z., Kane, A., Marcus, A.J. - 9. ed., McGraw-Hill, 2011.

The econometrics of financial markets / Campbell, J.Y., Lo, A.W., MacKinlay, A.C. - 2. printing, with corrections, Princeton Univ. Press, 1997.

T

6.6 Course: Advanced Game Theory [T-WIWI-102861]

Responsible: Prof. Dr. Karl-Martin Ehrhart
 Prof. Dr. Clemens Puppe
 Prof. Dr. Johannes Philipp Reiß

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101500 - Microeconomic Theory](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2521533	Advanced Game Theory	2 SWS	Lecture / ●	Reiß
WT 23/24	2521534	Übung zu Advanced Game Theory	1 SWS	Practice / ●	Reiß, Peters
Exams					
ST 2023	7900126	Advanced Game Theory			Puppe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites

None

Recommendation

Basic knowledge of mathematics and statistics is assumed.

Below you will find excerpts from events related to this course:

V

Advanced Game Theory

2521533, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)


Lecture (V)
On-Site





T

6.7 Course: Advanced Lab Blockchain Hackathon (Master) [T-WIWI-111126]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events				
WT 23/24	2512403	Advanced Lab Blockchain Hackathon (Bachelor)		Practical course /  Sunyaev, Kannengießer, Sturm, Beyene
Exams				
ST 2023	7900172	Lab Blockchain Hackathon (Master)		Sunyaev

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites

None

T

6.8 Course: Advanced Lab in Ubiquitous Computing [T-WIWI-102761]

Responsible: Prof. Dr.-Ing. Michael Beigl
Prof. Dr. Hartmut Schmeck

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101458 - Ubiquitous Computing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Irregular	1

Competence Certificate

See German version

Prerequisites

None

Annotation











See German Version





T

6.9 Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101455 - Web Data Management
M-WIWI-101456 - Intelligent Systems and Services
M-WIWI-101477 - Development of Business Information Systems
M-WIWI-105366 - Artificial Intelligence
M-WIWI-105368 - Web and Data Science

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
ST 2023	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / 	Schiefer, Schüler, Toussaint
ST 2023	2512207	Lab Automation in Everyday Life (Master)	3 SWS	Practical course / 	Oberweis, Forell, Frister, Schiefer
ST 2023	2512401	Advanced Lab Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course / 	Sunyaev, Pandl, Goram, Leiser
ST 2023	2512403	Advanced Lab Blockchain Hackathon (Master)		Practical course / 	Sunyaev, Sturm, Kannengießer, Beyene
ST 2023	2512500	Project Lab Machine Learning	3 SWS	Practical course / 	Zöllner
WT 23/24	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / 	Oberweis, Toussaint, Schiefer, Schüler
WT 23/24	2512401	Practical Course Sociotechnical Information Systems Development (Master)	3 SWS	Practical course / 	Sunyaev, Goram, Leiser
WT 23/24	2512403	Advanced Lab Blockchain Hackathon (Bachelor)		Practical course / 	Sunyaev, Kannengießer, Sturm, Beyene
WT 23/24	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course / 	Zöllner, Daaboul
WT 23/24	2512600	Project lab Information Service Engineering (Master)	3 SWS	Practical course / 	Sack
Exams					
ST 2023	7900020	Lab Automation in Everyday Life (Master)			Oberweis
ST 2023	7900086	Project Lab Machine Learning			Zöllner
ST 2023	7900148	Advanced Lab Realization of innovative services (Master)			Oberweis
ST 2023	7900172	Lab Blockchain Hackathon (Master)			Sunyaev
ST 2023	7900173	Advanced Lab Development of Sociotechnical Information Systems (Master)			Sunyaev

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites

None

Annotation

The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

**Lab Realisation of innovative services (Master)**

2512205, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

**Practical course (P)
Blended (On-Site/Online)**

Content

As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

Organizational issues

Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

**Lab Automation in Everyday Life (Master)**

2512207, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

**Practical course (P)
Blended (On-Site/Online)**

Content

As part of the lab, various topics on everyday automation are offered. During the lab, the participants will gain an insight into problem-solving oriented project work and work on a project together in small groups.

Further information can be found on the ILIAS page of the lab.

Organizational issues

Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

**Advanced Lab Development of Sociotechnical Information Systems (Master)**

2512401, SS 2023, 3 SWS, Language: German/English, [Open in study portal](#)

**Practical course (P)
Online**

Content

The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

**Project Lab Machine Learning**

2512500, SS 2023, 3 SWS, Language: German/English, [Open in study portal](#)

**Practical course (P)
Blended (On-Site/Online)**

Content

The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:

The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

**Lab Realisation of innovative services (Master)**

2512205, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content

As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

Organizational issues

Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

**Practical Course Cognitive automobiles and robots (Master)**

2512501, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content

The lab is intended as a practical supplement to courses such as "Machine Learning 1/2".

Scientific topics, mostly in the area of autonomous driving and robotics, will be addressed in joint work with ML/KI methods. The goal of the internship is for participants to design, develop, and evaluate ML Software system.

In addition to the scientific goals, such as the study and application of methods, the aspects of project-specific teamwork in research (from specification to presentation of results) are also worked on in this internship.

The individual projects require the analysis of the set task, selection of appropriate methods, specification and implementation and evaluation of the solution approach. Finally, the selected solution is to be documented and presented in a short lecture.

Learning Objectives:

- Students will be able to practically apply theoretical knowledge from lectures on machine learning to a selected area of current research.
- Students will be proficient in analyzing and solving thematic problems.
- Students will be able to evaluate, document, and present their concepts and results.

Recommendations:

- Theoretical knowledge of machine learning and/or AI.
- Python knowledge
- Initial experience with deep learning frameworks such as PyTorch/Jax/Tensorflow may be beneficial.

Workload:

The workload of 5 credit points consists of practical implementation of the selected solution, as well as time for literature research and planning/specification of the selected solution. In addition, a short report and presentation of the work performed will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

**Project lab Information Service Engineering (Master)**

2512600, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

**Practical course (P)
On-Site**

Content

The ISE project lab is based on the summer semester lecture "Information Service Engineering". Goal of the course is to work on a given research problem in small groups (3-4 students) related to the ISE lecture topics, i.e. Natural Language Processing, Knowledge Graphs, and Machine Learning. The solution of the given research problem requires the development of a software implementation.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

Required coursework includes:

- Mid term presentation (5-10 min)
- Final presentation (10-15 min)
- Course report (c. 20 pages)
- Participation and contribution of the students during the course
- Software development and delivery

Notes:

The ISE project lab can also be credited as a **seminar** (if necessary).

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

Participation will be restricted to 16 students.

Participation in the lecture "Information Service Engineering" (summer semester) is required. There are video recordings on our youtube channel.

ISE Tutor Team:

- Dr. Genet Asefa Gesese
- M. Sc. Mirza Mohtasim Alam
- M. Sc. Oleksandra Bruns
- M. Sc. Ebrahim Norouzi
- M. Sc. Mary Ann Tan
- B. Sc. Tabea Tietz
- M. Sc. Mahsa Vafaie

WS 2023/24 Tasks List:

- **Task 1: Zero-shot Ultrafine Typing of Named Entities.** Use Pre-trained Language Models to assign predefined labels to entity mentions in a given context. Evaluate approaches which require no training data on a standard benchmark, i.e. UFET
- **Task 2: Object Detection on Historical Theatre Photographs.** Use Pre-trained DL models to detect and identify objects in historical theatre photographs and integrate the results into an existing Knowledge Graph.
- **Task 3: Automatically Generate Ontologies from Competency Questions using Language Models.** Competency questions (CQs) define the scope of knowledge represented in an ontology and are used to evaluate an ontology based on its ability to answer each question. In this task, we are investigating the benefit of Large Language Models to generate and evaluate ontologies from a set of competency questions.
- **Task 4: Boosting the Performance of Large Language Models for Question Answering with Knowledge Graph Integration.** Often, large language models hallucinate users with wrong or confusing answers. In order to generate relevant answers, knowledge graphs can help in many ways. The goal of this task is to utilize a knowledge graph to provide context and factual information to a language model, thereby improving the relevance and accuracy of its responses.
- **Task 5: Information Extraction and Knowledge Graph Engineering on the Use Case of Historical Political Flyers**
Information extraction and Knowledge Graph construction from digitized political leaflets of the Weimar Republic.
- **Task 6: Sentiment Analysis on Multilingual Wikipedia.** Analyse how different language Versions of Wikipedia differ in terms of Sentiment Bias.
- of a Knowledge Graph from 1.3 Mio Archival Objects from the German Digital Library

Literature

ISE video channel on youtube: <https://www.youtube.com/channel/UCjkkhNSNuXrJpMYZoeSBw6Q/>

T


6.10 Course: Advanced Lab Realization of Innovative Services (Master) [T-WIWI-112914]





Responsible: Prof. Dr. Andreas Oberweis

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101477 - Development of Business Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
ST 2023	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / 	Schiefer, Schüler, Toussaint
Exams					
ST 2023	7900148	Advanced Lab Realization of innovative services (Master)			Oberweis

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Annotation

As part of the lab, the participants should work together in small groups to produce innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

Below you will find excerpts from events related to this course:

V

Lab Realisation of innovative services (Master)

2512205, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content

As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

Organizational issues



Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

T

6.11 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104520 - Human Factors in Security and Privacy](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	see Annotations	2

Events					
WT 23/24	2512554	Praktikum Security, Usability and Society (Bachelor)	3 SWS	Practical course / 	Volkamer, Mayer, Berens, Mossano, Ballreich
WT 23/24	2512555	Praktikum Security, Usability and Society (Master)	3 SWS	Practical course / 	Volkamer, Mayer, Berens, Mossano, Ballreich

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites

None

Recommendation

Knowledge from the lecture "Information Security" is recommended.

Annotation

The course will not be offered in the summer semester 2023.

Below you will find excerpts from events related to this course:

V

Praktikum Security, Usability and Society (Bachelor)

2512554, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Online

Content

The Praktikum "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a back-up one, to mattia.mossano@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

Important dates:

Kick-off: 13.10.2022, 10:00 AM CET in Big Blue Button - [Link](#)

Report + code submission : 30.01.2023 23:59 CET

Presentation deadline : 30.01.2023, 23:59 CET

Presentation day: 01.02.2023

Topics:

Programming Usable Security Intervention

In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (<https://secuso.aifb.kit.edu/english/TORPEDO.php>) or PassSec + (<https://secuso.aifb.kit.edu/english/PassSecPlus.php>). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Title: Portfolio Graphical Recognition-Based PWDs with Gamepads

Number of students: 2 Bachelor or Master level

Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

Title: Development of a secure web interface with a ticket system for the Hashcat Password Cracker

Number of students: 2 Bachelor or Master level

Description: Hashcat is a console application which allows to crack passwords using a given wordlist or password pattern. In order to allow multiple not necessarily trustworthy users to register a password cracking job with the specified parameters in parallel, a web platform with a ticket system should be developed within the framework of this laboratory topic. Therefore a frontend and backend should be implemented separately and a clear description of the interface between is essential part of this work. Python with Flask Web Framework can be used to implement the backend. Good knowledge in programming, APIs and web security are required.

Designing Security User studies

These topics are related to how to set up and conducting user studies of various types. This year, due to the Corona outbreak, we decided to conduct online studies only; otherwise, interviews and in lab studies would have been possible. At the end of the semester, the students present a report / paper and a talk in which they present their results.

Title: NoPhish Cardgame

Number of students: 1/2 Bachelor level

Description: Das NoPhish Konzept findet bereits in vielen Formen Anwendung. Es hilft dabei betrügerische Nachrichten von legitimen zu unterscheiden. Die neueste Form ist ein Cardgame bei dem man spielerisch lernen kann Phishing zu erkennen. Hierbei wird sowohl grundlegendes Wissen, als auch konkretes Wissen vermittelt. Aufgabe: Erheben von Daten (Studiendesign ist bereits vorhanden) und Auswertung bestehender Daten mit neu erhobenen Daten

Title: Analysing the perceptions on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'

Number of students: 1/2 Bachelor or Master level

Description: Email subject extensions are used in myn organistions to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to developpe the study protocol and to collect first data which should be analysed.

Title: Benutzerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten

Number of students: 2 Bachelor or Master level

Description: Das KIT bietet den Beschäftigten und Studierenden die Möglichkeit, ihre E-Mail-Kommunikation mittels S/MIME-Zertifikaten abzusichern. Für die Nutzenden entsteht hierbei die Herausforderung, eingehende Nachrichten hinsichtlich gültiger Signatur und Verschlüsselung zu prüfen und mögliche Angriffe zu erkennen. Zielsetzung dieser Arbeit ist die Konzeption und Erstellung einer Nutzerstudie zur Evaluation von Schulungsmaterialien. Die Studie soll verschiedene Nutzungsszenarien bei der Erkennung von Angriffen (z.B. durch ungültige Zertifikate) und das Verhalten der Nutzenden innerhalb dieser Szenarien umfassen.

Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)

Number of students: 1 Bachelor or Master level

Description: The Privacy Friendly Apps are a set of applications developed by the SECUSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users (<https://secuso.aifb.kit.edu/english/105.php>). One of these apps is "Sudoku", available for Android on both the Google Store and F-Droid. Although the app is friendlier to privacy than other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g., <https://idarinstitute.com/products/arthritis-simulation-gloves>). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis..

Title: Replication and extension of "What is this URL's destination?" (English only)

Number of students: 1 Bachelor level

Description: Replication of studies is a fundamental part of the scientific process: it allows to confirm or deny experimental results and can open new lines of research. This topic is a replication of the study presented in Albakry, S., Vaniea, K. & Wolters, M.K. (2020) What is this URL's destination? Empirical Evaluation of Users' URL Reading" (<https://doi.org/10.1145/3313831.3376168>). The student will re-implement the study following the precise description from the original authors, run it and then compare the results with the previous iteration.

Title: Password Generator Defaults

Number of students: 2 Bachelor or Master level

Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking

Number of students: 1/2 Bachelor or Master level

Description: PassSec+ ist eine von SECUSO entwickelte Browser-Erweiterung für Firefox und Google Chrome, die hilft, Passwörter, Zahlungsdaten und andere sensible Daten besser zu schützen, indem es bereits vor der Eingabe dieser Daten prüft, ob eine sichere Dateneingabe gewährleistet ist und im Zweifel ein Dialog anzeigt, welcher den Nutzer bei der Entscheidung unterstützt. In der Nutzerstudie soll untersucht werden, wo der Fokus des Nutzers mit und ohne Benutzung von PassSec+ liegt und dabei die Effektivität zur Prävention vor Phishing untersucht werden. Es wird das Setup sowie der Aufbau der Studie bereits vorgegeben. Ziel ist es, die Nutzerstudie mit Probanden durchzuführen und die Daten entsprechend z.B. mit Heatmaps auszuwerten.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php.



Praktikum Security, Usability and Society (Master)

2512555, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Online

Content

The Praktikum "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a backup one, to mattia.mossano@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

WiWi portal: <https://portal.wiwi.kit.edu/ys/6273>

Important dates:

Kick-off: 13.10.2022, 10:00 AM CET in Big Blue Button - [Link](#)

Report + code submission : 30.01.2023 23:59 CET

Presentation deadline : 30.01.2023, 23:59 CET

Presentation day: 01.02.2023

Topics:

Programming Usable Security Intervention

In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (<https://secuso.aifb.kit.edu/english/TORPEDO.php>) or PassSec + (<https://secuso.aifb.kit.edu/english/PassSecPlus.php>). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Title: Portfolio Graphical Recognition-Based PWDs with Gamepads

Number of students: 2 Bachelor or Master level

Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

Title: Development of a secure web interface with a ticket system for the Hashcat Password Cracker

Number of students: 2 Bachelor or Master level

Description: Hashcat is a console application which allows to crack passwords using a given wordlist or password pattern. In order to allow multiple not necessarily trustworthy users to register a password cracking job with the specified parameters in parallel, a web platform with a ticket system should be developed within the framework of this laboratory topic. Therefore a frontend and backend should be implemented separately and a clear description of the interface between is essential part of this work. Python with Flask Web Framework can be used to implement the backend. Good knowledge in programming, APIs and web security are required.

Designing Security User studies

These topics are related to how to set up and conducting user studies of various types. This year, due to the Corona outbreak, we decided to conduct online studies only; otherwise, interviews and in lab studies would have been possible. At the end of the semester, the students present a report / paper and a talk in which they present their results.

Title: Analysing the perceptions on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'

Number of students: 1/2 Bachelor or Master level

Description: Email subject extensions are used in myn organistions to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

Title: Benutzerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten

Number of students: 2 Bachelor or Master level

Description: Das KIT bietet den Beschäftigten und Studierenden die Möglichkeit, ihre E-Mail-Kommunikation mittels S/MIME-Zertifikaten abzusichern. Für die Nutzenden entsteht hierbei die Herausforderung, eingehende Nachrichten hinsichtlich gültiger Signatur und Verschlüsselung zu prüfen und mögliche Angriffe zu erkennen. Zielsetzung dieser Arbeit ist die Konzeption und Erstellung einer Nutzerstudie zur Evaluation von Schulungsmaterialien. Die Studie soll verschiedene Nutzungsszenarien bei der Erkennung von Angriffen (z.B. durch ungültige Zertifikate) und das Verhalten der Nutzenden innerhalb dieser Szenarien umfassen.

Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)

Number of students: 1 Bachelor or Master level

Description: The Privacy Friendly Apps are a set of applications developed by the SECUSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users (<https://secuso.aifb.kit.edu/english/105.php>). One of these apps is "Sudoku", available for Android on both the Google Store and F-Droid. Although the app is friendlier to privacy than other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g., <https://idarinstitute.com/products/arthritis-simulation-gloves>). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis.

Title: Password Generator Defaults

Number of students: 2 Bachelor or Master level

Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking

Number of students: 1/2 Bachelor or Master level

Description: PassSec+ ist eine von SECUSO entwickelte Browser-Erweiterung für Firefox und Google Chrome, die hilft, Passwörter, Zahlungsdaten und andere sensible Daten besser zu schützen, indem es bereits vor der Eingabe dieser Daten prüft, ob eine sichere Dateneingabe gewährleistet ist und im Zweifel ein Dialog anzeigt, welcher den Nutzer bei der Entscheidung unterstützt. In der Nutzerstudie soll untersucht werden, wo der Fokus des Nutzers mit und ohne Benutzung von PassSec+ liegt und dabei die Effektivität zur Prävention vor Phishing untersucht werden. Es wird das Setup sowie der Aufbau der Studie bereits vorgegeben. Ziel ist es, die Nutzerstudie mit Probanden durchzuführen und die Daten entsprechend z.B. mit Heatmaps auszuwerten.

Title: User study on user's knowledge about brainwaves verification

Number of students: 1 Master level

Description: Brainwaves can be used to authenticate users. However, several questions are left unanswered regarding the users' stance on this: What is the prior knowledge of users about verification and brainwaves? Are they comfortable wearing a device to record their brainwaves? How are they feeling regarding storing their brainwaves samples? Which kind of information can be extracted from the samples? How secure would such an authentication scheme be? The task of the student is to design, implement a pre-test a user study investigating these questions.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php.

T

6.12 Course: Advanced Machine Learning [T-WIWI-109921]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr. Abdolreza Nazemi

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2540535	Advanced Machine Learning	2 SWS	Lecture	Nazemi
ST 2023	2540536	Exercise Advanced Machine Learning	1 SWS	Practice	Nazemi
Exams					
ST 2023	7900227	Advanced Machine Learning			Geyer-Schulz
WT 23/24	7900253	Advanced Machine Learning (Nachklausur SoSe 2023)			Geyer-Schulz

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Advanced Machine Learning

2540535, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content

In recent years, the volume, variety, velocity, veracity, and variability of available data have increased due to improvements in computational and storage power. The rise of the Internet has made available large sets of data that allow us to use and merge them for different purposes. Data science helps us to extract knowledge from the continually-increasing large datasets. This course will introduce students to a wide range of machine learning and statistical techniques such as deep learning, LASSO, and support vector machine. You will get familiar with text mining, and the tools you need to analyze the various facets of data sets in practice. Students will learn theory and concepts with real data sets from different disciplines such as marketing, finance, and business.

Tentative Course Outline:

- Introduction
- Statistical Inference
- Shrinkage Methods
- Model Assessment and Selection
- Tree-based Machine Learning Algorithms
- Dimensionality Reduction
- Neural Networks and Deep Learning
- Natural Language Processing with Deep Learning
- Support Vector Machine

Time of attendance

- Attending the lecture: 13 x 90min = 19h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m

The student will learn

- A wide range of machine learning algorithms and their weaknesses.
- The fundamental issues and challenges: data, high-dimension, train, model selection, etc.
- How to imply machine learning algorithms for real-world applications.
- The fundamentals of deep learning, main research activities, and on-going research in this field.

Literature

- Alpaydin, E. (2014). Introduction to Machine Learning. Third Edition, MIT Press.
- De Prado, M. L. (2018). Advances in Financial Machine Learning. John Wiley & Sons.
- Goodfellow, I., Bengio, Y., and A. Courville (2017). Deep Learning. MIT Press. (online available)
- Hastie, T., Tibshirani, R., and J. Friedman (2009). Elements of Statistical Learning. Second Edition. Springer. (online available)
- Leskovec, J., Rajaraman, A., Ullman, J. D., (2014). Mining of Massive Datasets. Cambridge University Press. (online available)
- Witten, I. H., Eibe, F., Hall, M. A., Pal, C. J. (2016). Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann.

T

6.13 Course: Advanced Machine Learning and Data Science [T-WIWI-111305]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105659 - Advanced Machine Learning and Data Science](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each term	2

Exams			
ST 2023	7900378	Advanced Machine Learning and Data Science	Ulrich

Competence Certificate

Due to the professor's research sabbatical, the BSc module "Financial Data Science" and MSc module "Foundations for Advanced Financial -Quant and -Machine Learning Research" and the MSc module "Advanced Machine Learning and Data Science" along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The assessment is carried out in form of a written thesis based on the course "Advanced Machine Learning and Data Science".

Annotation

The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning. Please apply via the link: <https://portal.wiwi.kit.edu/forms/form/fbv-ulrich-msc-project>.


An online meetup will be offered at 14:00 on Tuesday of the first week of summer semester 2022 (i.e., 19.04.2022).





T

6.14 Course: Advanced Management Accounting [T-WIWI-102885]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2579907	Advanced Management Accounting	4 SWS	Lecture / 	Wouters, Dickemann, Letmathe
Exams					
WT 23/24	79-2579907-M	Advanced Management Accounting	Wouters		

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral exam (30 min) (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites

None.

Recommendation

The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

Annotation

This course is held in English. Lectures and tutorials are integrated.

The course is compulsory and must be examined.

Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

Below you will find excerpts from events related to this course:

V

Advanced Management Accounting

2579907, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

This course is held in English. Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

Inhalt:

- The course addresses several topics where management accounting is strongly related to marketing, finance, or organization and strategy, such as customer value propositions, financial performance measures, managing new product development, and technology investment decisions.

Learning objectives:

- Students will be able to consider advanced management accounting methods in an interdisciplinary way and to apply these to managerial decision-making problems in operations and innovation.
- They will also be able to identify relevant research results on such methods.

Examination:

- The assessment consists of an oral exam (30 min) taking place in the recess period (according to § 4 (2) No. 2 of the examination regulation).
- The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Required prior Courses:

- The course is compulsory and must be examined.

Recommendations:

- The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

Workload:

- The total workload for this course is approximately 135 hours. For further information see German version.

Literature

Literature is mostly made available via ILIAS.

T

6.15 Course: Advanced Statistics [T-WIWI-103123]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101637 - Analytics and Statistics](#)

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Exams			
ST 2023	7900037	Advanced Statistics	Grothe

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites

None

T

6.16 Course: Advanced Stochastic Optimization [T-WIWI-106548]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Irregular	2

Exams			
ST 2023	7900034	Advanced Stochastic Optimization	Rebennack

Competence Certificate

The assessment consists of an oral exam (20 minutes). The exam is offered every semester.

Prerequisites

None.

T

6.17 Course: Advanced Topics in Digital Management [T-WIWI-111912]





Responsible: Prof. Dr. Petra Nieken

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2573016	Advanced Topics in Digital Management	2 SWS	Colloquium / 	Nieken, Mitarbeiter

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment. The following aspects are included:

- Regular and active participation in the course dates
- Presentation of a given research topic.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Recommendation

We recommend visiting the course Incentives in Organization before taking this course.

The course is strongly recommended for students interested in empirical research in the areas digital HRM, personnel economics, and leadership and those who are interest in an academic career path.

Below you will find excerpts from events related to this course:

V

Advanced Topics in Digital Management

2573016, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Colloquium (KOL)
On-Site

Content

The students will discuss and analyze selected research papers in the areas digital HRM, personnel economics, and leadership with a focus on digital management. The students will present research papers and discuss research methods and designs as well as content. They will develop an own research design on a predefined topic.

Aim

The student

- Looks into current research topics in the areas HRM, personnel economics, and leadership with a focus on digital management and AI.
- Analyzes research papers in detail and evaluates the research outcomes.
- Trains their presentation skills and discussion skills.
- Practices scientific debating.
- Learns to critically evaluate research methods and trains the scientific discussion culture.
- Gains deeper knowledge in the area of digital HRM and management.
- Learns to evaluate research designs and takes into account the ethical dimension of research.
- Learns how to develop an own research design and idea.

Notes

Due to the interactive nature of the course, the number of participants is limited. If you are interested, please contact Prof. Nieken by email.

Workload

The total workload for this course is approximately 90 hours.

Lecture: 30 hours

Preparation: 45 hours

Exam preparation: 15 hours

Literature

Selected research papers

Organizational issues

Geb. 05.20, Raum 2A-25, Termine werden bekannt gegeben

T

6.18 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

Responsible: Prof. Dr. Kay Mitusch

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101406 - Network Economics](#)
[M-WIWI-101500 - Microeconomic Theory](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

Prerequisites

None

Recommendation

This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

T

6.19 Course: Advanced Topics in Human Resource Management [T-WIWI-111913]





Responsible: Prof. Dr. Petra Nieken

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2573014	Advanced Topics in Human Resource Management	2 SWS	Colloquium / 	Nieken, Mitarbeiter

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment. The following aspects are included:

- Regular and active participation in the course dates
- Presentation of a given research topic.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Recommendation

We recommend visiting the course [Incentives in Organization](#) before taking this course.

The course is strongly recommended for students interested in empirical research in the areas HRM, personnel economics, and leadership and those who are interest in an academic career path.

Below you will find excerpts from events related to this course:

V

Advanced Topics in Human Resource Management

2573014, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Colloquium (KOL)
On-Site

Content

The students will discuss and analyze selected research papers in the areas HRM, personnel economics, and leadership. The students will present research papers and discuss research methods and designs as well as content. They will develop an own research design on a predefined topic.

Aim

The student

- Looks into current research topics in the areas HRM, personnel economics, and leadership.
- Analyzes research papers in detail and evaluates the research outcomes.
- Trains their presentation skills and discussion skills.
- Practices scientific debating.
- Learns to critically evaluate research methods and trains the scientific discussion culture.
- Gains deeper knowledge in the area of HRM.
- Learns to evaluate research designs and takes into account the ethical dimension of research.
- Learns how to develop an own research design and idea.

Notes

Due to the interactive nature of the course, the number of participants is limited. If you are interested, please contact Prof. Nieken by email.

Workload

The total workload for this course is approximately 90 hours.

Lecture: 30 hours

Preparation: 45 hours

Exam preparation: 15 hours

Literature

Selected research papers

Organizational issues

Geb. 05.20, Raum 2A-25, Termine werden bekannt gegeben

T


6.20 Course: Algorithm Engineering [T-INFO-101332]





Responsible: Prof. Dr. Peter Sanders
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [M-INFO-100795 - Algorithm Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	4

Events					
WT 23/24	2400021	Algorithm Engineering	2/1 SWS	Lecture / 	Sanders, Seemaier

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

There are two partial achievements Algorithm Engineering (4 ECTS) and Algorithm Engineering Exercises (1 ECTS):

Algorithm Engineering:

The assessment is carried out as an oral examination lasting 20 minutes. § 4 Abs. 2 Nr. 2 SPO

Algorithm Engineering Exercises:

The assessment is carried out as an examination of another type.

The exercise can be evidenced by various performance records. This is determined individually during the lecture. Usually, the student prepares a seminar presentation and/or works on a practical tasks with written elaboration and evaluation (the main performance consists of the programming, documented by the source code that is to be handed in and supplemented by a short written report).

Students may redraw from the examination during the first XXX??? weeks after they have been assigned a task.

Prerequisites

none.

T

6.21 Course: Algorithm Engineering Pass [T-INFO-111856]

Responsible: Prof. Dr. Peter Sanders
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [M-INFO-100795 - Algorithm Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1	Grade to a third	Each summer term	1

Competence Certificate

There are two partial achievements Algorithm Engineering (4 ECTS) and Algorithm Engineering Exercises (1 ECTS):

Algorithm Engineering:

The assessment is carried out as an oral examination lasting 20 minutes.

Algorithm Engineering Exercises:

The assessment is carried out as an examination of another type. § 2 Abs. 2 Nr. 3

The exercise can be evidenced by various performance records. This is determined individually during the lecture. Usually, the student prepares a seminar presentation and/or works on a practical tasks with written elaboration and evaluation (the main performance consists of the

programming, documented by the source code that is to be handed in and supplemented by a short written report).

Students may redraw from the examination during the first XXX??? weeks after they have been assigned a task.

Prerequisites

none.





T

6.22 Course: Algorithmic Graph Theory [T-INFO-103588]

Responsible: Prof. Dr. Dorothea Wagner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100762 - Algorithmic Graph Theory](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
ST 2023	2400028	Algorithmische Graphentheorie	2+1 SWS	Lecture / Practice / ●	Ueckerdt, Gritzbach
Exams					
ST 2023	7500238	Algorithmic Graph Theory			Ueckerdt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.23 Course: Algorithmic Methods for Network Analysis [T-INFO-104759]




Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [M-INFO-102400 - Algorithmic Methods for Network Analysis](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
WT 23/24	2400007	Algorithmic Methods for Network Analysis	2+1 SWS	Lecture / Practice / ●	Wagner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.24 Course: Algorithms for Ad-Hoc and Sensor Networks [T-INFO-104388]**Responsible:** Prof. Dr. Dorothea Wagner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-102093 - Algorithms for Ad-Hoc and Sensor Networks](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

T

6.25 Course: Algorithms for Routing [T-INFO-100002]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [M-INFO-100031 - Algorithms for Routing](#)


Type
Oral examination

Credits
5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
2

Events					
ST 2023	2424638	Algorithmen für Routenplanung (mit Übungen)	3 SWS	Lecture / Practice / 	Sauer, Feilhauer, Wagner, Zündorf
Exams					
ST 2023	7500019	Algorithms for Routing			Ueckerdt


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.26 Course: Algorithms for Visualization of Graphs [T-INFO-104390]

Responsible: Prof. Dr. Dorothea Wagner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-102094 - Algorithms for Visualization of Graphs](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
WT 23/24	2424118	Algorithmen zur Visualisierung von Graphen	2+1 SWS	Lecture / Practice / 	Wagner, Ueckerdt, Merker
Exams					
ST 2023	7500222	Algorithms for Visualization of Graphs			Ueckerdt


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.27 Course: Algorithms II [T-INFO-102020]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-101173 - Algorithms II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 23/24	24079	Algorithms II	4 SWS	Lecture / 	Sanders, Laupichler, Maas
Exams					
ST 2023	7500464	Algorithms II			Sanders

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 120 minutes.

Prerequisites

none.

T

6.28 Course: Analysis of Multivariate Data [T-WIWI-103063]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105414 - Statistics and Econometrics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites

None

Recommendation

Attendance of the courses Statistics 1 [2600008] and Statistics 2 [2610020] is recommended.

Annotation

The lecture is not offered regularly. The courses planned for three years in advance can be found online.

T



6.29 Course: Application Security Lab [T-INFO-106289]





Responsible: Dr. Willi Geiselman
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-103166 - Application Security Lab](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	1

Events					
ST 2023	2400114	Application security lab	4 SWS	Practical course / 	Müller-Quade, Mechler, Dörre, Wressnegger, Noppel
WT 23/24	2400114	Application security lab	4 SWS	Practical course / 	Müller-Quade, Mechler, Dörre, Noppel, Wressnegger
Exams					
ST 2023	7500119	Application Security Lab			Geiselman, Müller- Quade, Wressnegger



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.30 Course: Applied Econometrics [T-WIWI-111388]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2520020	Applied Econometrics	2 SWS	Lecture / 	Krüger, Eberl
WT 23/24	2520021	Tutorial in Applied Econometrics	2 SWS	Practice / 	Eberl, Koster

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (90 min) according to §4(2), 1 of the examination regulation. A bonus can be acquired by successful completion of an assignment (written report + short in-class presentation) during the semester. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4).

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Applied Econometrics

2520020, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**Content:**

The course covers two econometric topics: (1) Conditional expectation and regression, and (2) Causal inference. Part (1) reviews foundations like the best linear predictor, least squares estimation, and robust covariance estimation. Part (2) introduces the potential outcomes framework for studying causal, what-if type questions such as 'How does an internship affect a person's future wage?'. It then presents research strategies like randomized trials, instrumental variables, and regression discontinuity.

For each part, we discuss econometric methods and theory, empirical examples (including recent research papers), and R implementation.

Learning goal:

Students are able to assess the properties of various econometric estimators and research designs, and to implement econometric estimators using R software.

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Independent Study: 105 hours

Literature

Angrist, J.D., and J.-S. Pischke (2009): Mostly Harmless Econometrics. Princeton University Press.

Cattaneo, M.D., N. Idrobo and R. Titiunik (2020): A Practical Introduction to Regression Discontinuity Designs: Foundations. Cambridge University Press.


Hansen, B. (2022): Econometrics. Princeton University Press.





DiTraglia, F.J. (2021): Lecture Notes on Treatment Effects. Course notes, available at <https://www.treatment-effects.com/>.

T

6.31 Course: Applied material flow simulation [T-MACH-112213]**Responsible:** Dr.-Ing. Marion Baumann**Organisation:** KIT Department of Mechanical Engineering**Part of:** [M-WIWI-102805 - Service Operations](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2117054	Applied material flow simulation	3 SWS	Lecture / Practice / 	Baumann
Exams					
ST 2023	76-T-MACH-112213	Applied material flow simulation			Baumann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Competence Certificate**

The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites

None

Recommendation

- Basic statistical knowledge and understanding
- Knowledge of a common programming language (Java, Python, ...)
- Recommended course: T-WIWI-102718 - Discrete Event Simulation in Production and Logistics

Below you will find excerpts from events related to this course:

V

Applied material flow simulation2117054, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)Lecture / Practice (VÜ)
On-Site

Content**Learning Content:**

- Methods of modeling a simulation such as:
 - Discrete-event simulation
 - Agent based simulation
- Design of a simulation model of a material flow system
- Data exchange in simulation models
- Verification and validation of simulation models
- Execution of simulation studies
- Statistical evaluation and parameter study

This is an application-oriented course in which the course contents are applied and deepened using the Anylogic software.

Learning Goals:

Students are able to:

- select the appropriate simulation modeling method depending on a modeling objective and build a suitable simulation model for material flow systems,
- extend a simulation model in a meaningful way with data import and export,
- verify and validate a simulation model,
- conduct a simulation study efficiently and with meaningful results, and
- design and conduct a parameter study and statistically analyze and evaluate the results.

Recommendations:

- Basic statistical skills
- Prior knowledge of a common programming language (Java, Python, ...).
- Recommended course: T-WIWI-102718 - Discrete Event Simulation in Production and Logistics

Workload for 4,5 ECTS (135 h):

- regular attendance: 21 hours
- self-study: 114 hours

Organizational issues

- **Im Wintersemester 2023/2024 ist die Veranstaltung auf maximal 30 Teilnehmer beschränkt.**
- **Die Anmeldung ist durch Beitritt zum ILIAS-Kurs und Ausfüllen des Anmeldeformulars (erforderliche Felder beim Beitritt zum ILIAS-Kurs) möglich.**
- **Die Anmeldung ist vom 01.09.2023 bis zum 30.09.2023 möglich.**

Literature

Borshev, A. (2022): The Big Book of Simulation Modeling - Multimethod Modeling with AnyLogic 8, <https://www.anylogic.de/resources/books/big-book-of-simulation-modeling/>.

Grigoryev, I. (2021): AnyLogic8 in Three Days, 5. Aufl., <https://www.anylogic.de/resources/books/free-simulation-book-and-modeling-tutorials/>.

Gutenschwager, K. et. al. (2017): Simulation in Produktion und Logistik, Springer Vieweg, Berlin.

VDI (2014): Simulation von Logistik-, Materialfluss- und Produktionssystemen - Grundlagen. VDI Richtlinie 3633, Blatt 1, VDI-Verlag, Düsseldorf.

VDI (2016): Simulation von Logistik-, Materialfluss- und Produktionssystemen - Simulation und Optimierung. VDI Richtlinie 3633, Blatt 12, VDI-Verlag, Düsseldorf

T

6.32 Course: Artificial Intelligence in Service Systems [T-WIWI-108715]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101448 - Service Management](#)
[M-WIWI-101506 - Service Analytics](#)
[M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)
[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2595650	Artificial Intelligence in Service Systems	1,5 SWS	Lecture / 🌀	Kühl, Spitzer, Vössing
WT 23/24	2595651	Übung zu Artificial Intelligence in Service Systems	1,5 SWS	Practice / 🎧	Kühl, Spitzer, Schemmer
Exams					
ST 2023	7900104	Artificial Intelligence in Service Systems			Satzger
WT 23/24	7900118	Artificial Intelligence in Service Systems			Satzger

Legend: 📺 Online, 🌀 Blended (On-Site/Online), 🎧 On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (60 min). Successful completion of the exercises is a prerequisite for admission to the written exam.

Prerequisites

None

Annotation

The course will be offered in the form of a flipped classroom concept starting in winter semester 2022/2023. The lecture will be recorded in advance and made available online. During the exercise classes, the contents of the lecture will be discussed and applied as part of programming exercises.

Below you will find excerpts from events related to this course:

V

Artificial Intelligence in Service Systems

2595650, WS 23/24, 1,5 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Artificial Intelligence (AI) and the application of machine learning is becoming more and more popular to solve relevant business challenges – both within isolated entities but also within co-creating systems (like value chains). However, it is not only essential to be familiar with precise algorithms but rather a general understanding of the necessary steps with a holistic view—from real-world challenges to the successful deployment of an AI-based solution. As part of this course, we teach the complete lifecycle of an AI project focusing on supervised machine learning challenges. We do so by also introducing the use of Python and the required packages like scikit-learn with exemplary data and use cases. We then take this knowledge to the more complex case of service systems with different entities (e.g., companies) who interact with each other and show possibilities on how to derive holistic insights. Apart from the technical aspects necessary when developing AI within service systems, we also shed light on the collaboration of humans and AI in such systems (e.g., with the support of XAI), topics of ethics and bias in AI, as well as AI's capabilities on being creative.

Students of this course will be able to understand and implement the complete lifecycle of a typical Artificial Intelligence use case with supervised machine learning. Furthermore, they understand the importance and the means of applying AI and Machine Learning within service systems, which allows multiple, independent entities to collaborate and derive insights. Besides technical aspects, they will gain an understanding of the broader challenges and aspects when dealing with AI. Students will be proficient with typical Python code for AI challenges.

Organizational issues

The course will be offered in the form of a flipped classroom concept starting in winter semester 2022/2023. The lecture will be recorded in advance and made available online. During the exercise classes, the contents of the lecture will be discussed and applied as part of programming exercises.

Literature

- Baier, L., Kühl, N., & Satzger, G. (2019). How to cope with change?-preserving validity of predictive services over time. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Cawley, G. C., & Talbot, N. L. (2010). On over-fitting in model selection and subsequent selection bias in performance evaluation. *The Journal of Machine Learning Research*, 11, 2079-2107.
- Fink, O., Netland, T., & Feuerriegel, S. (2021). Artificial intelligence across company borders. arXiv preprint arXiv:2107.03912.
- Gama, J., Žliobaitė, I., Bifet, A., Pechenizkiy, M., & Bouchachia, A. (2014). A survey on concept drift adaptation. *ACM computing surveys (CSUR)*, 46(4), 1-37.
- Hemmer, P., Schemmer, M., Vössing, M., & Kühl, N. (2021). Human-AI Complementarity in Hybrid Intelligence Systems: A Structured Literature Review. PACIS 2021 Proceedings.
- Hirt, R., & Kühl, N. (2018). Cognition in the Era of Smart Service Systems: Inter-organizational Analytics through Meta and Transfer Learning. In 39th International Conference on Information Systems, ICIS 2018; San Francisco Marriott Marquis San Francisco; United States; 13 December 2018 through 16 December 2018.
- Kühl, N., Goutier, M., Hirt, R., & Satzger, G. (2019, January). Machine Learning in Artificial Intelligence: Towards a Common Understanding. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Kühl, N., Hirt, R., Baier, L., Schmitz, B., & Satzger, G. (2021). How to Conduct Rigorous Supervised Machine Learning in Information Systems Research: The Supervised Machine Learning Report Card. *Communications of the Association for Information Systems*, 48(1), 46.
- Maleshkova, M., Kühl, N., & Jussen, P. (Eds.). (2020). *Smart Service Management: Design Guidelines and Best Practices*. Springer Nature.
- Martin, D., Hirt, R., & Kühl, N. (2019). Service Systems, Smart Service Systems and Cyber-Physical Systems—What's the difference? Towards a Unified Terminology. 14. Internationale Tagung Wirtschaftsinformatik 2019 (WI 2019), Siegen, Germany, February 24-27.
- Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2019). A survey on bias and fairness in machine learning. arXiv preprint arXiv:1908.09635.
- Müller, V. C., & Bostrom, N. (2016). Future progress in artificial intelligence: A survey of expert opinion. In *Fundamental issues of artificial intelligence* (pp. 555-572). Springer, Cham.
- Pan, S. J., & Yang, Q. (2009). A survey on transfer learning. *IEEE Transactions on knowledge and data engineering*, 22(10), 1345-1359.
- Schöffner, J., Machowski, Y., & Kühl, N. (2021). A Study on Fairness and Trust Perceptions in Automated Decision Making. In Joint Proceedings of the ACM IUI 2021 Workshops, April 13-17, 2021, College Station, USA.
- Shmueli, G., & Koppius, O. R. (2011). Predictive analytics in information systems research. *MIS quarterly*, 553-572.
- Zahn, M. V., Feuerriegel, S., & Kühl, N. (2021). The cost of fairness in AI: Evidence from e-commerce. *Business & information systems engineering*.

T

6.33 Course: Artificial Intelligence in Service Systems - Applications in Computer Vision [T-WIWI-111219]

Responsible: Prof. Dr. Gerhard Satzger

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101448 - Service Management](#)


[M-WIWI-101506 - Service Analytics](#)





[M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)

[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

[M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2595501	Artificial Intelligence in Service Systems - Applications in Computer Vision	3 SWS	Lecture / 	Satzger, Schmitz
Exams					
ST 2023	7900271	Artificial Intelligence in Service Systems - Applications in Computer Vision			Satzger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment.

Annotation

This course is admission restricted (see <http://dsi.iism.kit.edu>).

The course replaces "Service Analytics A" as of summer semester 2021.

Below you will find excerpts from events related to this course:

V

Artificial Intelligence in Service Systems - Applications in Computer Vision

2595501, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

---We renamed this course from "Service Analytics A" to "Artificial Intelligence in Service Systems - Applications in Computer Vision"---

Learning objectives

This course teaches students how to apply machine learning concepts to develop predictive models that form the basis of many innovative service offerings and business models today. Using a selected use case each term, students learn the foundations of selected algorithms and development frameworks and apply them to build a functioning prototype of an analytics-based service. Students will become proficient in writing code in Python to implement a data science use case over the course period.

Description

Data-driven services have become a key differentiator for many companies. Their development is based on the increasing availability of structured and unstructured data and their analysis through methods from data science and machine learning. Examples comprise highly innovative service offerings based on technologies such as natural language processing, computer vision or reinforcement learning.

Using a selected use case, this lecture will teach students how to develop analytics-based services in an applied setting. We teach the theoretical foundations of selected machine learning algorithms (e.g., convolutional neural networks) and development concepts (e.g., developing modeling, training, inference pipelines) and teach how to apply these concepts to build a functioning prototype of an analytics-based service (e.g., inference running on a device). During the course, students will work in small groups to apply the learned concepts in the programming language Python using packages such as Keras, Tensorflow or Scikit-Learn. For more information on recent projects as part of the course, please visit the website of our lecture: <https://www.aiss-cv.com>.

Recommendations

The course is aimed at students in the Master's program with basic knowledge in statistics and applied programming in Python. Knowledge from the lecture Artificial Intelligence in Service Systems may be beneficial.

Additional information

The lecture will be held as part of 7 blocks within the summer semester. Due to the practical group sessions in the course, the number of participants is limited. The official application period in the WiWi portal will open mid of February. Please apply here until April, 3rd: <https://go.wiwi.kit.edu/aiss-cv>. The course will be held mainly online via Zoom. For interim and final presentation, we will meet in person in building 05.20, room 1C-03. Further information on the dates of interim and final presentation will be announced via Ilias and mail.

Literature

- Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. *The elements of statistical learning*. Vol. 1. No. 10. New York: Springer series in statistics, 2001.
- Russell, S., & Norvig, P. (2002). *Artificial intelligence: a modern approach*.
- Goldstein, E. B. (2009). *Sensation and perception*. 8th. Belmont: Wadsworth, Cengage Learning, 496(3).
- Gonzalez, Rafael C., Woods, Richard E. (2018). *Digital Image Processing*. 4th Pearson India
- Szeliski, R. (2010). *Computer vision: algorithms and applications*. Springer Science & Business Media.
- Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016). You only look once: Unified, real-time object detection. In *Proceedings of the IEEE conference on computer vision and pattern recognition*(pp. 779-788).
- Sermanet, P., Chintala, S., & LeCun, Y. (2012, November). Convolutional neural networks applied to house numbers digit classification. In *Proceedings of the 21st International Conference on Pattern Recognition (ICPR2012)*(pp. 3288-3291). IEEE.
- Ren, S., He, K., Girshick, R., & Sun, J. (2015). Faster r-cnn: Towards real-time object detection with region proposal networks. In *Advances in neural information processing systems*(pp. 91-99).
- Girshick, R., Donahue, J., Darrell, T., & Malik, J. (2014). Rich feature hierarchies for accurate object detection and semantic segmentation. In *Proceedings of the IEEE conference on computer vision and pattern recognition*(pp. 580-587).
- Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). Imagenet classification with deep convolutional neural networks. In *Advances in neural information processing systems*(pp. 1097-1105).

**6.34 Course: Asset Pricing [T-WIWI-102647]**

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101482 - Finance 1](#)
[M-WIWI-101483 - Finance 2](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2530555	Asset Pricing	2 SWS	Lecture /	Uhrig-Homburg, Böll, Müller
ST 2023	2530556	Asset Pricing	1 SWS	Practice /	Uhrig-Homburg, Müller
Exams					
ST 2023	7900110	Asset Pricing			Uhrig-Homburg, Thimme
WT 23/24	7900056	Asset Pricing			Uhrig-Homburg

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

Below you will find excerpts from events related to this course:

**Asset Pricing**

2530556, SS 2023, 1 SWS, Language: German, [Open in study portal](#)

Practice (Ü)
On-Site

Literature

- Cochrane, J. H.: Asset Pricing, revised edition, Princeton University Press, 2005.
- Campbell, J.Y., Lo, A.W., MacKinlay, A.C.: The Econometrics of Financial Markets, 2. printing, with corrections, Princeton Univ. Press, 1997.

**6.35 Course: Auction Theory [T-WIWI-102613]**

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101500 - Microeconomic Theory](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2520408	Auktionstheorie	2 SWS	Lecture	Ehrhart
WT 23/24	2520409	Übungen zu Auktionstheorie	1 SWS	Practice	Ehrhart
Exams					
ST 2023	7900255	Auction Theory			Ehrhart
WT 23/24	7900039	Auction Theory			Ehrhart

Competence Certificate

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites

None

Below you will find excerpts from events related to this course:

**Auktionstheorie**

2520408, WS 23/24, 2 SWS, [Open in study portal](#)

Lecture (V)

Literature

- Ehrhart, K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011
- Krishna, V.: Auction Theory, Academic Press, Second Edition, 2010
- Milgrom, P.: Putting Auction Theory to Work, Cambridge University Press, 2004
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999

T

6.36 Course: Automated Planning and Scheduling [T-INFO-109085]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-104447 - Automated Planning and Scheduling](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

T 6.37 Course: Automated Visual Inspection and Image Processing [T-INFO-101363]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [M-INFO-100826 - Automated Visual Inspection and Image Processing](#)

Type Written examination	Credits 6	Grading scale Grade to a third	Recurrence Each winter term	Version 2
------------------------------------	---------------------	--	---------------------------------------	---------------------

Events					
WT 23/24	24169	Automated Visual Inspection and Image Processing	4 SWS	Lecture / On-Site	Beyerer, Zander
Exams					
ST 2023	7500003	Automated Visual Inspection and Image Processing			Beyerer
WT 23/24	7500008	Automated Visual Inspection and Image Processing			Beyerer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

V

Automated Visual Inspection and Image Processing

24169, WS 23/24, 4 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

Topics covered:

- sensors and concepts for image acquisition
- light and colour
- image signals (system theory, Fourier transformation, stochastic processes)
- excursion to wave optics
- pre-processing and image enhancement
- image restoration
- segmentation
- morphological image processing
- texture analysis
- detection
- image pyramids, multi scale analysis and wavelet-transform

Educational objective:

- Students have a sound knowledge regarding the basic concepts and methods of image processing (pre-processing and image enhancement, image restoration, image segmentation, morphological filtering, texture analysis, detection, image pyramids, multi-scale analysis and the wavelet transform)
- Students are in the position to work out and to evaluate solution concepts for problems of automated visual inspection
- Students have a sound knowledge of the different sensors and methods for the acquisition of image data as well as of the relevant optical principles
- Students know different concepts to describe image data and they know the essential system theoretical concepts and interrelations

Organizational issues

Die Erfolgskontrolle wird in der Modulbeschreibung erläutert.

Empfehlungen:

Grundkenntnisse der Optik und der Signalverarbeitung sind hilfreich.

Literature

Weiterführende Literatur

- R. C. Gonzalez und R. E. Woods, Digital Image Processing, Prentice-Hall, Englewood Cliffs, New Jersey, 2002
- B. Jähne, Digitale Bildverarbeitung, Springer, Berlin, 2002

T


6.38 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

Responsible: Dr. Gerd Gutekunst
Prof. Dr. Berthold Wigger

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101511 - Advanced Topics in Public Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2560134	Basics of German Company Tax Law and Tax Planning	3 SWS	Lecture / 	Wigger, Gutekunst
Exams					
ST 2023	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger
WT 23/24	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5 h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites

None

Recommendation

Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course "Öffentliche Einnahmen" beforehand.

Below you will find excerpts from events related to this course:

V

Basics of German Company Tax Law and Tax Planning

2560134, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.

T


6.39 Course: Behavioral Lab Exercise [T-WIWI-111806]





Responsible: Prof. Dr. Petra Nieken
Prof. Dr. Benjamin Scheibehenne

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Events					
WT 23/24	2500040	Behavioral Lab Exercise	4.5 SWS	Seminar / 	Scheibehenne, Nieken

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment.

Recommendation

This class caters towards Master students who are interested in empirical research and in running lab experiments.

Annotation

The course will be offered for the first time in the winter semester 21/22.

Due to the interactive nature of the class, the number of participants is limited. If you are interested, please contact the teachers directly via email.

Below you will find excerpts from events related to this course:

V

Behavioral Lab Exercise

2500040, WS 23/24, 4.5 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content


In this class, students learn the core principles of psychological and economic experiments. The course covers topics ranging from design principles, to best-practices, preregistration, and analysis of the experimental data. Students will actively participate in the course by covering one selected topic in a talk. All students will discuss the topics together with the professors to develop solid knowledge about experimental design and analysis plans. In a second step, all students will develop a draft of an experimental design and analysis plan for their own topic and present it to the class. The students will get detailed feedback enabling them to improve their drafts for future research.





T

6.40 Course: Biologically Inspired Robots [T-INFO-101351]

Responsible: Dr.-Ing. Arne Rönnau
Organisation: KIT Department of Informatics
Part of: [M-INFO-100814 - Biologically Inspired Robots](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	24619	Biologisch Motivierte Roboter	2 SWS	Lecture / 	Rönnau
Exams					
ST 2023	7500237	Biologically Inspired Robot			Rönnau


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.41 Course: Biometric Systems for Person Identification [T-INFO-105948]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation: KIT Department of Informatics
Part of: [M-INFO-102968 - Biometric Systems for Person Identification](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2403011	Biometric Systems for Person Identification	2 SWS	Lecture / 	Sarfraz
Exams					
ST 2023	7500025	Biometric Systems for Person Identification			Stiefelhagen
WT 23/24	7500043	Biometric Systems for Person Identification			Stiefelhagen

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Biometric Systems for Person Identification

2403011, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Biometrics deals with the science of recognizing and identifying humans based on their biometrics traits, such as finger prints, face, iris, gait etc. With the increasing demands put on security and surveillance e.g. safer access control, border control/passports and identifying criminals /law enforcement, biometrics becomes more and more essential and technologies are being developed to solve many issues in this demanding area of research. In this course, the students will learn the fundamental concepts of underlying biometrics technologies, understanding of various techniques for different topics/technologies used in biometrics.

The topics include

- Introduction: Biometrics acquisitions and image processing, basic introduction to the area of computer vision/machine learning applied to biometrics
- Biometrics system: requirements, enrollment, identification/verification, performance metrics
- Biometrics technologies: Overview of different biometrics technologies
- Finger print recognition: image enhancement, state-of-the art techniques, challenges
- Iris recognition: image acquisitions, feature extraction, state-of-the-art techniques, challenges
- Face recognition: introduction, current methods, applications
- Palm print recognition: current methods
- Gait recognition: emerging methods
- Multi-Biometrics: multiple modes of biometrics, fusion strategies
- Risk analysis: attacks, liveness detection, fraud prevention

T

6.42 Course: Blockchains & Cryptofinance [T-WIWI-108880]

Responsible: Dr. Philipp Schuster
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101409 - Electronic Markets](#)
[M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The examination is offered for the last time in winter semester 20/21 for first-time writers and then again for second attempts. The assessment consists of a written exam (75 min).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment).

Prerequisites

None

Recommendation

None

Annotation


The lecture is currently not offered.

T

6.43 Course: Bond Markets [T-WIWI-110995]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2530560	Bond Markets	3 SWS	Lecture / Practice / 	Uhrig-Homburg, Müller, Molnar
Exams					
ST 2023	7900280	Bond Markets			Uhrig-Homburg
WT 23/24	7900311	Bond Markets			Uhrig-Homburg

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (75min.)

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment).

Annotation

This course will be held in English.

Below you will find excerpts from events related to this course:

V

Bond Markets

2530560, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

The lecture "Bond Markets" deals with the national and international bond markets, which are an important source of financing for companies, as well as for the public sector. After an overview of the most important bond markets, different yield definitions are discussed. Based on this, the concept of the yield curve is presented. In addition, the theoretical and empirical relationships between ratings, default probabilities and spreads are analyzed. The focus will then be on questions regarding the valuation, measurement, management and control of credit risks.

The total workload for this course is approximately 135 hours (4.5 credits).

The assessment consists of a written exam (75min.) (according to §4(2), 1 SPO). A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Students deepen their knowledge of national and international bond markets. They gain knowledge of the traded instruments and their key figures for describing default risk such as ratings, default probabilities or credit spreads.

Organizational issues


Die Veranstaltung wird in der ersten Semesterhälfte an sechs Freitagen am Campus B (Geb. 09.21) im Raum 124 angeboten. Die Klausur findet dann direkt im Anschluss statt.

T

6.44 Course: Bond Markets - Models & Derivatives [T-WIWI-110997]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2530565	Bond Markets - Models & Derivatives	2 SWS	Block / 	Grauer, Uhrig-Homburg

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of success consists in equal parts of a written thesis and an oral exam including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.

Recommendation

Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.

Annotation

This course will be held in English.

Below you will find excerpts from events related to this course:

V

Bond Markets - Models & Derivatives

2530565, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Block (B)
On-Site

Content

- **Competence Certificate:** The assessment of success consists in equal parts of a written thesis and an oral exam (according to §4(2), 3 SPO) including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** Students deepen their knowledge of national and international bond markets. They are able to apply the knowledge they have gained about traded instruments and common valuation models for pricing derivative financial instruments.
- **Prerequisites:**
- **Content:** The lecture "Bond Markets – Models & Derivatives" deepens the content of the lecture "Bond Markets". The modelling of the dynamics of yield curves and the management of credit risks forms the theoretical foundation for the valuation of interest rate and credit derivatives to be discussed. In this course, students deal intensively with selected topics and acquire the relevant knowledge on their own.
- **Recommendation:** Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.
- **Workload:** The total workload for this course is approximately 90 hours (3.0 credits).

Organizational issues


Die Veranstaltung startet in der zweiten Semesterhälfte (Kickoff am 08.12.23) und hat Seminarcharakter - mit dem Ziel, ein selbstgewähltes Themenfeld in Form einer schriftlichen Ausarbeitung eigenständig zu erarbeiten.

T

6.45 Course: Bond Markets - Tools & Applications [T-WIWI-110996]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2530562	Bond Markets - Tools & Applications	1 SWS	Block / 	Uhrig-Homburg, Grauer

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an empirical case study with written elaboration and presentation. The main examination is offered once a year, re-examinations every semester.

Recommendation

Knowledge of the "Bond Markets" course is very helpful.

Annotation

This course will be held in English.

Below you will find excerpts from events related to this course:

V

Bond Markets - Tools & Applications

2530562, WS 23/24, 1 SWS, Language: English, [Open in study portal](#)

Block (B)
On-Site

Content

- **Competence Certificate:** The assessment consists of an empirical case study with written elaboration and presentation (according to §4(2), 3 SPO). The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** The students apply various methods in practice within the framework of a project-related case study. They are able to deal with empirical data and analyze them in a targeted manner.
- **Content:** The course "Bond Markets - Tools & Applications" includes a hands-on project in the field of national and international bond markets. Using empirical datasets, the students have to apply practical methods in order to analyze the data in a targeted manner.
- **Recommendation:** Knowledge of the "Bond Markets" course is very helpful.
- **Workload:** The total workload for this course is approximately 45 hours (1.5 credits).

Organizational issues

Die Veranstaltung findet in der ersten Semesterhälfte statt (Kickoff am 10.11.23) und beinhaltet eine eigenständige Projektarbeit im Umgang mit realen Bond Daten. Die Erfolgskontrolle erfolgt anhand einer schriftlichen Ausarbeitung und einer kurzen Präsentation.

T

6.46 Course: Business Data Analytics: Application and Tools [T-WIWI-109863]

Responsible: Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)
[M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)
[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2540466	Business Data Analytics: Application and Tools	2 SWS	Lecture / 🗣️	Knierim, Badewitz
ST 2023	2540467	Excercise Business Data Analytics: Application and Tools	1 SWS	Practice / 🗣️	Badewitz, Grote, Sterk, Bezzaoui, Nikolajevic
Exams					
ST 2023	7900183	Business Data Analytics: Application and Tools			Weinhardt
ST 2023	7900189	Business Data Analytics: Application and Tools			Weinhardt

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Cancelled

Competence Certificate

Success is monitored through ongoing elaborations and presentations of tasks and a written exam (60 minutes) at the end of the lecture period. Successful participation in the exercises is a prerequisite for admission to the written examination. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

The number of participants is limited to 50, as this is the only way to ensure conscientious support for the case study. The selection of participants is based on a short letter of motivation (max. 2000 characters including spaces) in the faculty's portal.

Prerequisites

None

Recommendation

Knowledge of (object-oriented) programming and statistics is helpful.

Annotation

The lecture is read in block sessions at the beginning of the semester. The dates will be communicated in the Wiwi-Portal.

Below you will find excerpts from events related to this course:

V

Business Data Analytics: Application and Tools

2540466, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

als Blockveranstaltung an 3 Terminen:

- Montag, 17.04.23 - 09:00 - 17:30 Uhr, 01.85 Teamraum A&B
- Dienstag, 18.04.23 - 09:00 - 17:30 Uhr, 10.50 Raum 604
- Mittwoch, 19.04.23 - 09:00 - 17:30 Uhr, 01.85 Teamraum A&B

**6.47 Course: Business Data Strategy [T-WIWI-106187]**

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540484	Business Data Strategy	2 SWS	Lecture /	Weinhardt, van Dinter, Badewitz
WT 23/24	2540485	Übung zu Business Data Strategy	1 SWS	Practice /	Weinhardt, Badewitz, Schulz

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation and an alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. The grade is determined by 2/3 through the written exam and by 1/3 through the alternative exam assessment (e.g., presentation).

Prerequisites

None

Recommendation

Students should be familiar with basic concepts of business organisations, information systems, and programming. However, all material will be introduced, so no formal pre-conditions are applied.

Annotation

Limited number of participants.

Below you will find excerpts from events related to this course:

**Business Data Strategy**

2540484, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

With new methods for capturing and using different types of data and industry's recognition that society's use of data is less than optimal, the need for comprehensive strategies is more important than ever before. Advances in cybersecurity and information sharing and the use of data in its raw form for decision making all add to the complexity of integrated processes, ownership, stewardship, and sharing. The life cycle of data in its entirety spans the infrastructure, system design, development, integration, and implementation of information-enabling solutions. This lecture focuses on teaching about these dynamics and tools to comprehend and manage them in organisation contexts. Given the increasing size and complexity of data, methods for the transformation and structured preparation are an important tool in the process of sense-making. Modern software solutions and programming languages provide frameworks for such tasks that form another part of this course ranging from conceptual systems modelling to data manipulation to automated generation of HTML reports and web-applications.

Organizational issues**Application/Registration**

Attendance will be limited to 20-25 participants. Application/registration is therefore preliminary. After the application deadline has passed, positions will be allocated, based on evaluation of the previous study records. Applications are accepted only through the Wiwi-Portal: <https://portal.wiwi.kit.edu/ys/5254>

Anmeldung

Die Teilnehmeranzahl ist begrenzt (ca. 20-25 Plätze). Eine Anmeldung erfolgt deshalb zunächst unter Vorbehalt. Nach Ablauf der Anmeldefrist werden die Plätze zur Teilnahme, nach Einsicht der Vorleistungen im Studium vergeben. Die Anmeldung/Bewerbung erfolgt ausschließlich über das Wiwi-Portal: <https://portal.wiwi.kit.edu/ys/5254>

T

6.48 Course: Business Dynamics [T-WIWI-102762]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr Paul Glenn

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101409 - Electronic Markets](#)
[M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540531	Business Dynamics	2 SWS	Lecture / 🗎	Geyer-Schulz, Glenn
WT 23/24	2540532	Exercise Business Dynamics	1 SWS	Practice / 🗎	Geyer-Schulz, Glenn
Exams					
ST 2023	7900065	Business Dynamics (Nachklausur WS 2022/2023)			Geyer-Schulz
WT 23/24	7979777	Business Dynamics (WS 2023/2024)			Geyer-Schulz

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Business Dynamics

2540531, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature

John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

T


6.49 Course: Business Intelligence Systems [T-WIWI-105777]

Responsible: Prof. Dr. Alexander Mädche
Mario Nadj
Dr. Peyman Toreini

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101506 - Service Analytics](#)
[M-WIWI-101510 - Cross-Functional Management Accounting](#)
[M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)
[M-WIWI-104068 - Information Systems in Organizations](#)
[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2540422	Business Intelligence Systems	3 SWS	Lecture / 	Mädche, Gnewuch
Exams					
ST 2023	7900149	Business Intelligence Systems			Mädche

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites

None

Recommendation

Basic knowledge on database systems is helpful.

Below you will find excerpts from events related to this course:

V

Business Intelligence Systems

2540422, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

In most modern enterprises, Business Intelligence & Analytics (BI&A) Systems represent a core enabler of decision-making in that they are supplying up-to-date and accurate information about all relevant aspects of a company's planning and operations: from stock levels to sales volumes, from process cycle times to key indicators of corporate performance. Modern BI&A systems leverage beyond reporting and dashboards also advanced analytical functions. Thus, today they also play a major role in enabling data-driven products and services. The aim of this course is to introduce theoretical foundations, concepts, tools, and current practice of BI&A Systems from a managerial and technical perspective.

The course is complemented with an engineering capstone project, where students work in a team with real-world use cases and data in order to create running Business intelligence & Analytics system prototypes.

Learning objectives

- Understand the theoretical foundations of key Business Intelligence & Analytics concepts supporting decision-making
- Explore key capabilities of state-of-the-art Business Intelligence & Analytics Systems
- Learn how to successfully implement and run Business Intelligence & Analytics Systems from multiple perspectives, e.g. architecture, data management, consumption, analytics
- Get hands-on experience by working with Business Intelligence & Analytics Systems with real-world use cases and data

Prerequisites

This course is limited to a capacity of 50 places. The capacity limitation is due to the attractive format of the accompanying engineering capstone project. Strong analytical abilities and profound skills in SQL as well as Python and/or R are required. Students have to apply with their CV and transcript of records. All organizational details and the underlying registration process of the lecture and the capstone project will be presented in the first lecture. The teaching language is English.

Literature

- Turban, E., Aronson, J., Liang T.-P., Sharda, R. 2008. "Decision Support and Business Intelligence Systems".
- Watson, H. J. 2014. "Tutorial: Big Data Analytics: Concepts, Technologies, and Applications," *Communications of the Association for Information Systems* (34), p. 24.
- Arnott, D., and Pervan, G. 2014. "A critical analysis of decision support systems research revisited: The rise of design science," *Journal of Information Technology* (29:4), Nature Publishing Group, pp. 269–293 (doi: 10.1057/jit.2014.16).
- Carlo, V. (2009). "Business intelligence: data mining and optimization for decision making". Editorial John Wiley and Sons, 308-317.
- Chen, H., Chiang, R. H. L, and Storey, V. C. 2012. „Business Intelligence and Analytics: From Big Data to Big Impact,“ *MIS Quarterly* (36:4), pp. 1165-1188.
- Davenport, T. 2014. *Big Data @ Work*, Boston, MA: Harvard Business Review.
- Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term"
- Power, D. J. 2008. "Decision Support Systems: A Historical Overview," *Handbook on Decision Support Systems*, pp. 121–140 (doi: 10.1007/978-3-540-48713-5_7).
- Sharma, R., Mithras, S., and Kankanhalli, A. 2014. „Transforming decision-making processes: a research agenda for understanding the impact of business analytics on organisations,“ *European Journal of Information Systems* (23:4), pp. 433-441.
- Silver, M. S. 1991. "Decisional Guidance for Computer-Based Decision Support," *MIS Quarterly* (15:1), pp. 105-122.

Further literature will be made available in the lecture.

T

6.50 Course: Business Models in the Internet: Planning and Implementation [T-WIWI-102639]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102806 - Service Innovation, Design & Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Competence Certificate

As of summer semester 2022, the course "Business Models in the Internet: Planning and Implementation" can no longer be taken. The exam will be offered in summer semester 2022 and winter semester 2022/23 for repeaters.

Prerequisites

None

Recommendation

None

**6.51 Course: Business Planning [T-WIWI-102865]**

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	2545109	Business Planning for Founders	2 SWS	Seminar /	Terzidis, Martjan
WT 23/24	2545109	Business Planning for Founders	2 SWS	Seminar /	Martjan, Terzidis
Exams					
ST 2023	7900234	Business Planning for Founders			Terzidis
WT 23/24	7900023	Business Planning for Founders			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

**Business Planning for Founders**

2545109, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

**Content
Content**

In the course Business Planning for Founders, you will be working in interdisciplinary teams on a real-world challenge presented by an industry partner (former partners have been e.g., EnBW and WIBU-Systems). To solve the case, you will learn about human-centered design using design thinking methods. These methods will help you develop your own business idea. Building on your idea, you will deploy a business plan and finally present, as a team, the results on the pitch day in front of the seminar participants and the industry partner.

Learning Objectives

After completing this course, the course participants will be able to:

- Follow a Design Thinking Process
- Understand how Prototypes are being developed
- Develop a sound Value Proposition for a target customer
- Create Business Ideas based on real life Use Cases in the field of IT-Security
- Develop a Business Model using the Tool Business Model Canvas
- Pitch your Business Ideas

Credentials:

ONLY ONE of the two options - Business Planning for founders OR Business Planning for founders in the field of IT-Security - can be taken and credited under the in CAS mentioned partial credit, as they cover similar content. Registration must take place in the CAS for the respective examination.

Organizational issues

Tuesday, 18.04.2023

Tuesday, 02.05.2023

Tuesday, 16.05.2023

Registration is via the Wiwi-Portal.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

**Business Planning for Founders**

2545109, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content**Course Content:**

In the course Business Planning for Founders, you will be working in interdisciplinary teams on a real-world challenge. The challenge for this semester will be about Chatbots and in the context of privacy risks. To solve the case, you will learn about human-centered design using design thinking methods. These methods will help you develop your own business idea. Building on your idea, you will deploy a business plan and finally present, as a team, the results on the pitch day in front of the seminar participants and a jury.

Information about the seminar:

ONLY ONE of the two options - Business Planning for founders OR Business Planning for founders in the field of IT-Security - can be taken and credited under the in CAS mentioned partial credit, as they cover similar content. Registration must take place in the CAS for the respective examination.

Target group: Master Student

Organizational issues

Registration is via the Wiwi-Portal.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

T

6.52 Course: Business Strategies of Banks [T-WIWI-102626]

Responsible: Prof. Dr. Wolfgang Müller
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	see Annotations	1

Competence Certificate

The lecture will be offered for the last time in the winter semester 2021/22. The exam will take place for the last time in the summer semester 2022 (only for repeaters).

Prerequisites

None

Recommendation

None

Annotation


The lecture will be offered for the last time in the winter semester 2021/22.





T

6.53 Course: Case Studies Seminar: Innovation Management [T-WIWI-102852]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2545105	Case studies seminar: Innovation management	2 SWS	Seminar / 	Weissenberger-Eibl
Exams					
WT 23/24	7900237	Case Studies Seminar: Innovation Management			Weissenberger-Eibl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessments (§4(2), 3 SPO).

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management is recommended.

Below you will find excerpts from events related to this course:

V

Case studies seminar: Innovation management

2545105, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course. A short introduction to presentation techniques is planned to help students prepare the seminar papers.

Literature


Werden in der ersten Veranstaltung bekannt gegeben.

T

6.54 Course: Challenges in Supply Chain Management [T-WIWI-102872]

Responsible: Esther Mohr
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102805 - Service Operations](#)
[M-WIWI-102808 - Digital Service Systems in Industry](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2550494	Challenges in Supply Chain Management	3 SWS	Lecture / 	Mohr
Exams					
ST 2023	00030	Challenges in Supply Chain Management			Nickel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written paper and an oral exam of ca. 30-40 min.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation

The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is offered irregularly. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

V

Challenges in Supply Chain Management

2550494, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

The course consists of case studies of BASF which cover future challenges of supply chain management. Thus, the course aims at a case-study based presentation, critical evaluation and exemplary discussion of recent questions in supply chain management. The focus lies on future challenges and trends, also with regard to their applicability in practical cases (especially in the chemical industry).

The main part of the course is working on a project together with BASF in Ludwigshafen. The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the project topic.

This course will include working on cutting edge supply chain topics like Industry 4.0/ "Internet of Everything in production", supply chain analytics, risk management, procurement and production in SCM. The team essays / project reports will be linked to industry-related challenges as well as to upcoming theoretical concepts. The topics of the seminar will be announced at the beginning of the term in a preliminary meeting.

Organizational issues

Bewerbung über das Wiwi-Portal möglich:

<http://go.wiwi.kit.edu/ChallengesSCM>

Literature

Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.

**6.55 Course: Competition in Networks [T-WIWI-100005]**

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101406 - Network Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 23/24	2561204	Competition in Networks	2 SWS	Lecture /	Mitusch
WT 23/24	2561205	Übung zu Wettbewerb in Netzen	1 SWS	Practice /	Wisotzky, Mitusch, Corbo
Exams					
ST 2023	7900274	Competition in Networks			Mitusch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Prerequisites

None.

Recommendation

Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

Below you will find excerpts from events related to this course:

**Competition in Networks**

2561204, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture

Literature

Literatur und Skripte werden in der Veranstaltung angegeben.

T

6.56 Course: Computational Cartography [T-INFO-101291]

Responsible: Dr. Martin Nöllenburg
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [M-INFO-100754 - Computational Cartography](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

T

6.57 Course: Computational Complexity Theory, with a View Towards Cryptography [T-INFO-103014]

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-101575 - Computational Complexity Theory, with a View Towards Cryptography](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Irregular	1

Events					
ST 2023	2400124	Computational Complexity Theory, with a View Towards Cryptography	4 SWS	Lecture	Müller-Quade, Benz, Berger
Exams					
ST 2023	7500183	Computational Complexity Theory, with a View Towards Cryptography			Geiselman, Müller-Quade

Below you will find excerpts from events related to this course:

V

Computational Complexity Theory, with a View Towards Cryptography

2400124, SS 2023, 4 SWS, Language: German, [Open in study portal](#)

Lecture (V)

T

6.58 Course: Computational Geometry [T-INFO-104429]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [M-INFO-102110 - Computational Geometry](#)


Type
Oral examination





Credits
6

Grading scale
Grade to a third

Recurrence
Irregular

Version
2

Events					
WT 23/24	2400083	Computational Geometry	4 SWS	Lecture / Practice / 	Bläsius, Yi

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Computational Geometry

2400083, WS 23/24, 4 SWS, Language: German, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Organizational issues


nur Masterstudiengang Informatik

T

6.59 Course: Computer Architecture [T-INFO-101355]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [M-INFO-100818 - Computer Architecture](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	2424570	Computer structures	3 SWS	Lecture / 	Karl
Exams					
ST 2023	7500190	Computer Architecture			Karl
WT 23/24	7500034	Computer Architecture			Karl


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled


T

6.60 Course: Computer Contract Law [T-INFO-102036]

Responsible: Michael Menk
Organisation: KIT Department of Informatics
Part of: [M-INFO-101216 - Private Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 23/24	2411604	Computer Contract Law	2 SWS	Lecture / 	Menk
Exams					
ST 2023	7500066	Computer Contract Law			Dreier, Matz
WT 23/24	7500065	Computer Contract Law			Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Computer Contract Law

2411604, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

Literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

Weiterführende Literatur

Ergänzende Literatur wird in den Vorlesungsfolien angegeben.

T

6.61 Course: Computer Graphics [T-INFO-101393]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher
Organisation: KIT Department of Informatics
Part of: [M-INFO-100856 - Computer Graphics](#)


Type
Written examination





Credits
6

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Events					
WT 23/24	24081	Computergrafik	4 SWS	Lecture / 	Dachsbacher, Bretl
Exams					
ST 2023	7500257	Computer Graphics			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.62 Course: Computer Graphics Pass [T-INFO-104313]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher
Organisation: KIT Department of Informatics
Part of: [M-INFO-100856 - Computer Graphics](#)

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each winter term	1

Events					
WT 23/24	24083	Übungen zu Computergrafik		Lecture / Practice	Bretl, Dolp, Piochowiak

T

6.63 Course: Context Sensitive Systems [T-INFO-107499]

Responsible: Prof. Dr.-Ing. Michael Beigl**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100728 - Context Sensitive Systems](#)[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)**Type**
Oral examination**Credits**
5**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	2400099	Context Sensitive Systems	1 SWS	Practice / 📱	Riedel
ST 2023	24658	Context Sensitive Systems	2 SWS	Lecture / 🗣️	Riedel
Exams					
ST 2023	7500305_25.09.23	Context Sensitive Systems			Riedel
ST 2023	7500305_28.07.23	Context Sensitive Systems			Riedel
ST 2023	7500305_31.08.23	Context Sensitive Systems			Riedel
WT 23/24	7500113_09.01.24	Context Sensitive Systems			Riedel
WT 23/24	7500305_20.11.23	Context Sensitive Systems			Riedel

Legend: 📱 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

T

6.64 Course: Convex Analysis [T-WIWI-102856]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Irregular

Version
1

Events					
ST 2023	2550120	Convex Analysis	2 SWS	Lecture /	Stein
ST 2023	2550121	Exercises Convex Analysis	2 SWS	Practice /	Stein, Schwarze
Exams					
ST 2023	7900208_SS2023_HK	Convex Analysis			Stein

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (www.iior.kit.edu).

Below you will find excerpts from events related to this course:

V

Convex Analysis

2550120, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

Convex Analysis deals with properties of convex functions and convex sets, amongst others with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number of applications which are not covered by techniques from smooth optimization, e.g. approximation problems with respect to the Manhattan or maximum norms, classification problems or the theory of statistical estimates. The lecture develops along another, geometrically intuitive example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introduction to entropic smoothing and convexity
- Global error bounds
- Smoothness properties of convex functions
- The convex subdifferential
- Global Lipschitz continuity
- Descent directions and stationarity conditions

Remark:

Prior to the attendance of this lecture, it is strongly recommended to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

Learning objectives:

The student

- knows and understands the fundamentals of convex analysis,
- is able to choose, design and apply modern techniques of convex analysis in practice.

Literature

- J. Borwein, A. Lewis, Convex Analysis and Nonlinear Optimization: Theory and Examples (2 ed.), Springer, 2006
- S. Boyd, L. Vandenberghe, Convex Optimization, Cambridge University Press, 2004
- O. Güler, Foundations of Optimization, Springer, 2010
- J.-B. Hiriart-Urruty, C. Lemarechal, Fundamentals of Convex Analysis, Springer, 2001
- B. Mordukhovich, N.M. Nam, An Easy Path to Convex Analysis and Applications, Morgan & Claypool Publishers, 2014
- R.T. Rockafellar, Convex Analysis, Princeton University Press, 1970
- R.T. Rockafellar, R.J.B. Wets, Variational Analysis, Springer, Berlin, 1998

T

6.65 Course: Cooperative Autonomous Vehicles [T-WIWI-112690]

Responsible: Prof. Dr. Alexey Vinel
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2511450	Cooperative Autonomous Vehicles	2 SWS	Lecture / 🗎	Vinel
ST 2023	2511451	Exercise Cooperative Autonomous Vehicles	1 SWS	Practice / 🗎	Vinel
Exams					
ST 2023	79AIFB_CAV_B5	Cooperative Autonomous Vehicles (Registration until 17 July 2023)			Vinel
WT 23/24	79AIFB_CAV_A3	Cooperative Autonomous Vehicles			Vinel

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min) or an oral exam (20 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

None

T

6.66 Course: Copyright [T-INFO-101308]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: [M-INFO-101215 - Intellectual Property Law](#)


Type
Written examination


Credits
3

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Events					
WT 23/24	24121	Copyright	2 SWS	Lecture / 	Sattler
Exams					
ST 2023	7500064	Copyright			Dreier, Matz
WT 23/24	7500064	Copyright			Matz


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.67 Course: Corporate Compliance [T-INFO-101288]

Responsible: Andreas Herzig
Organisation: KIT Department of Informatics
Part of: [M-INFO-101216 - Private Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2400087	Corporate Compliance	2 SWS	Lecture / 	Herzig, Siddiq
Exams					
ST 2023	7500063	Corporate Compliance			Dreier, Matz
WT 23/24	7500063	Corporate Compliance			Matz



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.68 Course: Corporate Financial Policy [T-WIWI-102622]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2530214	Corporate Financial Policy	2 SWS	Lecture / 	Ruckes
ST 2023	2530215	Übungen zu Corporate Financial Policy	1 SWS	Practice / 	Ruckes, Hoang
Exams					
ST 2023	7900073	Corporate Financial Policy			Ruckes
WT 23/24	7900058	Corporate Financial Policy			Ruckes

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Corporate Financial Policy

2530214, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The course develops the foundations for the management and financing of firms in imperfect markets.

The course covers the following topics:

- Measures of good corporate governance
- Corporate finance
- Liquidity management
- Executive compensation and incentives
- Corporate takeovers

Learning outcomes: The students



- are able to explain the importance of information asymmetry for the contract design of firms,
- are capable to evaluate measures for the reduction of information asymmetry,
- are in the position to analyze contracts with regard to their incentive and communication effects.

T

6.69 Course: Corporate Risk Management [T-WIWI-109050]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2530218	Corporate Risk Management	2 SWS	Lecture / 	Ruckes, Hoang
ST 2023	2530219	Exercise Corporate Risk Management		Practice / 	Ruckes, Hoang, Silbereis
Exams					
ST 2023	7900259	Corporate Risk Management			Ruckes
WT 23/24	7900136	Corporate Risk Management			Ruckes

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

Please note that the exam is only offered in the semester of the lecture as well as in the following semester.

Prerequisites

None

Recommendation

None

Annotation

The course will be held again in the summer term 2023 at the earliest. Please pay attention to the announcements on our website.

Below you will find excerpts from events related to this course:

V

Corporate Risk Management

2530218, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Organizational issues

The course will be offered as a block course in the summer term 2023. Further information will be published during the term. Please pay attention to our announcements.

In case of questions, please contact the tutor of the discussion sessions.

Literature

- Friberg, Richard. *Managing Risk and Uncertainty: A Strategic Approach*. Cambridge, MA: Managing Risk and Uncertainty, 2015.
- Stulz, René M. *Risk Management & Derivatives*. Mason, Ohio: Cengage Learning, Inc, 2002.
- Jorion, Philippe. *Value at Risk, 3rd Ed: The New Benchmark for Managing Financial Risk*. 3 ed. New York: General Finance & Investing, 2006

T

6.70 Course: Critical Information Infrastructures [T-WIWI-109248]**Responsible:** Prof. Dr. Ali Sunyaev**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-104403 - Critical Digital Infrastructures](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	4

Events					
WT 23/24	2511400	Critical Information Infrastructures	2 SWS	Lecture / 🗎	Sunyaev, Dehling, Jin
WT 23/24	2511401	Exercises to Critical Information Infrastructures	1 SWS	Practice / 🗎	Sunyaev, Dehling, Jin

Legend: 🗎 Online, 🔄 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

The alternative exam assessment consists of

- the preparation of a written elaboration as well as
- an oral examination as part of a presentation of the work.

Details of the grades will be announced at the beginning of the course.

The examination is only offered to first-time students in the winter semester, but can be repeated in the following summer semester.

Prerequisites

None.

Annotation

New lecture from winter semester 2018/2019.

T

6.71 Course: Cryptographic Voting Schemes [T-INFO-101279]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [M-INFO-100742 - Cryptographic Voting Schemes](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

T

6.72 Course: Curves and Surfaces for Geometric Design II [T-INFO-102041]

Responsible: Prof. Dr. Hartmut Prautzsch**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101231 - Curves and Surfaces for Geometric Design](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	2

Exams			
ST 2023	7500316	Curves and Surfaces for Geometric Design II	Prautzsch

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

oral exam (80%) and exercises (20%)

Prerequisites

None.

T

6.73 Course: Curves and Surfaces in CAD I [T-INFO-101374]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-100837 - Curves and Surfaces in CAD I](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Exams			
ST 2023	7500253	Curves and Surfaces in CAD I	Prautzsch

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.
 oral exam (80%) and exercises (20%)

Prerequisites

None.

T

6.74 Course: Curves and Surfaces in CAD II [T-INFO-102006]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101213 - Curves and Surfaces in CAD III](#)


Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Irregular	1

T

6.75 Course: Data and Storage Management [T-INFO-101276]

Responsible: Prof. Dr. Bernhard Neumair
Organisation: KIT Department of Informatics
Part of: [M-INFO-100739 - Data and Storage Management](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	24074	Data and Storage Management	2 SWS	Lecture / 	Neumair
Exams					
ST 2023	7500353	Data and Storage Management			Neumair
WT 23/24	7500112	Data and Storage Management			Neumair

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.76 Course: Data Privacy: From Anonymization to Access Control [T-INFO-108377]

Responsible: Prof. Dr.-Ing. Klemens Böhm**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-104045 - Data Privacy: From Anonymization to Access Control](#)**Type**
Written examination**Credits**
3**Grading scale**
Grade to a third**Recurrence**
Irregular**Version**
1

Events					
ST 2023	2400132	Data Privacy: From Anonymization to Access Control	2 SWS	/ ●	Buchmann
Exams					
ST 2023	7500209	Data Privacy: From Anonymization to Access Control			Böhm

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

T

6.77 Course: Data Science [T-INFO-113124]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [M-INFO-106505 - Data Science](#)

Type
Oral examination

Credits
8





Grading scale
Grade to a third

Recurrence
Each winter term

Version
2

Events

WT 23/24	24114	Data Science 1	3 SWS	Lecture / 	Böhm
----------	-------	--------------------------------	-------	---	------

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Prerequisites

None.

T

6.78 Course: Data Science 1 [T-INFO-111622]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Dr.-Ing. Edouard Fouché

Organisation: KIT Department of Informatics

Part of: [M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)


Type
Written examination





Credits
5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
3

Events					
WT 23/24	24114	Data Science 1	3 SWS	Lecture / 	Böhm
Exams					
ST 2023	7500311	Data Science 1			Böhm
ST 2023	7500362	Data Science I			Böhm

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.79 Course: Database as a Service [T-INFO-111400]**Responsible:** Prof. Dr.-Ing. Klemens Böhm**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105724 - Database as a Service](#)[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Exams			
ST 2023	7500056	Database as a Service	Böhm

Prerequisites

none

**6.80 Course: Database Systems and XML [T-WIWI-102661]**

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101456 - Intelligent Systems and Services](#)
[M-WIWI-101477 - Development of Business Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2511202	Database Systems and XML	2 SWS	Lecture /	Oberweis
WT 23/24	2511203	Exercises Database Systems and XML	1 SWS	Practice /	Oberweis, Fritsch
Exams					
ST 2023	79AIFB_DBX_A3	Database Systems and XML (Registration until 17 July 2023)			Oberweis
WT 23/24	79AIFB_DBX_A4	Database Systems and XML			Oberweis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Below you will find excerpts from events related to this course:

**Database Systems and XML**

2511202, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly more important with the emergence of the extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing data base systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

Note on the event format:

The course Database Systems and XML will be held in WS 23/24 in a "Flipped Classroom" format. Videos and supporting materials are provided for the lecture content, which students can work through independently and at their own pace. During the semester, interactive classroom sessions are held at regular intervals to practice and reinforce the lecture content.

Learning objectives:

Students

- know the basics of XML and generate XML documents,
- are able to use XML database systems and to formulate queries to XML documents,
- know to assess the use of XML in operational practice in different application contexts.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- M. Klettke, H. Meyer: XML & Datenbanken: Konzepte, Sprachen und Systeme. dpunkt.verlag 2003
- H. Schöning: XML und Datenbanken: Konzepte und Systeme. Carl Hanser Verlag 2003
- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- R. Elmasri, S. B. Navathe: Grundlagen der Datenbanksysteme. 2009
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2008

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T


6.81 Course: Decentralized Systems: Fundamentals, Modeling, and Applications [T-INFO-110820]





Responsible: Prof. Dr. Hannes Hartenstein

Organisation: KIT Department of Informatics

Part of: [M-INFO-105334 - Decentralized Systems: Fundamentals, Modeling, and Applications](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each summer term	3

Events					
ST 2023	2400089	Decentralized Systems: Fundamentals, Modeling, and Applications	4 SWS	Lecture / Practice / 	Stengele, Hartenstein
Exams					
ST 2023	7500284	Decentralized Systems: Fundamentals, Modeling, and Applications			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Recommendation

Prior knowledge in Foundations of IT-Security and Computer Networks is recommended.

Below you will find excerpts from events related to this course:

V

Decentralized Systems: Fundamentals, Modeling, and Applications

2400089, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

Decentralized Systems (like blockchain-based systems) represent distributed systems that are controlled by multiple parties who make their own independent decisions. In this course, we cover fundamental theoretical aspects as well as up-to-date decentralized systems and connect theory with current practice. We thereby address fault tolerance, security & trust, as well as performance aspects at the example of applications like Bitcoin, Ethereum Smart Contracts, and Matrix.

The lecture covers the following topics:

- Fundamentals
 - Peer-to-Peer Overlay Networks, Sybil and Eclipse Attacks
 - Formalization of decentralized systems, including models for their computation, communication, faults, and timing.
 - Leader election and mutual exclusion in decentralized systems based on different models for node identities and timing.
 - Byzantine consensus in synchronous and asynchronous settings, including Bracha's fundamental algorithm for reliable broadcast, Practical Byzantine Fault Tolerant consensus, and the fundamental limits.
 - Consistency models and protocols, up to and including Conflict-Free Replicated Data Types.
- Applications
 - Matrix
 - Distributed Ledgers, Blockchain, and Bitcoin
 - Payment Channel Networks
 - Ethereum as a smart contract platform
 - Decentralized storage systems

Competency**Goals:**


1. Fundamentals & Modeling
 1. The student is able to recognize and distinguish distributed, federated, and decentralized systems.
 2. The student understands consensus, consistency and coordination within the context of networked and decentralized systems.
 3. The student understands the concept of Sybil attacks.
 4. The student is familiar with decentralized algorithms for leader election and mutual exclusion for execution contexts with various guarantees.
 5. The student understands the formally proven limits of fault tolerance and their underlying assumptions. This includes an understanding of synchronous and asynchronous network models which underpin the respective proofs. The student also understands several models for fault tolerance, notably silent and noisy crash as well as byzantine fault tolerance within the context of decentralized and distributed systems.
 6. The student has a basic understanding of state machine replication.
 7. The student knows various models for and levels of consistency.
2. Applications
 1. The student understands conflict-free replicated data types and their use in decentralized systems like Matrix.
 2. The student has a fundamental understanding of blockchain-based cryptocurrencies (e.g. Bitcoin/Ethereum), Payment Channels, and decentralized communication systems like Matrix.
 3. The student understands trust relations in distributed and decentralized systems and applications.
 4. The student is able to understand how the previously introduced theoretical foundations relate to networked and decentralized systems in practice.
 5. The student understands concepts of decentralized storage systems.





T

6.82 Course: Deep Learning and Neural Networks [T-INFO-109124]

Responsible: Prof. Dr. Alexander Waibel**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-104460 - Deep Learning and Neural Networks](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	2400024	Deep Learning and Neural Networks	4 SWS	Lecture / 	Waibel, Nguyen
Exams					
ST 2023	7500044	Deep Learning and Neural Networks			Waibel


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.83 Course: Deep Learning for Computer Vision I: Basics [T-INFO-111491]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation: KIT Department of Informatics
Part of: [M-INFO-105753 - Deep Learning for Computer Vision I: Basics](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2400007	Deep Learning for Computer Vision I: Basics	2 SWS	Lecture / 	Stiefelhagen
Exams					
ST 2023	7500122	Deep Learning for Computer Vision I: Basics			Stiefelhagen
WT 23/24	7500258	Deep Learning for Computer Vision I: Basics			Stiefelhagen

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Recommendation

Basic knowledge of pattern recognition as taught in the module Cognitive Systems, is expected.


Annotation





The course is partially given in German and English.

T

6.84 Course: Deep Learning for Computer Vision II: Advanced Topics [T-INFO-111494]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105755 - Deep Learning for Computer Vision II: Advanced Topics](#)**Type**
Written examination**Credits**
3**Grading scale**
Grade to a third**Recurrence**
Each winter term**Version**
2

Events					
WT 23/24	2400258	Deep Learning for Computer Vision II: Advanced Topics	2 SWS	Lecture / 	Stiefelhagen, Sarfraz, Reiß
Exams					
ST 2023	7500150	Deep Learning for Computer Vision II: Advanced Topics			Stiefelhagen
WT 23/24	7500277	Deep Learning for Computer Vision II: Advanced Topics			Stiefelhagen

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.85 Course: Demand-Driven Supply Chain Planning [T-WIWI-110971]

Responsible: Dr. Josef Packowski
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102805 - Service Operations](#)


Type
Written examination





Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Events					
WT 23/24	2550510	Demand-Driven Supply Chain Planning		Lecture / 	Packowski
Exams					
ST 2023	7900163	Demand-Driven Supply Chain Planning			Packowski

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam.

Annotation


Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The course is planned to be held every winter term. The planned lectures and courses for the next three years are announced online.





T

6.86 Course: Deployment of Database Systems [T-INFO-101317]

Responsible: Prof. Dr.-Ing. Klemens Böhm**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100780 - Deployment of Database Systems](#)[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 23/24	2400111	Datenbankeinsatz	3 SWS	Lecture / 	Böhm
Exams					
ST 2023	7500090	Deployment of Database Systems			Böhm
ST 2023	7500366	Deployment of Database Systems			Böhm
WT 23/24	7500007	Deployment of Database Systems			Böhm

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.87 Course: Derivatives [T-WIWI-102643]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101482 - Finance 1](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2530550	Derivatives	2 SWS	Lecture / 🗎	Uhrig-Homburg
ST 2023	2530551	Übung zu Derivate	1 SWS	Practice / 🗎	Eska, Uhrig-Homburg
Exams					
ST 2023	7900111	Derivatives			Uhrig-Homburg
WT 23/24	7900051	Derivatives			Uhrig-Homburg

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Derivatives

2530550, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature

- Hull (2012): Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition

Weiterführende Literatur:

Cox/Rubinstein (1985): Option Markets, Prentice Hall

T

6.88 Course: Design and Architectures of Embedded Systems (ES2) [T-INFO-101368]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [M-INFO-100831 - Design and Architectures of Embedded Systems \(ES2\)](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2424106	Design and architectures of embedded systems (ES2)	2 SWS	Lecture	Khdr, Henkel

Below you will find excerpts from events related to this course:

V

Design and architectures of embedded systems (ES2)

2424106, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content

State-of-the-art System-on-Chips (SoCs) integrate more than a billion transistors on a single chip. Embedded devices powered by these SoCs would be increasingly ubiquitous and seamlessly integrated into the environment. Therefore they will no longer be perceived as separate computing devices. Such examples can be found in Wireless Sensor Networks (WSNs), Cyber Physical Systems (CPSs), electronic textiles and many more.

However, new efficient ESL (Embedded System Level) design tools as well as novel hardware-software architectures must be developed in order to enable embedded devices to achieve their true potential. The focus of this lecture is therefore on the high-level design methods and architectures for embedded systems. Since the power consumption of embedded systems is of paramount importance, this lecture emphasizes on hardware-software co-design procedures targeting low power consumption.

Appointments for the oral exam can be requested at ces.itec.kit.edu/972.php

The student learns complex hardware-software co-design methods that can be applied to the design of embedded systems. The student assesses and selects specific hardware-software architecture most suitable for an embedded system given its function. Furthermore, the student receives an introduction to the relevant current research topics.

T

6.89 Course: Design Principles for Interactive Real-Time Systems [T-INFO-101290]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100753 - Design Principles for Interactive Real-Time Systems](#)


Type
Oral examination





Credits
3

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	24648	Design Principles for Interactive Real-Time Systems	2 SWS	Lecture / 	Peinsipp-Byma, Sauer
Exams					
ST 2023	7500030	Design Principles for Interactive Real-Time Systems			Beyerer, Sauer, Peinsipp-Byma
WT 23/24	7500098	Design Principles for Interactive Real-Time Systems			Beyerer, Sauer, Peinsipp-Byma

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.90 Course: Design Thinking [T-WIWI-102866]**

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	2545008	Design Thinking (Track 1)	2 SWS	Seminar /	Jochem, Terzidis
WT 23/24	2545008	Design Thinking (Track 1)	2 SWS	Seminar /	Jochem, Terzidis
Exams					
ST 2023	7900053	Design Thinking (Track 1)			Terzidis
WT 23/24	7900084	Design Thinking (Track 1)			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessments (§4(2), 3 SPO).

Prerequisites

None

Recommendation

None

Annotation

The seminar content will be published on the website of the institute.

Below you will find excerpts from events related to this course:

	Design Thinking (Track 1) 2545008, SS 2023, 2 SWS, Language: English, Open in study portal	Seminar (S) On-Site
--	--	--------------------------------------

Content**Content**

Design Thinking is a user-centric innovation management method. The iterative process first analyzes the problem space and builds a sound understanding of the future users. Subsequently, ideas for the solution are generated, prototypes are created and tested by the user group. The result is a proven and validated product.

Learning Objectives

During the seminar, the students learn basic procedures for achieving user-centric innovations. These are concrete methods that start with the potential user of certain products and services. The method is problem-oriented and emphasizes the specific customer situation. After attending the seminar, the students have a clear understanding of the need to explore end-user needs and are able to independently apply the methods of Design Thinking for developing market-driven innovations at a basic level.

Credentials:

ATTENTION: Creditability in the seminar module: The seminar is NOT credited in the seminar module! Crediting is only possible in the EXPERT MODULE ENTREPRENEURSHIP.

Organizational issues

Registration is via the Wiwi-Portal.

	Design Thinking (Track 1) 2545008, WS 23/24, 2 SWS, Language: English, Open in study portal	Seminar (S) Blended (On-Site/Online)
--	---	---

Content**Course Content:**

Design Thinking is a user-centric innovation management method. The iterative process first analyzes the problem space and builds a sound understanding of the future users. Subsequently, ideas for the solution are generated, prototypes are created and tested by the user group. The result is a proven and validated product.

Learning Objectives

During the seminar, the students learn basic procedures for achieving user-centric innovations. These are concrete methods that start with the potential user of certain products and services. The method is problem-oriented and emphasizes the specific customer situation. After attending the seminar, the students have a clear understanding of the need to explore end-user needs and are able to independently apply the methods of Design Thinking for developing market-driven innovations at a basic level.

Credentials:

Registration is via the Wiwi portal.

ATTENTION: Creditability in the seminar module: The seminar is NOT credited in the seminar module! Crediting is only possible in the EXPERT MODULE ENTREPRENEURSHIP.

Organizational issues

Registration is via the Wiwi portal.

In the seminar you will work on a project in teams of 4-5 persons. The groups are formed in the seminar

**6.91 Course: Designing Interactive Systems [T-WIWI-110851]****Responsible:** Prof. Dr. Alexander Mädche**Organisation:** KIT Department of Economics and Management

Part of: [M-WIWI-104068 - Information Systems in Organizations](#)
[M-WIWI-104080 - Designing Interactive Information Systems](#)
[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2540558	Designing Interactive Systems	3 SWS	Lecture /	Mädche, Gnewuch
Exams					
ST 2023	00009	Designing Interactive Systems			Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Annotation

The course is held in english.

Below you will find excerpts from events related to this course:

**Designing Interactive Systems**

2540558, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content**Description**

Computers have evolved from batch processors towards highly interactive systems. This offers new possibilities but also challenges for the successful design of the interaction between human and computer. Interactive systems are socio-technical systems in which users perform tasks by interacting with technology in a specific context in order to achieve specified goals and outcomes.

The aim of this course is to introduce advanced concepts and theories, interaction technologies as well as current practice of contemporary interactive systems.

The course is complemented with a design capstone project, where students in a team select and apply design methods & techniques in order to create an interactive prototype

Learning objectives

- Get an advanced understanding of conceptual foundations of interactive systems from a human and computer perspective
- explore the theoretical grounding of Interactive Systems leveraging theories from reference disciplines such as psychology
- know specific design principles for the design of advanced interactive systems
- get hands-on experience in conceptualizing and designing advanced Interactive Systems to solve a real-world challenge from an industry partner by applying the lecture contents.

Prerequisites

No specific prerequisites are required for the lecture

Literature

Die Vorlesung basiert zu einem großen Teil auf

· Benyon, D. (2014). Designing interactive systems: A comprehensive guide to HCI, UX and interaction design (3. ed.). Harlow: Pearson.


Weiterführende Literatur wird in der Vorlesung bereitgestellt.





T

6.92 Course: Development of Sustainable Business Models [T-WIWI-112143]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 23/24	2500043	Development of Sustainable Business Models	3 SWS	Seminar / 	Duwe

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Non exam assessment. The final grade is composed 50% of the grade of the written paper (ca. 5 Pages/Person) and 50% of the presentation of the results.

Prerequisites

None


Recommendation





Prior attendance of the course Innovation Management is recommended.

T

6.93 Course: Digital Accessibility and Assistive Technologies [T-INFO-111830]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105882 - Digital Accessibility and Assistive Technologies](#)**Type**
Oral examination**Credits**
3**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	2400165	Digital Accessibility and Assistive Technologies	2 SWS	Lecture / 	Stiefelhagen, Schwarz
Exams					
ST 2023	7500163	Digital Accessibility and Assistive Technologies			Stiefelhagen
WT 23/24	7500320	Digital Accessibility and Assistive Technologies			Stiefelhagen

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.94 Course: Digital Democracy [T-WIWI-113160]****Responsible:** Jonas Fegert**Organisation:** KIT Department of Economics and Management

Part of: [M-WIWI-101410 - Business & Service Engineering](#)
[M-WIWI-101446 - Market Engineering](#)
[M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)
[M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each winter term	1 terms	1

Events					
WT 23/24	00052	Digital Democracy	2 SWS	Lecture /	Fegert
WT 23/24	00053	Übung zur Digital Democracy	1 SWS	Practice /	Fegert

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment. The examination consists of two parts (presentation and oral exam). Details on the design of the exam will be announced at the beginning of the course.

Annotation

Limited to 25 students. Application (cover letter) via the Wiwi-portal.

Below you will find excerpts from events related to this course:

**Digital Democracy**00052, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)**Lecture (V)**
Blended (On-Site/Online)**Content**

The "Digital Democracy" Lecture deals with opportunities and challenges of democracy and participation in a digitalized world. Social networks and other platforms have become a central place for human interaction.

These technologies open up many possibilities to connect people, promote societal discourse, and organize social movements. On the other hand, they are also used to undermine democracy by extremist forces.

One example is the spread of disinformation through social media, which can undermine trust in democratic institutions and exacerbate divisions in society. Big tech actors pursue their own economically driven interests, some of which run counter to societal ones.

So to what extent can Internet platforms help strengthen social discourse? And what measures can be taken to promote the quality and diversity of discourse in the digital world? What role do big tech players play in digital democracy and how can their interests be reconciled with democratic principles? These and many more questions will be explored in the lecture. The lecture introduces theoretical foundations and evidence-based research on digital democracy. It will address the following questions: What characterizes deliberative democracies, how do democracies change, and what can damage them? How does social polarization emerge and what drives it - off- and online. Accordingly, different platform types and phenomena of disinformation, such as clickbait, will be presented. The last part of the lecture series will deal with the search for approaches and alternatives to these problems.

Organizational issues


Beschränkung auf 25 Plätze mit Bewerbung per kurzem Motivationschreiben (ab Anfang/Mitte September über das Wiki-Portal)




T

6.95 Course: Digital Health [T-WIWI-109246]

Responsible: Prof. Dr. Ali Sunyaev**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-104403 - Critical Digital Infrastructures](#)[M-WIWI-104813 - Information Systems: Internet-Based Markets and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 23/24	2511402	Digital Health	2 SWS	Lecture / 	Sunyaev, Thiebes, Schmidt-Kraepelin

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Competence Certificate**

Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §4(2),3 of the examination regulation. Details of the grading will be announced at the beginning of the course. The examination is only offered to first-time writers in the winter semester, but can be repeated in the following summer semester.

Prerequisites

None.

T

6.96 Course: Digital Marketing [T-WIWI-112693]

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105312 - Marketing and Sales Management](#)
[M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2571185	Digital Marketing	2 SWS	Lecture / 🗎	Kupfer
ST 2023	2571186	Digital Marketing Exercise	1 SWS	Practice / 🗎	Mitarbeiter
Exams					
ST 2023	7900064	Digital Marketing			Kupfer
ST 2023	7900070	Digital Marketing			Kupfer

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

The control of success is done by the elaboration and presentation of a group task as well as a written exam. Further details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Students are highly encouraged to actively participate in class.

Below you will find excerpts from events related to this course:

V

Digital Marketing

2571185, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Students learn the theoretical foundations of digital marketing and its most important concepts. They develop an understanding both for the digital consumer and the digital environment. Special emphasis will be given to digital marketing strategies and practices, such as content marketing and influencer marketing. A tutorial offers the opportunity to apply the key learnings of the lecture as part of a group work.

The learning objectives are as follows:

- Getting to know the theoretical foundations of digital marketing
- Evaluating digital marketing strategies and practices (e.g., in the context of content marketing and influencer marketing)
- Fostering critical and analytical thinking skills and the application of knowledge to marketing problems
- Improving English skills

Total time required for 4.5 credit points: approx. 135 hours

Attendance time: 30 hours

Self-study: 105 hours

Organizational issues

Termine werden bekannt gegeben.

T

6.97 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

Responsible: Prof. Dr. Martin Klarmann
Anja Konhäuser

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105312 - Marketing and Sales Management](#)
[M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Competence Certificate

Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

Prerequisites

None.

Annotation

This course will not take place in the summer term 2023, but is expected to be offered again on a regular basis starting in the summer term 2024.

Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing and Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed. For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu). Please note that only one of the 1.5-ECTS courses can be attended in this module.

**6.98 Course: Digital Services: Innovation & Business Models [T-WIWI-112757]****Responsible:** Prof. Dr. Gerhard Satzger**Organisation:** KIT Department of Economics and Management

Part of: [M-WIWI-101410 - Business & Service Engineering](#)
[M-WIWI-101448 - Service Management](#)
[M-WIWI-102754 - Service Economics and Management](#)
[M-WIWI-102806 - Service Innovation, Design & Engineering](#)
[M-WIWI-104813 - Information Systems: Internet-Based Markets and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2595468	Digital Services: Innovation & Business Models	1.5 SWS	Lecture /	Satzger, Benz, Schüritz
ST 2023	2595469	Übung zu Digital Services: Innovation & Business Models	1.5 SWS	Practice /	Satzger, Benz, Schüritz
Exams					
ST 2023	7900113	Digital Services: Innovation & Business Models			Satzger
WT 23/24	7900215	Digital Services: Innovation & Business Models - oral			Satzger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 min.).

Prerequisites

None

Recommendation

None

Annotation

The course Digital Services: Innovation & Business Models replaces the course Service Innovation based on a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Previous foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Below you will find excerpts from events related to this course:

**Digital Services: Innovation & Business Models**

2595468, SS 2023, 1.5 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Leveraging data and digital technologies for business success is a key challenge for organizations as they need to

- get aware of the newly arising potential
- develop suitable digital services that are user-centric and individualized
- “servitize” their offering portfolio and business model
- transform their organizations

This course will equip students with concepts and methods to tackle this challenge along two dimensions: First, we will cover innovation as a concept as well as apply contemporary innovation methods (like Design Thinking, Open Innovation) to the services space. Second, we deal with leveraging innovation to develop new business models (including multi-partner concepts in platforms or ecosystems), to servitize existing business models (e.g., via product-service-systems), and to accordingly transform the organization.

The course links innovation and business model theories with practical examples and exercises. Students are asked to actively engage in the discussion.

Organizational issues

The course will be offered in the form of a flipped classroom concept starting in summer semester 2023. The lecture will be recorded in advance and made available online. During the “in presence” sessions, the contents of the lecture will be applied and expanded on.

Literature

- Bohmann, T./ Leimeister, J.M./ Möslin, K. (2014), Service Systems Engineering, Business & Information Systems Engineering, Vol. 6, No.2, 73-79.
- Cardoso, J., Fromm, H., Nickel, S., Satzger, G., Studer, R., & Weinhardt, C. (Eds.) (2015). Fundamentals of service systems (Vol. 12). Heidelberg: Springer.
- Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. John Wiley & Sons.
- Rogers, S. (2003). Diffusion of Innovations. 5. ed. New York: Free Press.
- Satzger, G., Benz, C., Bohmann, T., Roth, A. (2022). Servitization and Digitalization as Siamese Twins – Concepts and Research Agenda. Edvardsson/Tronvoll (eds.): The Palgrave Handbook of Service Management, 967-989.
- Uebersnickel, F., Brenner, W., Pukall, B., Naef, T., & Schindlholzer, B. (2015). Design Thinking: Das Handbuch. Frankfurt am Main: Frankfurter Allgemeine Buch.
- Vargo, S.L., Lusch, R.F. (2017). Service-dominant logic 2025. Int. J. Res. Mark. 34, 46–67.
- Weill, P.; Woerner, S.L. (2018): “What’s your Digital Business Model? – Six Questions to Help you Build the Next-Generation Enterprise“. Boston, Massachusetts: Harvard Business Review Press.

**6.99 Course: Digital Transformation and Business Models [T-WIWI-108875]**

Responsible: Dr. Daniel Jeffrey Koch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2023	2545103	Digital Transformation and Business Models	2 SWS	Seminar /	Koch
Exams					
ST 2023	7900284	Digital Transformation and Business Models			Weissenberger-Eibl

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Non exam assessment (following §4(2) 3 of the examination regulation). The final grade is composed 75% of the grade of the written paper and 25% of the presentation.

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management is recommended.

Below you will find excerpts from events related to this course:

**Digital Transformation and Business Models**

2545103, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content


The seminar "Digital Transformation and Business Models" aims at the development of thematic aspects of digital transformation with simultaneous application of different business model methodologies. Established companies face the challenge of digital transformation. The digital transformation is particularly relevant for the business models of industrial enterprises. As part of innovation management, the examination of business model changes against the background of digital transformation is one of the main challenges facing the German economy. At the beginning, seminar topics will be assigned. These will be presented and discussed at the end of the seminar. In the first seminar date impulses to business model methodologies and the digital transformation take place, which are to be discussed then, in order to provide an understanding for the topic complex and to ensure the purposeful development of the seminar topics.





T

6.100 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible: Hon.-Prof. Dr. Sven Spieckermann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102805 - Service Operations](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2550488	Ereignisdiskrete Simulation in Produktion und Logistik	3 SWS	Lecture / 	Spieckermann
Exams					
ST 2023	7900244	Discrete-Event Simulation in Production and Logistics			Spieckermann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written paper and an oral exam of about 30-40 min (alternative exam assessment).

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation

Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is planned to be held every summer term.

The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

V

Ereignisdiskrete Simulation in Produktion und Logistik

2550488, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

Organizational issues

Den Bewerbungszeitraum finden Sie auf der Veranstaltungswebseite im Lehre-Bereich unter dol.ior.kit.edu

Literature

- Gutenschwager K., Rabe M., Spieckermann S. und S. Wenzel (2017): Simulation in Produktion und Logistik, Springer, Berlin.
- Banks J., Carson II J. S., Nelson B. L., Nicol D. M. (2010) Discrete-event system simulation, 5.Aufl., Pearson, Upper Saddle River.
- Eley, M. (2012): Simulation in der Logistik - Einführung in die Erstellung ereignisdiskreter Modelle unter Verwendung des Werkzeuges "Plant Simulation", Springer, Berlin und Heidelberg
- Kosturiak, J. und M. Gregor (1995): Simulation von Produktionssystemen. Springer, Wien und New York.
- Law, A. M. (2015): Simulation Modeling and Analysis. 5th Edition, McGraw-Hill, New York usw.
- Liebl, F. (1995): Simulation. 2. Auflage, Oldenbourg, München.
- Noche, B. und S. Wenzel (1991): Marktspiegel Simulationstechnik. In: Produktion und Logistik. TÜV Rheinland, Köln.
- Pidd, M. (2004): Computer Simulation in Management Science. 5th Edition, Wiley, Chichester.
- Robinson S (2004) Simulation: the practice of model development and use. John Wiley & Sons, Chichester
- VDI (2014): Simulation von Logistik-, Materialfluß- und Produktionssystemen. VDI Richtlinie 3633, Blatt 1, VDI-Verlag, Düsseldorf.

T

6.101 Course: Distributed Computing [T-INFO-101298]

Responsible: Prof. Dr. Achim Streit
Organisation: KIT Department of Informatics
Part of: [M-INFO-100761 - Distributed Computing](#)

Type
Written examination

Credits
4

Grading scale
Grade to a third

Recurrence
Each winter term

Version
2

Events					
WT 23/24	2400050	Distributed Computing	2 SWS	Lecture / 🗣️	Streit, Krauß, Fischer
Exams					
ST 2023	7500282	Distributed Computing			Streit

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes. Depending on the number of participants it will be announced six weeks before the assessment (§3 Abs. 3 SPO) if the assessment is done

- as an oral examination according to § 4 Abs. 2 No. 2 SPO or
- as a written examination according to § 4 Abs. 2 No. 1 SPO.

Prerequisites

none.

Recommendation

Knowledge in the area of computer networks helpful.

**6.102 Course: Dynamic Macroeconomics [T-WIWI-109194]**

Responsible: Prof. Dr. Johannes Brumm
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101478 - Innovation and Growth](#)
[M-WIWI-101496 - Growth and Agglomeration](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	4

Events					
WT 23/24	2560402	Dynamic Macroeconomics	2 SWS	Lecture /	Brumm
WT 23/24	2560403	Übung zu Dynamic Macroeconomics	1 SWS	Practice /	Hußmann
Exams					
ST 2023	7900188	Dynamic Macroeconomics			Brumm

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is a written exam (60 min.).

Prerequisites

None.

Below you will find excerpts from events related to this course:

**Dynamic Macroeconomics**

2560402, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

This course addresses macroeconomic questions on an advanced level. The main focus of this course is on dynamic programming and its fundamental role in modern macroeconomics. In the first part of the course, the necessary mathematical tools are introduced as well as basic applications in labor economics, economic growth and business cycle analysis. In the second part of the course, these basic models are expanded to incorporate household heterogeneity in various forms: Models of economic inequality to analyze the distributional impact of tax policies and models of overlapping generations to analyze the impact of social security reforms or changes in government debt. Finally, advanced methods based on sparse grids or neural nets are introduced to solve high-dimensional models. The course pursues a hands-on approach so that students not only gain theoretical insights but also learn numerical tools to solve dynamic economic models using the programming language Python.

Literature



Literatur und Skripte werden in der Veranstaltung angegeben.

T

6.103 Course: Economics of Innovation [T-WIWI-112822]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101478 - Innovation and Growth](#)
[M-WIWI-101514 - Innovation Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2560236	Economics of Innovation	2 SWS	Lecture / 	Ott
ST 2023	2560237	Exercises of Economics of Innovation	1 SWS	Practice / 	Ott, Mirzoyan
Exams					
ST 2023	7900107	Economics of Innovation			Ott

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites

None

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Below you will find excerpts from events related to this course:

V

Economics of Innovation

2560236, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**Learning objectives:**

Students shall be given the ability to

- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- understand the relationships between market structure and the development of innovation
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Course content:**The course covers the following topics:**

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Exam description:

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature

Auszug:


- Aghion, P., Howitt, P. (2009), *The Economics of Growth*, MIT Press, Cambridge MA.
- de la Fuente, A. (2000), *Mathematical Methods and Models for Economists*. Cambridge University Press, Cambridge, UK.
- Klodt, H. (1995), *Grundlagen der Forschungs- und Technologiepolitik*. Vahlen, München.
- Linde, R. (2000), *Allokation, Wettbewerb, Verteilung - Theorie*, UNIBUCH Verlag, Lüneburg.
- Ruttan, V. W. (2001), *Technology, Growth, and Development*. Oxford University Press, Oxford.
- Scotchmer, S. (2004), *Incentives and Innovation*, MIT Press.
- Tirole, Jean (1988), *The Theory of Industrial Organization*, MIT Press, Cambridge MA.

T

6.104 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsible: PD Dr. Patrick Jochem
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101452 - Energy Economics and Technology](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2023	2581006	Efficient Energy Systems and Electric Mobility	2 SWS	Lecture / 	Jochem
Exams					
ST 2023	7981006	Efficient Energy Systems and Electric Mobility			Fichtner
WT 23/24	7981006	Efficient Energy Systems and Electric Mobility			Fichtner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Efficient Energy Systems and Electric Mobility

2581006, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.

- Understand the concept of energy efficiency as applied to specific systems
- Obtain an overview of the current trends in energy efficiency
- Be able to determine and evaluate alternative methods of energy efficiency improvement
- Overview of technical and economical stylized facts on electric mobility
- Judging economical, ecological and social impacts through electric mobility

Organizational issues

s. Institutsaushang

Literature



Wird in der Vorlesung bekanntgegeben.

T

6.105 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540454	eFinance: Information Systems for Securities Trading	2 SWS	Lecture / 	Weinhardt, Jaquart
WT 23/24	2540455	Übungen zu eFinance: Information Systems for Securities Trading	1 SWS	Practice / 	Motz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Annotation

The course "eFinance: Information Systems for Securities Trading" covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.

Below you will find excerpts from events related to this course:

V

eFinance: Information Systems for Securities Trading

2540454, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Literature

- Picot, Arnold, Christine Bortenlänger, Heiner Röhl (1996): "Börsen im Wandel". Knapp, Frankfurt
- Harris, Larry (2003): "Trading and Exchanges - Market Microstructure for Practitioners". Oxford University Press, New York

Weiterführende Literatur:



- Gomber, Peter (2000): "Elektronische Handelssysteme - Innovative Konzepte und Technologien". Physika Verlag, Heidelberg
- Schwartz, Robert A., Reto Francioni (2004): "Equity Markets in Action - The Fundamentals of Liquidity, Market Structure and Trading". Wiley, Hoboken, NJ

T

6.106 Course: Emerging Trends in Digital Health [T-WIWI-110144]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2513404	Seminar Emerging Trends in Digital Health (Bachelor)	2 SWS	Seminar / 	Sunyaev, Toussaint, Brecker, Danylak
ST 2023	2513405	Seminar Emerging Trends in Digital Health (Master)	2 SWS	Seminar / 	Sunyaev, Toussaint, Brecker, Danylak
Exams					
ST 2023	7900146	Seminar Emerging Trends in Digital Health (Master)			Sunyaev

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of a final thesis.

Prerequisites

None.

Annotation



The course is usually held as a block course.

T

6.107 Course: Emerging Trends in Internet Technologies [T-WIWI-110143]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2513402	Seminar Emerging Trends in Internet Technologies (Bachelor)	2 SWS	Seminar / 	Sunyaev, Toussaint, Brecker, Danylak
ST 2023	2513403	Seminar Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar / 	Sunyaev, Toussaint, Brecker, Danylak
Exams					
ST 2023	7900128	Seminar Emerging Trends in Internet Technologies (Master)			Sunyaev

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of a final thesis.

Prerequisites

None.

Annotation


The course is usually held as a block course.





T

6.108 Course: Emissions into the Environment [T-WIWI-102634]

Responsible: Ute Karl
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581962	Emissions into the Environment	2 SWS	Lecture / 	Karl
Exams					
ST 2023	7981962	Emissions into the Environment			Schultmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Recommendation

None

Below you will find excerpts from events related to this course:

V

Emissions into the Environment

2581962, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

Emission sources/emission monitoring/emission reduction: The lecture gives an overview of relevant emissions of air pollutants and greenhouse gases, emission monitoring and pollutant abatement options together with relevant legal regulations at national and international level. In addition, the fundamentals of circular economy, waste management and recycling are explained.

Structure:

Air pollution control

- Introduction, terms and definitions
- Sources of air pollutants
- Legal framework of air quality control
- Technical measures to reduce air pollutant emissions

Circular economy, recycling and waste management

- Waste collection and logistics
- Dual systems for packaging waste
- Recycling
- Thermal and biological waste treatment
- Final waste disposal

Literature

Wird in der Veranstaltung bekannt gegeben.

T

6.109 Course: Empirical Software Engineering [T-INFO-101335]

Responsible: Dr. Christopher Gerking
Organisation: KIT Department of Informatics
Part of: [M-INFO-100798 - Empirical Software Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1


Exams			
ST 2023	7500053	Empirical Software Engineering	Gerking




T

6.110 Course: Employment Law [T-INFO-111436]

Responsible: Dr. Alexander Hoff
Organisation: KIT Department of Informatics
Part of: [M-INFO-101216 - Private Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2023	24668	Employment Law	2 SWS	Lecture / 	Hoff
Exams					
ST 2023	7500082	Employment Law			Dreier, Matz
WT 23/24	7500001	Employment Law			Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.111 Course: Energy and Environment [T-WIWI-102650]

Responsible: Ute Karl
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101452 - Energy Economics and Technology](#)
[M-WIWI-101468 - Environmental Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2581003	Energy and Environment	2 SWS	Lecture / 🗣️	Karl
ST 2023	2581004	Übungen zu Energie und Umwelt	1 SWS	Practice / 🗣️	Langenmayr, Fichtner, Kraft
Exams					
ST 2023	7981003	Energy and Environment			Fichtner
WT 23/24	7981003	Energy and Environment			Fichtner

Legend: 🗣️ Online, 🗣️🗣️ Blended (On-Site/Online), 🗣️ On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None.

Below you will find excerpts from events related to this course:

V

Energy and Environment

2581003, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture focuses on the environmental impacts arising from fossil fuels use and on the methods for the evaluation of such impacts. The first part of the lecture describes the environmental impacts of air pollutants and greenhouse gases as well as technical measures for emission control. The second part covers methods of impact assessment and their use in environmental communication as well as methods for the scientific support of emission control strategies.

The topics include:

- Fundamentals of energy conversion
- Formation of air pollutants during combustion
- Technical measures to control emissions from fossil-fuel combustion processes
- External effects of energy supply (life cycle analyses of selected energy systems)
- Environmental communication on energy services (e.g. electricity labelling, carbon footprint)
- Integrated Assessment Modelling to support the European Clean Air Strategy
- Cost-effectiveness analyses and cost-benefit analyses for emission control strategies
- Monetary valuation of external effects (external costs)

Literature

Die Literaturhinweise sind in den Vorlesungsunterlagen enthalten (vgl. ILIAS)

T

6.112 Course: Energy Informatics 1 [T-INFO-103582]

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [M-INFO-101885 - Energy Informatics 1](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	2

Events					
WT 23/24	2400058	Energy Informatics 1	4 SWS	Lecture / Practice	Hagenmeyer, Süß, Bauer, Geiges, Werling
Exams					
ST 2023	7500079	Energy informatics 1			Hagenmeyer

Below you will find excerpts from events related to this course:

V

Energy Informatics 1

2400058, WS 23/24, 4 SWS, Language: German/English, [Open in study portal](#)

Lecture / Practice (VÜ)

Content

This module provides an overview of the physical and technical principles of different forms of energy, their storage, their transmission and the corresponding energy conversion processes. Furthermore, this module covers the system-technical combination of different local energy systems to form an overall energy system and provides an outlook on typical information technology applications in the energy sector.

In detail, the following topics are discussed with examples:

- Energy forms, systems and storage
- Energy conversion processes in power plants
- Renewable resources
- Energy transmission (electricity/gas/heat networks)
- Electrical networks of the future, load management
- Use of information and communication technology (ICT)
- Energy Economics

Literature

Diese werden in der Vorlesung gegeben.

T

6.113 Course: Energy Informatics 1 - Preliminary Work [T-INFO-110356]

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [M-INFO-101885 - Energy Informatics 1](#)

Type
Completed coursework

Credits
0

Grading scale
pass/fail

Recurrence
Each term

Version
1

Exams			
ST 2023	7500065	Energy Informatics 1 - preliminary work	Hagenmeyer

T

6.114 Course: Energy Informatics 2 [T-INFO-106059]

Responsible: Prof. Dr. Veit Hagenmeyer
Organisation: KIT Department of Informatics
Part of: [M-INFO-103044 - Energy Informatics 2](#)


Type
Oral examination



Credits
5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
2

Events					
ST 2023	2400017	Energy Informatics 2	4 SWS	Lecture / Practice / 	Hagenmeyer, Förderer, Stucky, Bao, Elbez, Kühnapfel, Schäfer, Mikut, Cakmak, An, Süß
Exams					
ST 2023	7500156	Energy Informatics 2			Hagenmeyer

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.115 Course: Energy Market Engineering [T-WIWI-107501]

Responsible: Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101451 - Energy Economics and Energy Markets](#)
[M-WIWI-103720 - eEnergy: Markets, Services and Systems](#)
[M-WIWI-104813 - Information Systems: Internet-Based Markets and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2540464	Energy Market Engineering	2 SWS	Lecture /	Weinhardt
ST 2023	2540465	Übung zu Energy Market Engineering	1 SWS	Practice /	Semmelmann
Exams					
ST 2023	79852	Energy Market Engineering			Weinhardt

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites

None

Recommendation

None

Annotation

Former course title until summer term 2017: T-WIWI-102794 "eEnergy: Markets, Services, Systems".

The lecture has also been added in the IIP Module *Basics of Liberalised Energy Markets*.

Below you will find excerpts from events related to this course:

V

Energy Market Engineering

2540464, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature



- Erdmann G, Zweifel P. *Energieökonomik, Theorie und Anwendungen*. Berlin Heidelberg: Springer; 2007.
- Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX*. *Zeitschrift für Energiewirtschaft*. 2008:147-161.
- Stoft S. *Power System Economics: Designing Markets for Electricity*. IEEE; 2002.,
- Ströbele W, Pfaffenberger W, Heuterkes M. *Energiewirtschaft: Einführung in Theorie und Politik*. 2nd ed. München: Oldenbourg Verlag; 2010:349.

T

6.116 Course: Energy Networks and Regulation [T-WIWI-107503]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-103720 - eEnergy: Markets, Services and Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540494	Energy Networks and Regulation	2 SWS	Lecture / 	Rogat, Miskiw
WT 23/24	2540495	Übung zu Energy Networks and Regulation	1 SWS	Practice / 	Rogat, Miskiw

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation.

The exam is offered every semester. Re-examinations are offered on every ordinary examination date.

Prerequisites

None

Recommendation

None

Annotation

Former course title until summer term 2017: T-WIWI-103131 "Regulatory Management and Grid Management - Economic Efficiency of Network Operation"

Below you will find excerpts from events related to this course:

V

Energy Networks and Regulation

2540494, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content**Learning Goals**

The student,

- understands the business model of a network operator and knows its central tasks in the energy supply system,
- has a holistic overview of the interrelationships in the network economy,
- understands the regulatory and business interactions,
- is in particular familiar with the current model of incentive regulation with its essential components and understands its implications for the decisions of a network operator
- is able to analyse and assess controversial issues from the perspective of different stakeholders.

Content of teaching

The lecture “Energy Networks and Regulation” provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator’s abilities to deal with the massive challenges lying ahead (“Energiewende”, redispatch, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO
- Objectives of regulation: Fair price calculation and high standard access conditions
- The functioning of incentive regulation
- First major amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily?) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

Literature

Averch, H.; Johnson, L.L (1962). Behavior of the firm under regulatory constraint, in: American Economic Review, 52 (5), S. 1052 – 1069.

Bundesnetzagentur (2006): Bericht der Bundesnetzagentur nach § 112a EnWG zur Einführung der Anreizregulierung nach § 21a EnWG, http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Anreizregulierung/BerichtEinfuehrgAnreizregulierung.pdf?__blob=publicationFile&v=3.

Bundesnetzagentur (2015): Evaluierungsbericht nach § 33 Anreizregulierungsverordnung, https://www.bmwi.de/Redaktion/DE/Downloads/A/anreizregulierungsverordnung-evaluierungsbericht.pdf?__blob=publicationFile&v=1.

Filippini, M.; Wild, J.; Luchsinger, C. (2001): Regulierung der Verteilnetzpreise zu Beginn der Marktöffnung. Erfahrungen in Norwegen und Schweden, Bundesamt für Energie, Bern, http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/34/066/34066585.pdf.

Gómez, T. (2013): Monopoly Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 151 – 198, Springer-Verlag, London.

Gómez, T. (2013): Electricity Distribution, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 199 – 250, Springer-Verlag, London.

Pérez-Arriaga, I.J. (2013): Challenges in Power Sector Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 647 – 678, Springer-Verlag, London.

Rivier, M.; Pérez-Arriaga, I.J.; Olmos, L. (2013): Electricity Transmission, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 251 – 340, Springer-Verlag, London.

T

6.117 Course: Energy Trading and Risk Management [T-WIWI-112151]

Responsible: N.N.
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101451 - Energy Economics and Energy Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	2

Events					
ST 2023	2581020	Energy Trading and Risk Management	2 SWS	Lecture / 	Kraft, Fichtner
Exams					
ST 2023	7981020	Energy Trade and Risk Management			Fichtner
WT 23/24	7981020	Energy Trading and Risk Management			Fichtner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The lecture "Energiehandel und Risikomanagement" will be held in English under the title "Energy Trading and Risk Management" from the summer semester 2022. The examination for the English-language lecture will be offered in English from the summer semester 2022.

The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Energy Trading and Risk Management

2581020, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

1. Introduction to Markets, Mechanisms and Interaction
2. Electricity Trading (platforms, products, mechanisms)
3. Balancing Energy Markets and Congestion Management
4. Coal Markets (reserves, supply, demand, and transport)
5. Investments and Capacity Markets
6. Oil and Gas Markets (supply, demand, trade, and players)
7. Trading Game
8. Risk Management in Energy Trading

Literature**Weiterführende Literatur:**

Burger, M., Graeber, B., Schindlmayr, G. (2007): *Managing energy risk: An integrated view on power and other energy markets*, Wiley&Sons, Chichester, England

EEX (2010): *Einführung in den Börsenhandel an der EEX auf Xetra und Eurex*, www.eex.de

Erdmann, G., Zweifel, P. (2008), *Energieökonomik, Theorie und Anwendungen*, Springer, ISBN: 978-3-540-71698-3

Hull, J.C. (2006): *Options, Futures and other Derivatives*, 6. Edition, Pearson Prentice Hall, New Jersey, USA

Borchert, J., Schlemm, R., Korth, S. (2006): *Stromhandel: Institutionen, Marktmodelle, Pricing und Risikomanagement (Gebundene Ausgabe)*, Schäffer-Poeschel Verlag

www.riskglossary.com

T

6.118 Course: Engineering Interactive Systems [T-WIWI-110877]**Responsible:** Prof. Dr. Alexander Mädche**Organisation:** KIT Department of Economics and Management

Part of: [M-WIWI-102806 - Service Innovation, Design & Engineering](#)
[M-WIWI-104080 - Designing Interactive Information Systems](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)
[M-WIWI-104813 - Information Systems: Internet-Based Markets and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Exams			
ST 2023	00006	Engineering Interactive Systems	Mädche
WT 23/24	7900195	Engineering Interactive Systems: AI & Wearables	Mädche

Competence Certificate

Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Annotation

The course is held in English.

T

6.119 Course: Entrepreneurial Leadership & Innovation Management [T-WIWI-102833]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	3

Competence Certificate

Please note: The seminar cannot be offered in the winter semester 2019/2020 due to organizational reasons. Alternative exam assessment.

Prerequisites

None

Recommendation




None





T

6.120 Course: Entrepreneurship [T-WIWI-102864]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each term	1

Events					
ST 2023	2545001	Entrepreneurship	2 SWS	Lecture / 	Terzidis, Dang
WT 23/24	2545001	Entrepreneurship	2 SWS	Lecture / 	Terzidis
WT 23/24	9005470	Entrepreneurship		Lecture / 	Terzidis
Exams					
ST 2023	7900002	Entrepreneurship			Terzidis
ST 2023	7900192	Entrepreneurship			Terzidis

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Students are offered the opportunity to earn a grade bonus through separate assignments. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by a maximum of one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the lecture.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Entrepreneurship

2545001, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

The lecture as a compulsory part of the module "Entrepreneurship" introduces the basic concepts of entrepreneurship. Important concepts and empirical facts are introduced, which relate to the conception and implementation of newly founded companies.

The focus here is on introducing methods for generating innovative business ideas, translating patents into business concepts, and general principles of business modeling and business planning. In particular, approaches such as Lean-Startup and Effectuation as well as concepts for financing young companies are covered.

A "KIT Entrepreneurship Talk" is part of each session, in which experienced founder and entrepreneur personalities report on their experiences in the practice of the establishment of an enterprise. Dates and speakers will be announced on the EnTechnon homepage.

Learning objectives:

The students will be introduced to the topic of entrepreneurship. After successful attendance of the course they should have an overview of the sub-areas of entrepreneurship and be able to understand basic concepts of entrepreneurship and apply key concepts.

Workload:

The total effort with 3 credit points: approx. 90 hours

Presence time: 30 hours

Pre- and postprocessing of the LV: 45.0 hours

Exam and exam preparation: 15.0 hours

Examination:

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation)

A grade bonus can be earned by successfully participating in a case study as part of the Entrepreneurship lecture. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to 0.3 or 0.4. The bonus only applies if you have passed the exam with at least a 4.0. More details will be provided in the lecture. Participation in the case study is voluntary.

Exam dates: tbd, probably 22.06.2023, 6pm - 7.10pm

Organizational issues

VL findet jeweils Di, 15:45 - 19:00 an folgenden Terminen statt:

18.04.2023

25.04.2023

02.05.2023

09.05.2023

16.05.2023

23.05.2023

06.06.2023

13.06.2023 (Prep Session)

22.06.2023 (Klausur, 18.00 - 19.10 Uhr)

Literature

Füglister, Urs, Müller, Christoph und Volery, Thierry (2008): Entrepreneurship

Ries, Eric (2011): The Lean Startup

Osterwalder, Alexander (2010): Business Model Generation

Aulet, Bill (2013): Disciplined Entrepreneurship. 24 Steps to a Successful Startup. Hoboken: Wiley.

R.C. Dorf, T.H. Byers: Technology Ventures – From Idea to Enterprise., (McGraw Hill 2008)

Hisrich, Robert D.; Ramadani, Veland (2017): Effective entrepreneurial management. Strategy, planning, risk management, and organization. Cham, Switzerland: Springer.

**Entrepreneurship**

2545001, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

The lecture as an obligatory part of the module "Entrepreneurship" introduces the basic concepts of entrepreneurship. Important concepts and empirical facts are presented that relate to the conception and implementation of newly founded companies.

The focus here is on the introduction to methods for generating innovative business ideas, for transferring patents into business concepts and general principles of business modelling and business planning. In particular approaches such as Lean Startup and Effectuation as well as concepts for the financing of young enterprises are treated.

A "KIT Entrepreneurship Talk" is part of each session, in which experienced founder and entrepreneur personalities report on their experiences in practice of the establishment of an enterprise. Dates and speakers will be announced on the EnTechnon homepage.

Learning objectives:

The students are introduced to the topic Entrepreneurship. After successful attendance of the meeting they are to have an overview of the subranges of the Entrepreneurships and be able to understand basic concepts of the Entrepreneurships and apply key concepts.

Workload:

Total effort with 3 credit points: approx. 90 hours

Presence time: 30 hours

Pre- and postprocessing of the LV: 45.0 hours

Exam and exam preparation: 15.0 hours

Examination:

The assessment of success takes place in the form of a written examination (60 min.) (according to §4(2), 1 SPO). The grade is the grade of the written exam.

A grade bonus can be earned through successful participation in a case study in the Entrepreneurship lecture. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to 0.3 or 0.4. The bonus only applies if you have passed the exam with at least a 4.0. More details will be provided in the lecture. Participation in the case study is voluntary.

Exam date: tba

Organizational issues

VL findet jeweils Mo, 15:45 - 19:00 an folgenden Terminen statt:

23.10.2023

30.10.2023

06.11.2023

13.11.2023

20.11.2023

27.11.2023

04.12.2023

11.12.2023 (Prep Session)

Literature

Aulet, Bill (2013): Disciplined Entrepreneurship. 24 Steps to a Successful Startup. Hoboken: Wiley.

R.C. Dorf, T.H. Byers: Technology Ventures – From Idea to Enterprise., (McGraw Hill 2008)

Füglister, Urs, Müller, Christoph and Volery, Thierry (2008): Entrepreneurship

Hisrich, Robert D.; Ramadani, Veland (2017): Effective entrepreneurial management. Strategy, planning, risk management, and organization. Cham, Switzerland: Springer.

Ries, Eric (2011): The Lean Startup.

Osterwalder, Alexander (2010): Business Model Generation.

**Entrepreneurship**

9005470, WS 23/24, SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture introduces the basic concepts of entrepreneurship. The individual stages of dynamic corporate development are covered. Emphasis is placed on the introduction to methods for generating innovative business ideas, the translation of patents into business concepts and general basics of business planning.

Further contents are the conception and use of service oriented information systems for founders, technology management and business model generation as well as lean startup methods for the implementation of business ideas by means of controlled experiments in the market.

Organizational issues

Anmeldung unter studium.hoc.kit.edu

Literature

Christine Volkmann, Kim Oliver Tokarski: Entrepreneurship: Gründung und Wachstum von jungen Unternehmen (2006)

Urs Fueglistaller, Christoph A. Müller, Thierry Volery: Entrepreneurship: Modelle - Umsetzung - Perspektiven (2008)

Eric Ries: The Lean Startup (2011)

Peter Drucker: Entrepreneurship & Innovation (1984)

Dorf, R.C. and Byers, T.H. (2008): Technology Ventures - From Idea to Enterprise

Runge, W. (2014): Technology Entrepreneurship - A Treatise on Entrepreneurs and Entrepreneurship for and n Technology Ventures

**6.121 Course: Entrepreneurship Research [T-WIWI-102894]**

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2023	2545002	Entrepreneurship Research	2 SWS	Seminar /	Terzidis
Exams					
ST 2023	7900052	Entrepreneurship Research			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The performance review is done via a so called other methods of performance review (term paper) (alternative exam assessment). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar.

Prerequisites

None

Recommendation

None

Annotation

The topics will be prepared in groups. The presentation of the results is done during a a block period seminar at the end of the semester. Students have to be present all day long during the seminar.

Below you will find excerpts from events related to this course:

**Entrepreneurship Research**

2545002, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content**Content**

The students independently develop a topic from entrepreneurship research in an international setting as a tandem with a partner. At first, there will be an introduction to the methodologies used such as systematic literature review, design science, qualitative and quantitative data analysis and more. As part of a written elaboration, the seminar topic must be presented scientifically on 15-20 pages. The results of the seminar paper will be presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives

As part of the written elaboration, the basics of independent scientific work (literature research, argumentation + discussion, citing literature sources, application of qualitative, quantitative and simulative methods) are trained. The skills acquired in the seminar are used to prepare for a potential master thesis. The course is therefore particularly aimed at students who want to write their thesis at the Chair for Entrepreneurship and Technology Management.

Organizational issues

The dates will be announced.

Registration is via the Wiwi-Portal.

Literature

Will be announced in the seminar.

T

6.122 Course: Entrepreneurship Seasonal School [T-WIWI-113151]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 23/24	2500215	Entrepreneurship Seasonal School	2 SWS	Block /	Weimar, Terzidis
Exams					
WT 23/24	7900146	Entrepreneurship Seasonal School			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment. The grade is composed of the presentation and the written elaboration. Details on the design of the examination will be announced in the course.

Prerequisites

The Seasonal School is intended for advanced bachelor's and all master's students (all disciplines). Participation in the selection process is a prerequisite.

Recommendation

Basic knowledge of business administration, attendance of the lecture Entrepreneurship as well as openness and interest in intercultural exchange are recommended. Solid knowledge of the English language is an advantage.

Annotation

Entrepreneurship Seasonal School

Below you will find excerpts from events related to this course:

V

Entrepreneurship Seasonal School

2500215, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Block (B)
On-Site

Content

During the Entrepreneurship Seasonal School, students develop a business model based on innovative technologies and social problems in workshops in international teams for one week.

Course Content:

The Entrepreneurship Seasonal School brings together students from different universities to spend a week strengthening their knowledge of digital entrepreneurship in healthcare. Experience the life of an entrepreneur and learn how to attain resources to realize a product vision. During one week, you will develop a range of entrepreneurial competences crucial for establishing a successful venture. Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. By gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

In WS 2023/24 the one-week program is being hosted by the Karlsruhe Institute of Technology, with co-teaching support from the Eucor partners University of Basel and the University of Strasbourg.

In the seminar you will work on a project in teams of max. 5 persons.

Learning Objectives:

After attending the event, you will be able to...

- describe the role of entrepreneurship
- develop innovative and technology-based solutions for societal problems,
- develop a viable business model for a problem,
- present a business idea to a panel of judges,
- and be empowered to work independently in multidisciplinary and multicultural teams

Organizational issues

19.02.24 – 23.02.24, Details will be announced later. Registration via wiwi portal.

T

6.123 Course: Environmental and Resource Policy [T-WIWI-102616]

Responsible: Rainer Walz
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101468 - Environmental Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	2560548	Environmental and Ressource Policy	2 SWS	Lecture / Practice	Walz
Exams					
ST 2023	7900277	Environmental and Resource Policy			Mitsch, Walz

Competence Certificate

See German version

Recommendation

It is recommended to already have knowledge in the area of industrial organization and economic policy. This knowledge may be acquired in the courses *Introduction to Industrial Organization* [2520371] and *Economic Policy* [2560280].

Below you will find excerpts from events related to this course:

V

Environmental and Ressource Policy2560548, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture / Practice (VÜ)

Literature**Weiterführende Literatur:**

Michaelis, P.: *Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung*, Heidelberg
 OECD: *Environmental Performance Review Germany*, Paris

T

6.124 Course: Environmental Economics and Sustainability [T-WIWI-102615]

Responsible: Prof. Dr. Rainer Walz
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101468 - Environmental Economics](#)

Type
Written examination

Credits
3

Grading scale
Grade to a third

Recurrence
Each winter term

Version
2

Events					
WT 23/24	2521547	Umweltökonomik und Nachhaltigkeit (mit Übung)	2 SWS	Lecture / Practice	Walz
Exams					
ST 2023	7900273	Environmental Economics and Sustainability			Mitusch

Competence Certificate

See German version

Prerequisites

None

Recommendation


It is recommended to already have knowledge in the area of macro- and microeconomics. This knowledge may be acquired in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014].





T

6.125 Course: Environmental Law [T-BGU-111102]

Responsible: Dr. Ulrich Smeddinck**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences**Part of:** [M-WIWI-101468 - Environmental Economics](#)

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each winter term	1 terms	1

Events					
WT 23/24	6111177	Environmental Law		Lecture / 	Smeddinck
Exams					
WT 23/24	8262111102_1	Environmental Law			Smeddinck

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Competence Certificate**

Written exam with 120 min

Prerequisites

None

Annotation

None

T

6.126 Course: European and International Law [T-INFO-101312]

Responsible: Ulf Brühann
Organisation: KIT Department of Informatics
Part of: [M-INFO-101217 - Public Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	24666	Europäisches und Internationales Recht	2 SWS	Lecture / 	Brühann
Exams					
ST 2023	7500084	European and International Law			Dreier
WT 23/24	7500048	European and International Law			Zufall

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.127 Course: Experimental Economics [T-WIWI-102614]**

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101505 - Experimental Economics](#)
[M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540489	Experimental Economics	2 SWS	Lecture /	Knierim
WT 23/24	2540493	Übung zu Experimental Economics	1 SWS	Practice /	Greif-Winzrieth, Knierim

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 min).

By successful completion of 70% of the maximum number of points in the exercise(s) a bonus can be obtained.

If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4). The exact criteria for the award of a bonus will be announced at the beginning of the lecture.

Prerequisites

None

Below you will find excerpts from events related to this course:

**Experimental Economics**

2540489, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature


- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2. Aufl. 2006.
- Handbook of Experimental Economics; J. Kagel, A. Roth; Princeton University Press, 1995.
- Experiments in Economics; J.D. Hey; Blackwell Publishers, 1991.
- Experimental Economics; D.D. Davis, C.A. Holt; Princeton University Press, 1993.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.





T

6.128 Course: Explainable Artificial Intelligence [T-INFO-112774]

Responsible: TT-Prof. Dr. Rudolf Lioutikov
Organisation: KIT Department of Informatics
Part of: [M-INFO-106302 - Explainable Artificial Intelligence](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2400128	Explainable Artificial Intelligence	2 SWS	Lecture / 	Lioutikov
Exams					
ST 2023	7500359	Explainable Artificial Intelligence			Lioutikov

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 120 minutes.

A bonus can be acquired through successful participation in the exercise as a success control of a different kind (§4(2), 3 SPO 2008) or study performance (§4(3) SPO 2015). The exact criteria for awarding a bonus will be announced at the beginning of the lecture. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The bonus is only valid for the main and post exams of the semester in which it was earned. After that, the grade bonus expires.

Prerequisites

None.

Recommendation

- Experience in Machine Learning is recommended, e.g. through prior coursework.
- The Computer Science Department offers several great lectures e.g., “Maschinelles Lernen - Grundlagen und Algorithmen” and “Deep Learning”
- A good mathematical background will be beneficial
- Python / PyTorch experience could be beneficial when we discuss practical examples/implementations.

Below you will find excerpts from events related to this course:

V

Explainable Artificial Intelligence

2400128, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Recent advances in Machine Learning and Deep Learning in particular have led to the imminent introduction of AI agents into a wide variety of applications. However, the apparent “black-box” nature of these approaches hinders their application in both critical systems and close human-robot interactions. The sub-field of eXplainable Artificial Intelligence (XAI) aims to address this shortcoming. This lecture will introduce and discuss various concepts and methods of XAI and consider them from perspective of Robot Learning and Human-Robot Interaction.

The lecture will start with a (brief) introduction into relevant deep learning approaches, before discussing interpretable scene, task and behavior representations. Afterward the lecture will consider itself with Data-Driven and Goal-Driven AI. Finally, first approaches that incorporate XAI and XAI-based human feedback directly into the learning process itself will be discussed. An exemplary list of topics is given below:

- Introduction to XAI
- Interpretable Machine Learning vs Explainable Machine Learning
 - Primer / Introduction to relevant Deep Learning Concepts
- MLPs and CNNs
- Graph Neural Networks
- Transformers
- Diffusion Models
- Score Based Methods
 - Interpretable Structures
- Scene Representations
- Task Representations
- Behavior Representations
 - Data-Driven Explainable AI: XAI Methods for
- Shapley Values
- Saliency Maps
- Concept Activation Vectors
- Linguistic Neuron Annotation
 - Goal-Driven Explainable AI: XAI Methods for
- Generative Explaining Models
- Behavior Verbalization
- Behavior Visualization
 - Interactive Learning
- Integrating Human Feedback
- Explanatory Interactive Learning
 - Experience in Machine Learning is recommended, e.g. through prior coursework.
 - The Computer Science Department offers several great lectures e.g., “Maschinelles Lernen - Grundlagen und Algorithmen” and “Deep Learning”
 - A good mathematical background will be beneficial

Python / PyTorch experience could be beneficial when we discuss practical examples/implementations.

Arbeitsaufwand = 90h = 3 ECTS

- ca 30h Vorlesungsbesuch
- ca 30h Nachbearbeitung
- ca 30h Prüfungsvorbereitung

Organizational issues

Als Blockvorlesung 31.07.-04.08.2023

[KIT-Fakultät für Informatik/1. Informatik Lehrveranstaltungen/1.10 Wahlvorlesungen](#)

T

6.129 Course: Extraordinary Additional Course in the Module Cross-Functional Management Accounting [T-WIWI-108651]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate

The assessment depends on which extraordinary course becomes part of the module "Cross-Functional Management Accounting".

.

Prerequisites

None

Annotation

The purpose of this placeholder is to make it possible to include an extraordinary course in the module "Cross-Functional Management Accounting". Proposals for specific courses have to be approved in advance by the module coordinator.

T

6.130 Course: Financial Analysis [T-WIWI-102900]

Responsible: Dr. Torsten Luedecke
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2530205	Financial Analysis	2 SWS	Lecture / 🗣️	Luedecke
ST 2023	2530206	Übungen zu Financial Analysis	2 SWS	Practice / 🗣️	Luedecke
Exams					
ST 2023	7900075	Financial Analysis			Luedecke
WT 23/24	7900059	Financial Analysis			Ruckes, Luedecke

Legend: 🗣️ Online, 🗣️🗣️ Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

See German version.

Prerequisites

None

Recommendation

Basic knowledge in corporate finance, accounting, and valuation is required.

Below you will find excerpts from events related to this course:

V

Financial Analysis

2530205, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature

- Alexander, D. and C. Nobes (2017): Financial Accounting – An International Introduction, 6th ed., Pearson.
- Penman, S.H. (2013): Financial Statement Analysis and Security Valuation, 5th ed., McGraw Hill.

**6.131 Course: Financial Econometrics [T-WIWI-103064]**

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)
[M-WIWI-105414 - Statistics and Econometrics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2520022	Financial Econometrics I	2 SWS	Lecture /	Schienle, Buse
WT 23/24	2520023	Übungen zu Financial Econometrics I	2 SWS	Practice /	Schienle, Buse
Exams					
ST 2023	7900223	Financial Econometrics			Schienle
WT 23/24	7900123	Financial Econometrics II			Schienle
WT 23/24	7900126	Financial Econometrics			Schienle

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites

None

Recommendation

Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics"[2520016]

Annotation

The next lecture will take place in the winter semester 2022/23.

Below you will find excerpts from events related to this course:

**Financial Econometrics I**

2520022, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**Learning objectives:**

The student

- shows a broad knowledge of financial econometric estimation and testing techniques
- is able to apply his/her technical knowledge using software in order to critically assess empirical problems

Content:

ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises

Requirements:

It is recommended to attend the course *Economics III: Introduction to Econometrics* [2520016] prior to this course.

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Literature

Taylor, S. J. (2005): "Asset Price Dynamics, Volatility, and Prediction", Princeton University Press.

Tsay, R. S. (2005): "Analysis of Financial Time Series: Financial Econometrics", Wiley, 2nd edition.

Cochrane, J. H. (2005): "Asset Pricing", revised edition, Princeton University Press.

Campbell, J. Y., A. W. Lo, and A. C. MacKinlay (1997): "The Econometrics of Financial Markets", Princeton University Press.

Hamilton, J. D. (1994): "Time Series Analysis", Princeton University Press.



Additional literature will be discussed in the lecture.

T

6.132 Course: Financial Econometrics II [T-WIWI-110939]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)
[M-WIWI-105414 - Statistics and Econometrics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2023	2521302	Financial Econometrics II	2 SWS	Lecture / 	Schienle, Buse
ST 2023	2521303	Übung zu Financial Econometrics II	1 SWS	Practice / 	Buse, Schienle
Exams					
ST 2023	7900081	Financial Econometrics II			Schienle

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Written examination (90 minutes). If the number of participants is low, an oral examination will be held instead.

Prerequisites

None

Recommendation

Knowledge of the contents covered by the course "Financial Econometrics"

Annotation

Course language is English


The next lecture will take place in the summer semester of 2023.

T

6.133 Course: Financial Intermediation [T-WIWI-102623]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)
[M-WIWI-101502 - Economic Theory and its Application in Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2530232	Financial Intermediation	2 SWS	Lecture / 	Ruckes
WT 23/24	2530233	Übung zu Finanzintermediation	1 SWS	Practice	Ruckes, Benz
Exams					
ST 2023	7900078	Financial Intermediation			Ruckes
WT 23/24	7900063	Financial Intermediation			Ruckes

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Financial Intermediation

2530232, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

Terminankündigungen des Instituts beachten

Literature**Weiterführende Literatur:**

- Hartmann-Wendels/Pfingsten/Weber (2014): Bankbetriebslehre, 6. Auflage, Springer Verlag.
- Freixas/Rochet (2008): Microeconomics of Banking, 2. Auflage, MIT Press.

T

6.134 Course: Firm creation in IT security [T-WIWI-110374]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate

Alternative exam assessment. The grade consists of the presentation and the written elaboration.

Prerequisites

None

T

6.135 Course: Formal Systems [T-INFO-101336]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [M-INFO-100799 - Formal Systems](#)

Type
Written examination

Credits
6

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Events					
WT 23/24	24086	Formale Systeme	4 SWS	Lecture / Practice	Beckert, Ulbrich, Weigl
Exams					
ST 2023	7500009	Formal Systems			Beckert
WT 23/24	7500036	Formal Systems			Beckert

T

6.136 Course: Formal Systems II: Application [T-INFO-101281]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [M-INFO-100744 - Formal Systems II: Application](#)


Type
Oral examination

Credits
5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	2400093	Formal Systems II: Application	3 SWS	Lecture / 	Ulbrich, Beckert
Exams					
ST 2023	7500006	Formale Systeme II: Anwendung			Beckert

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.137 Course: Formal Systems II: Theory [T-INFO-101378]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: [M-INFO-100841 - Formal Systems II: Theory](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

T

6.138 Course: Fundamentals for Financial -Quant and -Machine Learning Research [T-WIWI-111846]

Responsible: Prof. Dr. Maxim Ulrich

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-105894 - Foundations for Advanced Financial -Quant and -Machine Learning Research](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	see Annotations	1

Competence Certificate

Due to the professor's research sabbatical, the BSc module "Financial Data Science" and MSc module "Foundations for Advanced Financial -Quant and -Machine Learning Research" and the MSc module "Advanced Machine Learning and Data Science" along with the respective examinations will not be offered in SS2023. Bachelor and Master thesis projects are not affected and will be supervised.

The module examination is an alternative exam assessment with a maximum score of 100 points to be achieved. These points are distributed over 4 worksheets to be submitted during the semester. The worksheets cover the respective material of the module and are handed out, worked on and assessed in lecture weeks 3 (10 points), 6 (20 points), 9 (30 points) and 12 (40 points).

The module-wide exam (all 4 worksheets) must be taken in the same semester.

The worksheets are a mixture of analytical tasks and programming tasks with financial data.

Recommendation

- Strongly recommended to have good knowledge in financial econometrics (MLE, OLS, GLS, ARMA-GARCH), mathematics (differential equations, difference equations and optimization), investments (CAPM, factor models), asset pricing (SDF, SDF pricing), derivatives (Black-Scholes, risk-neutral pricing), and programming of statistical concepts (Java or R or Python or Matlab or C or ...)
- Strongly recommended to have a strong interest for interdisciplinary research work in statistics, programming, applied math and financial economics.
- Students lacking the prior knowledge might find the resources of the Chair helpful: www.youtube.com/c/cram-kit.

Annotation

The course is offered every second year.





T

6.139 Course: Fundamentals of National and International Group Taxation [T-WIWI-111304]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101511 - Advanced Topics in Public Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2560133	Fundamentals of National and International Group Taxation	3 SWS	Lecture / 	Wigger, Gutekunst
Exams					
ST 2023	790kobe	Fundamentals of National and International Group Taxation			Wigger
WT 23/24	790kobe	Fundamentals of National and International Group Taxation			Wigger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites

None

Recommendation

It is recommended to attend the course "Basics of German Company Tax Law and Tax Planning" beforehand.

T

6.140 Course: Fuzzy Sets [T-INFO-101376]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [M-INFO-100839 - Fuzzy Sets](#)


Type
Oral examination


Credits
6

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	24611	Fuzzy Sets	3 SWS	Lecture / 	Pfaff
Exams					
ST 2023	7500001	Fuzzy Sets			Pfaff
WT 23/24	7500011	Fuzzy Sets			Pfaff

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Fuzzy Sets

24611, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In this module, the fundamental theory and practical applications of fuzzy sets are communicated. The course copes with fuzzy arithmetics, fuzzy logic, fuzzy relations, and fuzzy deduction. The representation of fuzzy sets and their properties are the theoretical foundation. Based on this theory, arithmetic and logical operations are axiomatically derived and analyzed. Furthermore, it is shown how arbitrary functions and relations are transferred into fuzzy sets. An application of the logic part of the module, fuzzy deduction, shows different approaches to applying rule-based systems on fuzzy sets. The final part of the course treats the problem of fuzzy control.

Literature

Hilfreiche Quellen werden im Skript und in den Vorlesungsfolien genannt.

T

6.141 Course: Geometric Optimization [T-INFO-101267]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-100730 - Geometric Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1


Exams			
ST 2023	7500230	Geometric Optimization	Prautzsch





T

6.142 Course: Global Manufacturing [T-WIWI-112103]

Responsible: Dr. Henning Sasse
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581956	Global Manufacturing	2 SWS	Lecture / 	Sasse
Exams					
ST 2023	7981956	Global Manufacturing			Schultmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Annotation

The lecture will be held for the first time in the winter semester 2022/23.

Below you will find excerpts from events related to this course:

V

Global Manufacturing

2581956, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

- Fundamentals of international business
- Forms of international cooperation and value creation
- Site selection
- Cost driven internationalization and site selection
- Sales and customer driven internationalization and site selection
- Challenges, risks and risk mitigation
- Management of international production sites
- Types and case studies of international production

Organizational issues

Blockveranstaltung, siehe Homepage

Literature


Wird in der Veranstaltung bekannt gegeben.

T

6.143 Course: Global Optimization I [T-WIWI-102726]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2550134	Global Optimization I	2 SWS	Lecture / 	Stein
Exams					
ST 2023	7900205_SS2023_HK	Global Optimization I			Stein
WT 23/24	7900004_WS2324_NK	Global Optimization I			Stein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO). The successful completion of the exercises is required for admission to the written exam.

The exam is offered in the lecture of semester and the following semester.

The success check can be done also with the success control for "Global optimization II". In this case, the duration of the written exam is 120 min.

Prerequisites

None

Recommendation

None

Annotation

Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V

Global Optimization I

2550134, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:




- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990





T

6.144 Course: Global Optimization I and II [T-WIWI-103638]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Events					
ST 2023	2550134	Global Optimization I	2 SWS	Lecture / 	Stein
ST 2023	2550135	Exercise to Global Optimization I and II	2 SWS	Practice / 	Stein, Beck
ST 2023	2550136	Global Optimization II	2 SWS	Lecture / 	Stein
Exams					
ST 2023	7900207_SS2023_HK	Global Optimization I and II			Stein
WT 23/24	7900006_WS2324_NK	Global Optimization I and II			Stein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

None

Annotation

Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V

Global Optimization I

2550134, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

**Global Optimization II**

2550136, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:


- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990





T

6.145 Course: Global Optimization II [T-WIWI-102727]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2550136	Global Optimization II	2 SWS	Lecture / 	Stein
Exams					
ST 2023	7900206_SS2023_HK	Global Optimization II			Stein
WT 23/24	7900005_WS2324_NK	Global Optimization II			Stein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of "Global optimization I". In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Annotation

Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V

Global Optimization II

2550136, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

T

6.146 Course: Graph Partitioning and Graph Clustering in Theory and Practice [T-INFO-101295]**Responsible:** Prof. Dr. Peter Sanders

Dr. rer. nat. Torsten Ueckerdt

Organisation: KIT Department of Informatics**Part of:** [M-INFO-100758 - Graph Partitioning and Graph Clustering in Theory and Practice](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

T

6.147 Course: Graph Partitioning and Graph Clustering in Theory and Practice - Practical [T-INFO-110999]**Responsible:** Prof. Dr. Peter Sanders

Dr. rer. nat. Torsten Ueckerdt

Organisation: KIT Department of Informatics**Part of:** [M-INFO-100758 - Graph Partitioning and Graph Clustering in Theory and Practice](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1	Grade to a third	Each summer term	1

**6.148 Course: Graph Theory and Advanced Location Models [T-WIWI-102723]**

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Events					
WT 23/24	2500007		1,5 SWS	Practice /	Bakker
WT 23/24	2550484	Graph Theory and Advanced Location Models	3 SWS	Lecture /	Nickel
WT 23/24	2550485		1 SWS	Practice	Dunke, Bindewald
Exams					
WT 23/24	7900033	Graph Theory and Advanced Location Models			Nickel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at <http://dol.ior.kit.edu/english/Courses.php>.

Below you will find excerpts from events related to this course:

**Graph Theory and Advanced Location Models**

2550484, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Graph Theory is an important part of Discrete Mathematics. A special attraction is in its clearness and variety of proof techniques. Topic of the first part "Graph Theory" is the mediation of basic graph theoretical concepts and algorithms, which are deployed in many areas of operations research. In focus is the modeling of different problems with graph theoretical methods and their solutions with efficient algorithms. Significant focal points are shortest paths, flows, matchings, colorings and matroids. A variety of application areas of location theory has attracted increasing research interest within the last decades, because location decisions are a critical factor in strategic planning. In the second part "Advanced Location Models", some current research questions of modern industrial location theory are discussed after a short introduction. Thereby, practical models and suitable solution methods for location problems in general networks are presented. The lecture goes into details about pareto solutions in networks, ordered median problems, covering problems and allocation problems.

Literature



- Jungnickel: Graphs, Networks and Algorithms, 2nd edition, Springer, 2005
- Diestel: Graph Theory, 3rd edition, Springer, 2006
- Bondy, Murty: Graph Theory, Springer, 2008
- Nickel, Puerto: Location Theory, Springer, 2005
- Drezner: Facility Location – Applications and Theory, 2nd edition, Springer, 2005

T

6.149 Course: Growth and Development [T-WIWI-112816]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101478 - Innovation and Growth](#)
[M-WIWI-101496 - Growth and Agglomeration](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2561503	Growth and Development	2 SWS	Lecture / 	Ott
WT 23/24	2561504	Exercise for Growth and Development	1 SWS	Practice / 	Völkle, Ott, Zoroglu
Exams					
ST 2023	7900105	Growth and Development			Ott

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as an open-book examination or as a 60-minute written examination.

Prerequisites

None

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Below you will find excerpts from events related to this course:

V

Growth and Development

2561503, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
On-Site

Content

This course is intended as an introduction to the field of advanced macroeconomics with a special focus on economic growth. Lectures aim to deal with the theoretical foundations of exogenous and endogenous growth models. The importance of growth for nations and discussion of some (well-known) growth theories together with the role of innovation, human capital and environment will therefore be primary focuses of this course.

Learning objective:

Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

Course content:

- Intertemporal consumption decision
- Growth models with exogenous saving rates: Solow
- Growth models with endogenous saving rates: Ramsey
- Growth and environmental resources
- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Exam description:

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature

Auszug:

- Acemoglu, D. (2009): Introduction to modern economic growth. Princeton University Press, New Jersey.
- Aghion, P., Howitt, P. (2009): Economics of growth, MIT-Press, Cambridge/MA.
- Barro, R.J., Sala-i-Martin, X. (2003): Economic Growth. MIT-Press, Cambridge/MA.
- Sydsaeter, K., Hammond, P. (2008): Essential mathematics for economic analysis. Prentice Hall International, Harlow.
- Sydsæter, K., Hammond, P., Seierstad, A., Strom, A., (2008): Further Mathematics for Economic Analysis, Second Edition, Pearson Education Limited, Essex.

T

6.150 Course: Hands-on Bioinformatics Practical [T-INFO-103009]

Responsible: Prof. Dr. Alexandros Stamatakis
Organisation: KIT Department of Informatics
Part of: [M-INFO-101573 - Hands-on Bioinformatics Practical](#)


Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	3





T

6.151 Course: Heat Economy [T-WIWI-102695]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101452 - Energy Economics and Technology](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	2

Events					
ST 2023	2581001	Heat Economy	2 SWS	Lecture / 	Fichtner
Exams					
ST 2023	7981001	Heat Economy			Fichtner
WT 23/24	7981001	Heat Economy			Fichtner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written (60 minutes) or oral exam (30 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites

None.

Recommendation

None

Annotation

See German version.

Below you will find excerpts from events related to this course:

V

Heat Economy

2581001, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues


Block, Seminarraum Standort West - siehe Institutsaushang





T

6.152 Course: Heterogeneous Parallel Computing Systems [T-INFO-101359]

Responsible: Prof. Dr. Wolfgang Karl**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100822 - Heterogeneous Parallel Computing Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2424117	Heterogene parallele Rechensysteme	2 SWS	Lecture / 	Karl
Exams					
WT 23/24	7500209	VL: Heterogeneous Parallel Computing Systems			Karl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T



6.153 Course: Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy [T-INFO-101262]





Responsible: Prof. Dr.-Ing. Tamim Asfour
Hon.-Prof. Dr. Uwe Spetzger

Organisation: KIT Department of Informatics

Part of: M-INFO-100725 - Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each term	2

Events					
ST 2023	24678	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy	2 SWS	Lecture / 	Spetzger
WT 23/24	24139	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy	2 SWS	Lecture / 	Spetzger
Exams					
ST 2023	7500145	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy			Spetzger
WT 23/24	7500118	Human Brain and Central Nervous System: Anatomy, Information Transfer, Signal Processing, Neurophysiology and Therapy			Spetzger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled



6.154 Course: Human Factors in Security and Privacy [T-WIWI-109270]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104520 - Human Factors in Security and Privacy](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	3

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation. Only those who have successfully participated in the exercises and the lecture will be admitted to the examination.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

Both need to be done:

- Pass Quiz on Paper for Graphical Passwords
- Presentation of Results Exercise 2

+ 9 of the following 11 need to be done:

- Submit ILIAS certificate until Oct 24
- Pass Quiz on InfoSec Lecture
- Active participation exercise 1 Part 1 - Evaluation and analyses methods
- Pass Quiz Paper Discussion 1 - User Behaviour and motivation theories
- Active participation exercise 1 Part 2
- Pass Quiz Paper Discussion 2 - User Behaviour and motivation theories
- Pass Quiz Paper Discussion 3 - Security Awareness
- Active participation exercise 1 Part 3
- Pass Quiz Paper Discussion 4 - Graphical Authentication
- Pass Quiz Paper Discussion 5 - Shoulder Surfing Authentication
- Active participation exercise 2

Recommendation

The prior attendance of the lecture "Information Security" is strongly recommended.

Annotation

The lecture will not be offered in winter semester 2020/21.


Some lectures are in English, some in German.





T

6.155 Course: Human-Machine-Interaction [T-INFO-101266]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [M-INFO-100729 - Human Computer Interaction](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	2

Events					
ST 2023	24659	Human-Computer-Interaction	2 SWS	Lecture / 	Beigl, Lee
Exams					
ST 2023	7500048	Human-Machine-Interaction			Beigl
WT 23/24	7500076	Human-Machine-Interaction			Beigl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.156 Course: Human-Machine-Interaction in Anthropomatics: Basics [T-INFO-101361]





Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Dr. Jürgen Geisler

Organisation: KIT Department of Informatics

Part of: [M-INFO-100824 - Human-Machine-Interaction in Anthropomatics: Basics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 23/24	24100	Human-Machine-Interaction in Anthropomatics: Basics	2 SWS	Lecture / 	van de Camp
Exams					
ST 2023	7500005	Human-Machine-Interaction in Anthropomatics: Basics			Beyerer, van de Camp
WT 23/24	7500017	Human-Machine-Interaction in Anthropomatics: Basics			Beyerer, van de Camp



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.157 Course: Human-Machine-Interaction Pass [T-INFO-106257]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: [M-INFO-100729 - Human Computer Interaction](#)

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each summer term	1

Events					
ST 2023	2400095	Human-Computer-Interaction	1 SWS	Practice / 	Beigl, Lee
ST 2023	24659	Human-Computer-Interaction	2 SWS	Lecture / 	Beigl, Lee
Exams					
ST 2023	7500121	Human-Machine-Interaction			Beigl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T 6.158 Course: Humanoid Robotics Laboratory [T-INFO-111590]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: [M-INFO-105792 - Humanoid Robotics Laboratory](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	2

Events					
WT 23/24	24890	Humanoid Robotics Laboratory	4 SWS	Practical course /	Asfour
Exams					
WT 23/24	7500149	Humanoid Robotics Laboratory			Asfour

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Recommendation

- Very good programming skills in at least one high-level programming language are strongly recommended.
- Attendance of the lectures Robotics 1, Robotics 2, Robotics 3, as well as the robotics practical course are recommended.
- Project-specific recommendations (knowledge of C++, Python, ...) will be announced in the individual project descriptions

Annotation

- Internship dates are always by arrangement with the supervising staff member.
- An extension work of the topic as a master thesis is possible in principle.
- The number of participants in this practical course is generally **limited** and varies with the number of available research projects at the institute.

Below you will find excerpts from events related to this course:

V

Humanoid Robotics Laboratory

24890, WS 23/24, 4 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)

On-Site

Content

In this practical course, a is worked on alone or in small teams with up to 3 students. Questions of humanoid robotics are dealt with, such as semantic scene interpretation, active perception, planning of grasping and manipulation tasks, action representation with motion primitives, and programming by demonstration.

The project work (alone or in groups) is performed largely independently but supported by scientific staff of the H2T. At the end of the practical course, the work has to be documented and presented in a scientific talk.

Learning Objectives:

- Students will be able to independently understand, structure, analyze, and solve a complex humanoid robotics problem using existing programming skills, alone or in a small team.
- Students can convey complex technical content in a presentation.

Recommendation:

- Very good programming skills in at least one high-level programming language are strongly recommended.
- Attendance of the lectures Robotics 1, Robotics 2, Robotics 3, as well as the robotics practical course are recommended.
- Project-specific recommendations (knowledge of C++, Python, ...) will be announced in the individual project descriptions

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer mündlichen Prüfung nach § 4 Abs. 2 Nr. 2 SPO.

Die Modulnote ist die Note der mündlichen Prüfung.

Zielgruppe: Das Praktikum richtet sich an Studierende der Informatik, Elektrotechnik, Maschinenbau, Mechatronik im Masterstudium sowie alle Interessenten an der Robotik.

Arbeitsaufwand:

6 LP entspricht ca. 180h, davon

1. 10h Präsenzzeit in Praktikumsbesprechungen
2. 10h Vor- und Nachbereitung derselben
3. 150h Selbststudium zur Bearbeitung des Themas



ca. 10h Vorbereitung und Halten eines wissenschaftlichen Vortrags





T

6.159 Course: Incentives in Organizations [T-WIWI-105781]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101500 - Microeconomic Theory](#)
[M-WIWI-101505 - Experimental Economics](#)
[M-WIWI-101510 - Cross-Functional Management Accounting](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2573003	Incentives in Organizations	2 SWS	Lecture / 	Nieken
ST 2023	2573004	Übung zu Incentives in Organizations	2 SWS	Practice / 	Nieken, Mitarbeiter, Walther, Gorny
Exams					
ST 2023	7900132	Incentives in Organizations			Nieken
WT 23/24	7900201	Incentives in Organizations			Nieken

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

Prerequisites

None

Recommendation

Knowledge of microeconomics, game theory, and statistics is assumed.

Below you will find excerpts from events related to this course:

V

Incentives in Organizations

2573003, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The students acquire profound knowledge about the design and the impact of different incentive and compensation systems. Topics covered are, for instance, performance based compensation, team work, intrinsic motivation, multitasking, and subjective performance evaluations. We will use microeconomic or behavioral models as well as empirical data to analyze incentive systems. We will investigate several widely used compensation schemes and their relationship with corporate strategy. Students will learn to develop practical implications which are based on the acquired knowledge of this course.

Aim

The student

- develops a strategic understanding about incentives systems and how they work.
- analyzes models from personnel economics.
- understands how econometric methods can be used to analyze performance and compensation data.
- knows incentive schemes that are used in companies and is able to evaluate them critically.
- can develop practical implications which are based on theoretical models and empirical data from companies.
- understands the challenges of managing incentive and compensation systems and their relationship with corporate strategy.

Workload

The total workload for this course is: approximately 135 hours.

Lecture: 32 hours

Preparation of lecture: 52 hours

Exam preparation: 51 hours

Literature

Slides, Additional case studies and research papers will be announced in the lecture.

Literature (complementary):

Managerial Economics and Organizational Architecture, Brickley / Smith / Zimmerman, McGraw-Hill Education, 2015

Behavioral Game Theory, Camerer, Russell Sage Foundation, 2003

Personnel Economics in Practice, Lazear / Gibbs, Wiley, 2014

Introduction to Econometrics, Wooldridge, Andover, 2014

Econometric Analysis of Cross Section and Panel Data, Wooldridge, MIT Press, 2010

T

6.160 Course: Information Processing in Sensor Networks [T-INFO-101466]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [M-INFO-100895 - Information Processing in Sensor Networks](#)

Type
Oral examination

Credits
6

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1



Exams			
ST 2023	7500011	Information Processing in Sensor Networks	Hanebeck, Pfaff





T

6.161 Course: Information Service Engineering [T-WIWI-106423]

Responsible: Prof. Dr. Harald Sack
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101456 - Intelligent Systems and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2511606	Information Service Engineering	2 SWS	Lecture / 	Sack, Tan, Vafaie
ST 2023	2511607	Exercises to Information Service Engineering	1 SWS	Practice / 	Sack
Exams					
ST 2023	79AIFB_ISE_B3	Information Service Engineering (Registration until 17 July 2023)			Sack
WT 23/24	79AIFB_ISE_B2	Information Service Engineering			Sack

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Information Service Engineering

2511606, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**- The Art of Understanding**

- Data, Information, Knowledge and Wisdom
- Syntax, Semantics, Context, Pragmatics, and Experience

- Natural Language Processing

- NLP and Basic Linguistic Knowledge
- NLP Applications, Techniques & Challenges
- Evaluation, Precision and Recall
- Regular Expressions and Automata
- Tokenization
- Language Model and N-Grams
- Part-of-Speech Tagging
- Distributional Semantics & Word Embeddings

- Knowledge Graphs

- Knowledge Representations and Ontologies
- Resource Description Framework (RDF) as simple Data Model
- Creating new Models with RDFS
- Querying RDF(S) with SPARQL
- More Expressivity via Web Ontology Language (OWL)
- From Linked Data to Knowledge Graphs
- Wikipedia, DBpedia, and Wikidata
- Knowledge Graph Quality Assurance with SHACL

- Basic Machine Learning

- Machine Learning Fundamentals
- Evaluation and Generalization Problems
- Linear Regression
- Decision Trees
- Unsupervised Learning
- Neural Networks and Deep Learning

- ISE Applications

- Knowledge Graph Embeddings
- Knowledge Graph Completion
- Knowledge Graphs and Large Language Models
- Semantic Search
- Exploratory Search and Recommender Systems

Learning objectives:

- The students know the fundamentals and measures of information theory and are able to apply those in the context of Information Service Engineering.
- The students have basic skills of natural language processing and are enabled to apply natural language processing technology to solve and evaluate simple text analysis tasks.
- The students have fundamental skills of knowledge representation with ontologies as well as basic knowledge of Semantic Web and Linked Data technologies. The students are able to apply these skills for simple representation and analysis tasks.
- The students have fundamental skills of information retrieval and are enabled to conduct and to evaluate simple information retrieval tasks.
- The students apply their skills of natural language processing, Linked Data engineering, and Information Retrieval to conduct and evaluate simple knowledge mining tasks.
- The students know the fundamentals of recommender systems as well as of semantic and exploratory search.

Literature

- D. Jurafsky, J.H. Martin, Speech and Language Processing, 2nd ed. Pearson Int., 2009.
- A. Hogan, The Web of Data, Springer, 2020.
- G. Rebal, A. Ravi, S. Churiwala, An Introduction to Machine Learning, Springer, 2019.





T

6.162 Course: Innovation Management: Concepts, Strategies and Methods [T-WIWI-102893]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2545100	Innovation Management: Concepts, Strategies and Methods	2 SWS	Lecture / 	Weissenberger-Eibl
Exams					
ST 2023	7900144	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl
WT 23/24	7900145	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes). The exam takes place in every summer semester. Re-examinations are offered at every ordinary examination date.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Innovation Management: Concepts, Strategies and Methods

2545100, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

The course 'Innovation Management: Concepts, Strategies and Methods' offers scientific concepts which facilitate the understanding of the different phases of the innovation process and resulting strategies and appropriate methodologies suitable for application. The concepts refer to the entire innovation process so that an integrated perspective is made possible. This is the basis for the teaching of strategies and methods which fulfil the diverse demands of the complex innovation process. The course focuses particularly on the creation of interfaces between departments and between various actors in a company's environment and the organisation of a company's internal procedures. In this context a basic understanding of knowledge and communication is taught in addition to the specific characteristics of the respective actors. Subsequently methods are shown which are suitable for the profitable and innovation-led implementation of integrated knowledge.

Aim: Students develop a differentiated understanding of the different phases and concepts of the innovation process, different strategies and methods in innovation management.

Organizational issues

Wichtig! Bitte treten Sie dem **ILIAS-Kurs zur Vorlesung** bei, damit wir Ihnen weitere Informationen mitteilen können.

Literature

Eine ausführliche Literaturliste wird mit den Vorlesungsunterlagen zur Verfügung gestellt.

Eine Einführung bei: Vahs,D./Brem,A. (2013): Innovationsmanagement. Von der Idee zur erfolgreichen Vermarktung, 4. Auflage, Stuttgart 2013.

T


6.163 Course: Innovative Concepts for Programming Industrial Robots [T-INFO-101328]





Responsible: Prof. Dr.-Ing. Björn Hein

Organisation: KIT Department of Informatics

Part of: [M-INFO-100791 - Innovative Concepts for Programming Industrial Robots](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	24179	Innovative Concepts for Programming Industrial Robots	2 SWS	Lecture / 	Hein
Exams					
ST 2023	750001	Innovative Concepts for programming Industrial Robots			Hein


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.164 Course: Integrated Network and Systems Management [T-INFO-101284]

Responsible: Prof. Dr. Bernhard Neumair**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100747 - Integrated Network and Systems Management](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	2400004	Integrated Network and Systems Management	2 SWS	Lecture / 	Neumair
Exams					
ST 2023	7500144	Integrated Network and Systems Management			Neumair
WT 23/24	7500051	Integrated Network and Systems Management			Neumair

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.165 Course: Intelligent Agent Architectures [T-WIWI-111267]

Responsible: Prof. Dr. Andreas Geyer-Schulz

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)
[M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540525	Intelligent Agent Architectures	2 SWS	Lecture / 🗣️	Geyer-Schulz
WT 23/24	2540526	Übung zu Intelligent Agent Architectures	1 SWS	Practice / 🗣️	Geyer-Schulz, Schweizer
Exams					
ST 2023	7900069	Intelligent Agent Architectures (Nachklausur WS 2022/2023)			Geyer-Schulz
WT 23/24	79011480	Intelligent Agent Architectures (WS 2023/2024)			Geyer-Schulz

Legend: 🗣️ Online, 🗣️🗣️ Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".

Below you will find excerpts from events related to this course:

V

Intelligent Agent Architectures

2540525, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**Course content:**

The lecture is structured in three parts:

In the first part the methods used for architecture design are introduced (system analysis, UML, formal specification of interfaces, software and analysis patterns, and the separation in conceptual and IT-architectures. The second part is dedicated to learning architectures and machine learning methods. The third part presents examples of learning CRM-Architectures.

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Learning Goals:

Students have special knowledge of software architectures and of the methods which are used in their development (Systems analysis, formal methods for the specification of interfaces and algebraic semantic, UML, and, last but not least, the mapping of conceptual architectures to IT architectures.

Students know important architectural patterns and they can – based on their CRM knowledge – combine these patterns for innovative CRM applications.

Assessment:

The assessment consists of a written exam of 1-hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from exercise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Literature

- P. Clements u. a., *Documenting Software Architectures. Views and Beyond*. Upper Saddle River: Addison-Wesley, 2011.
- Fowler, *Patterns of Enterprise Application Architecture*. Amsterdam: Addison-Wesley Longman, 2002.
- S. Russell und P. Norvig, *Artificial Intelligence: A Modern Approach*, 3. Aufl. Harlow Essex England: Pearson New International Edition, 2014.
- V. N. Vapnik, *The Nature of Statistical Learning Theory*. New York: Springer, 1995.

T

6.166 Course: Intelligent Agents and Decision Theory [T-WIWI-110915]

Responsible: Prof. Dr. Andreas Geyer-Schulz

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)
[M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2540537	Intelligent Agents and Decision Theory	2 SWS	Lecture	Geyer-Schulz
ST 2023	2540538	Übung zu Intelligent Agents and Decision Theory	1 SWS	Practice	Schweizer
Exams					
ST 2023	7900306	Intelligent Agents and Decision Theory			Geyer-Schulz
WT 23/24	7900294	Intelligent Agents and Decision Theory (Nachklausur SS 2023)			Geyer-Schulz

Competence Certificate

Oral (30 minutes) or written examination (60 minutes). The exam is held in each semester and can be repeated at any regular examination date. Details of the grading system and any exam bonus that may be achieved from the practice are announced in the course.

Prerequisites

None

Recommendation

We assume knowledge in statistics, operations research and microeconomics as taught in the Bachelor program (VWL I, Operations Research I + II, Statistics I + II) and a familiarity with preferably the Python programming language.

Annotation

new lecture starting summer semester 2020

Below you will find excerpts from events related to this course:

V

Intelligent Agents and Decision Theory

2540537, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content

The key assumption of this lecture is that the concept of artificial intelligence is inseparably linked to the economic concept of rationality of agents. We consider different classes of decision problems - decisions under certainty, risk and uncertainty - from an economic, managerial and AI-engineering perspective:

From an economic point of view, we analyze how to act rationally in these situations based on classic utility theory. In this regard, the course also introduces the relevant parts of decision theory for dealing with

- multiple conflicting objectives,
- incomplete, risky and uncertain information about the world,
- assessing utility functions, and
- quantifying the value of information ...

From an engineering perspective, we discuss how to develop practical solutions for these decision problems, using appropriate AI components. We introduce

- a general, agent-based design framework for AI systems,

as well as AI methods from the fields of

- search (for decisions under certainty),
- inference (for decisions under risk) and
- learning (for decisions under uncertainty).

Where applicable, the course highlights the theoretical ties of these methods with decision theory.

We conclude with a discussion of ethical and philosophical issues concerning the development and use of AI.

Learning objectives

Students are able to design, analyze, implement, and evaluate intelligent agents.

Lecture Outline

1. Introduction: Artificial intelligence and the economic concept of rationality
2. Intelligent Agents: A general, agent-based design framework for AI systems
3. Decision under certainty: Assessing utility functions for decisions with multiple objectives
4. Search: Linear programming for decisions under certainty
5. Decisions under risk: The expected utility principle
6. Information systems: Improving economic decisions under risk
7. Inference: Bayesian networks for decisions under risk
8. Information Learning objectives value: When should an agent gather new information?
9. Decisions under uncertainty: Complete lack of information
10. Learning: Statistical learning of bayesian networks
11. Learning: Supervised learning with neural networks
12. Learning: Reinforcement learning
13. Learning: Preference-based reinforcement learning
14. Discussion: Ethical and philosophical issues

Note: This rough outline may be subject to change.

Literature**Basic literature (by lecture):**

1. Russell & Norvig (2016, chapter 1), Bamberg et al. (2019, chapters 1 & 2)
2. Russell & Norvig (2016, chapter 2)
3. Keeney & Raiffa (1993, chapter 3)
4. Nickel et al. (2014, chapter 1) [German], Russell & Norvig (2016, chapter 3)
5. Bamberg et al. (2019, chapter 4), Fishburn (1988)
6. Bamberg et al. (2019, chapter 6)
7. Russell & Norvig (2016, chapters 13, 14, 16)
8. Russell & Norvig (2016, chapter 16), Bamberg et al. (2019, chapter 6)
9. Bamberg et al. (2019, chapter 5)
10. Russell & Norvig (2016, chapter 20)
11. Goodfellow et al. (2016, chapter 6)
12. Sutton & Barto (2018, chapter 3)
13. Wirth et al. (2017)
14. Russell & Norvig (2016, chapter 26)

Detailed references:

Bamberg, Coenenberg & Krapp (2019). Betriebswirtschaftliche Entscheidungslehre (16th ed.). Verlag Franz Vahlen GmbH.

Fishburn (1988). Nonlinear preference and utility theory. Baltimore: Johns Hopkins University Press.

Goodfellow, Bengio & Courville (2016). Deep learning. Cambridge: MIT press.

Keeney & Raiffa (1993). Decisions with multiple objectives: preferences and value trade-offs. Cambridge University Press.

Nickel, S., Stein, O., & Waldmann, K.-H. (2014). Operations Research (2nd ed.). Springer Berlin Heidelberg.

Russell & Norvig (2016). Artificial Intelligence: A Modern Approach (3rd Global Edition). Pearson.

Sutton & Barto (2018). Reinforcement learning: An introduction. Cambridge: MIT press.

Wirth, Akrouf, Neumann & Fürnkranz (2017). A Survey of Preference-Based Reinforcement Learning Methods. Journal of Machine Learning Research, 18(1), 1-46.

T

6.167 Course: Interactive Computer Graphics [T-INFO-101269]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher
Organisation: KIT Department of Informatics
Part of: [M-INFO-100732 - Interactive Computer Graphics](#)


Type
Oral examination

Credits
5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	24679	Interaktive Computergrafik	2 SWS	Lecture / 	Dachsbacher
Exams					
ST 2023	7500123	Interactive Computer Graphics			Dachsbacher
WT 23/24	7500202	Interactive Computer Graphics			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.168 Course: International Business Development and Sales [T-WIWI-110985]



Responsible: Erice Casenave
Prof. Dr. Martin Klarmann
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-105312 - Marketing and Sales Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	see Annotations	1

Events					
WT 23/24	2572189	International Business Development and Sales	4 SWS	Block / 	Klarmann, Terzidis, Schmitt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

Annotation

Please note that currently it cannot be guaranteed that the course will take place in the winter term 22/23. Please contact the Marketing and Sales Research Group for further information.

Below you will find excerpts from events related to this course:

V

International Business Development and Sales

2572189, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

**Block (B)
On-Site**

Content

This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model.

- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.


Total workload for 6 ECTS: about 180 hours.

T

6.169 Course: International Finance [T-WIWI-102646]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	see Annotations	1

Events					
ST 2023	2530570	International Finance	2 SWS	Lecture / 	Walter, Uhrig-Homburg
Exams					
ST 2023	7900097	International Finance			Uhrig-Homburg
WT 23/24	7900052	International Finance			Uhrig-Homburg

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites

None

Recommendation

None

Annotation

The course is offered as a 14-day or block course.

Below you will find excerpts from events related to this course:

V

International Finance

2530570, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

Kickoff am Mittwoch, 26.04.23, 15:45 - 19:00 Uhr im Raum 320 im Geb. 09.21 (Blücherstr. 17). Die Veranstaltung wird samstags als Blockveranstaltung angeboten, nach dem Kickoff nach Absprache.

Literature**Weiterführende Literatur:**


- Eiteman, D. et al., Multinational Business Finance, 13. Auflage, 2012.
- Solnik, B. und D. McLeavey, Global Investments, 6. Auflage, 2008.

T

6.170 Course: Internet Law [T-INFO-101307]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: [M-INFO-101215 - Intellectual Property Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 23/24	24354	Internet Law	2 SWS	Lecture / 	Sattler
Exams					
ST 2023	7500057	Internet Law			Dreier, Matz
WT 23/24	7500060	Internet Law			Matz


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.171 Course: Internet of Everything [T-INFO-101337]

Responsible: Prof. Dr. Martina Zitterbart**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100800 - Internet of Everything](#)[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	24104	Internet of Everything	2 SWS	Lecture / 	Zitterbart, Mahrt, Neumeister
Exams					
ST 2023	7500071	Internet of Everything			Zitterbart
WT 23/24	7500009	Internet of Everything			Zitterbart

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.172 Course: Introduction to Bayesian Statistics for Analyzing Data [T-WIWI-110918]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
ST 2023	2500016	Bayesian Statistics for Analyzing Data		Lecture	Scheibehenne
WT 23/24	2500025	Bayesian Statistics for Analyzing Data	2 SWS	Lecture	Scheibehenne

Competence Certificate

Grades will be based on active participation (50%) and homework assignments (50%).

Prerequisites

Participants should already have a basic knowledge of R and standard frequentist statistical tests. Please bring your own Laptop with you as we will be using R for several hands-on examples and exercises during the class. We will mainly work with the book "Statistical Rethinking. A Bayesian Course with Examples in R and Stan" by Richard McElrath. Students are advised to obtain the book before the class starts.


Annotation

Due to its interactive nature, the number of participants will be limited.

T

6.173 Course: Introduction to Bioinformatics for Computer Scientists [T-INFO-101286]**Responsible:** Prof. Dr. Alexandros Stamatakis**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100749 - Introduction to Bioinformatics for Computer Scientists](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2400055	Introduction to Bioinformatics for Computer Scientists	2 SWS	Lecture / 	Stamatakis
Exams					
ST 2023	7500330	Introduction to Bioinformatics for Computer Scientists			Stamatakis
WT 23/24	7500057	Introduction to Bioinformatics for Computer Scientists			Stamatakis

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Recommendation**

Grundlegende Kenntnisse in den Bereichen der theoretischen Informatik (Algorithmen, Datenstrukturen) und der technischen Informatik (sequentielle Optimierung in C oder C++, Rechnerarchitekturen, parallele Programmierung, Vektorprozessoren) werden vorausgesetzt.

T

6.174 Course: Introduction to Hybrid Quantum Machine Learning Algorithms [T-INFO-112571]

Responsible: Dr. Max Fischer
Dr. Eileen Kühn

Organisation: KIT Department of Informatics

Part of: [M-INFO-106189 - Introduction to Hybrid Quantum Machine Learning Algorithms](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Exams			
ST 2023	7500199	Introduction to Hybrid Quantum Machine Learning Algorithms (05.04.)	Fischer, Kühn

T

6.175 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsible: Prof. Dr. Steffen Rebennack**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)**Type**
Written examination**Credits**
4,5**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
3

Events					
ST 2023	2550470	Introduction to Stochastic Optimization	2 SWS	Lecture / 📺	Rebennack
ST 2023	2550471	Übung zur Einführung in die Stochastische Optimierung	1 SWS	Practice / 🔄	Rebennack, Füllner
ST 2023	2550474	Rechnerübung zur Einführung in die Stochastische Optimierung	2 SWS	Others	Rebennack, Füllner
Exams					
ST 2023	7900311	Introduction to Stochastic Optimization			Rebennack

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 📍 On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites


None.

T

6.176 Course: Introduction to Video Analysis [T-INFO-101273]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [M-INFO-100736 - Introduction to Video Analysis](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	24684	Introduction to Video Analysis	2 SWS	Lecture / 	Arens
Exams					
ST 2023	7500031	Introduction to Video Analysis			Beyerer, Arens
WT 23/24	7500099	Introduction to Video Analysis			Beyerer, Arens

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.177 Course: IT Security [T-INFO-112818]





Responsible: Prof. Dr. Hannes Hartenstein
 Prof. Dr. Jörn Müller-Quade
 Prof. Dr. Thorsten Strufe
 TT-Prof. Dr. Christian Wressnegger

Organisation: KIT Department of Informatics

Part of: [M-INFO-106315 - IT Security](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	2

Events					
WT 23/24	2400010	IT Security	4 SWS	Lecture / Practice / 	Müller-Quade, Strufe, Wressnegger, Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 90 minutes.

Prerequisites

None.

Recommendation


Students should be familiar with the content of the compulsory lecture "Informationssicherheit".





T

6.178 Course: IT-Security Management for Networked Systems [T-INFO-101323]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: [M-INFO-100786 - IT-Security Management for Networked Systems](#)
[M-WIWI-101458 - Ubiquitous Computing](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 23/24	24149	IT-Security Management for Networked Systems	3 SWS	Lecture / Practice / 	Hartenstein, Droll, Grundmann
Exams					
ST 2023	7500599	IT-Security Management for Networked Systems			Hartenstein
WT 23/24	7500599	IT-Security Management for Networked Systems			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.179 Course: Joint Entrepreneurship Summer School [T-WIWI-109064]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
ST 2023	2545021	Joint Entrepreneurship School	4 SWS	Seminar /	Kleinn, Terzidis
Exams					
ST 2023	7900346	Joint Entrepreneurship Summer School			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The learning control of the program (Summer School) consists of two parts:

A) Investor Pitch:

Based on a presentation (investor pitch) in front of a jury, the insights gained and developed during the course of the event are presented and the business idea presented. Among other things, the presentation performance of the team, the structured content and the logical consistency of the business idea are evaluated. The exact evaluation criteria will be announced in the course.

B) Written elaboration:

The second part of the assessment is a written report. The iterative knowledge gain of the entire event is systematically logged and can be further supplemented by the contents of the presentation. The report documents key action steps, applied methods, findings, market analyzes and interviews and prepares them in writing. The exact structure and requirements will be announced in the course.

The grade consists of 50% presentation performance and 50% written preparation.

Prerequisites

The Summer School is aimed at master students of KIT. Prerequisite is the participation in the selection process.

Recommendation

We recommend basic business knowledge, the lecture Entrepreneurship as well as openness and interest in intercultural exchange. Solid knowledge of the English language is an advantage.

Annotation

The working language during the Summer School is English. A one-week stay in China is part of the Summer School.

Below you will find excerpts from events related to this course:

	Joint Entrepreneurship School 2545021, SS 2023, 4 SWS, Language: English, Open in study portal	Seminar (S) Online
--	--	-------------------------------------

Content

During the Summer School in Shanghai and Karlsruhe, students develop a business model of technologies and patents developed at KIT in workshops in German-Chinese tandems over the period of two weeks.

Click on our website for detailed information and a video: <https://etm.entechnon.kit.edu/english/1095.php>

Organizational issues

Preparation dates: Dates will be announced.

JES: Dates will be announced, expected to be in July and/or September

**6.180 Course: Judgement and Decision Making [T-WIWI-111099]**

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105312 - Marketing and Sales Management](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)
[M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each winter term	1 terms	2

Events					
WT 23/24	2500041	Exercise Judgment and Decision Making	2 SWS	Practice /	Seidler
WT 23/24	2540440	Judgment and Decision Making	3 SWS	Lecture /	Scheibehenne, Seidler
Exams					
ST 2023	7900001	Judgement and Decision Making			Scheibehenne

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment. The grading includes the following aspects:

- a written exam (60 minutes)
- a presentation during the exercise.

The scoring system for the grading will be announced at the beginning of the course.

Prerequisites

Registration via the WIWI-Portal is required for participation in the Übung. The Übung is a prerequisite for the exam.

Annotation

The judgments and decisions that we make can have long ranging and important consequences for our (financial) well-being and individual health. Hence, the goal of this lecture is to gain a better understanding of how people make judgments and decisions and the factors that influences their behavior. We will look into simple heuristics and mental shortcuts that decision makers use to navigate their environment, in particular so in an economic context. Following this the lecture will provide an overview into social and emotional influences on decision making. In the second half of the semester we will look into some more specific topics including self-control, nudging, and food choice. The last part of the lecture will focus on risk communication and risk perception. We will address these questions from an interdisciplinary perspective at the intersection of Psychology, Behavioral Economics, Marketing, Cognitive Science, and Biology. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates.

The workload of the class is 4.5 ECTS. This consists of 3 ETCS for the lecture and 1.5 ETCS for the Übung. Details about the Übung will be communicated at the first day of the class.

Below you will find excerpts from events related to this course:

**Judgment and Decision Making**

2540440, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

In this lecture, students will be introduced to fundamental theories and key insights on human judgment and decision making. Topics include decision making under uncertainty, choice biases, simple heuristics, risk perception and -communication, as well as social and emotional influences on decision making, to name but a few. In the Wintersemester 20/21 this class will be held online. The lecture videos will be available for download and there will be regular online meetings to discuss the topics. The lecture will be held in English.

T


6.181 Course: KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics [T-WIWI-111109]





Responsible: Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)
[M-WIWI-104080 - Designing Interactive Information Systems](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2023	2540474	KD²Lab Forschungspraktikum: New Ways and Tools in Experimental Economics	3 SWS	Lecture / 	Greif-Winzrieth, Knierim
Exams					
ST 2023	7900368	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics			Weinhardt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Non exam assessment. Grading will be based on a continuous basis throughout the semester. The assessment consists of:

- A written paper, and
- a group presentation with subsequent discussion and question and answer session of 30 minutes.

For particularly active and constructive participation in the discussions of other papers during the final presentation, a bonus of one grade level (0.3 or 0.4) can be achieved on the passed exam. Details on the grading will be announced at the beginning of the event.

Annotation

Due to the laboratory capacity and in order to ensure an optimal supervision of the project groups, the number of participants is limited. Places are allocated according to preferences and suitability for the topics. In particular, previous knowledge in the field of experimental economics plays a role.

The course will be offered starting in the summer semester 2021.

T

6.182 Course: Knowledge Discovery [T-WIWI-102666]

Responsible: Dr.-Ing. Michael Färber
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101456 - Intelligent Systems and Services](#)
[M-WIWI-105366 - Artificial Intelligence](#)
[M-WIWI-105368 - Web and Data Science](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2511302	Knowledge Discovery and Graph Representation Learning	2 SWS	Lecture /	Färber
WT 23/24	2511303	Exercises to Knowledge Discovery and Graph Representation Learning	1 SWS	Practice /	Färber, Saier, Shao
Exams					
ST 2023	79AIFB_KD_C3	Knowledge Discovery (Registration until 17 July 2023)			Färber
WT 23/24	79AIFB_KD_B3	Knowledge Discovery			Färber

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is a written exam (60 minutes).

1. Successful participation in the exercises can earn a grade bonus in two ways:
By handing in the answers to an exercise sheet and reaching or exceeding 80% correct answers.
2. By handing in the results of an implementation task related to machine learning, which reaches or exceeds a given evaluation value.

If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by a maximum of one grade level (0.3 or 0.4).

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Knowledge Discovery and Graph Representation Learning

2511302, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture provides a comprehensive overview of various approaches in machine learning and data mining for knowledge extraction. It explores multiple fields, including machine learning, natural language processing, and knowledge representation. The main focus is on discovering patterns and regularities in extensive data sets, particularly unstructured text found in news articles, publications, and social media. This process is known as knowledge discovery. The lecture delves into specific techniques, methods, challenges, as well as current and future research topics within this field.

One part of the lecture is dedicated to understanding large language models (LLMs), such as ChatGPT, by exploring their underlying principles, training methods, and applications. Additionally, the lecture dives into graph representation learning, which involves extracting meaningful representations from graph data. It covers the mathematical foundations of graph and geometric deep learning, highlighting the latest applications in areas like explainable recommender systems.

Moreover, the lecture highlights the integration of knowledge graphs with large language models, known as neurosymbolic AI. This integration aims to combine structured and unstructured data to enhance knowledge extraction and representation.

The content of the lecture encompasses the entire machine learning and data mining process. It covers topics on supervised and unsupervised learning techniques, as well as empirical evaluation. Various learning methods are explored, ranging from classical approaches like decision trees, support vector machines, and neural networks to more recent advancements such as graph neural networks.

Learning objectives:

Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (<http://www-stat.stanford.edu/~tibs/ElemStatLearn/>)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

**Exercises to Knowledge Discovery and Graph Representation Learning**

2511303, WS 23/24, 1 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site

Content

The exercises are based on the lecture Knowledge Discovery. Several exercises are covered, which take up and discuss in detail the topics covered in the lecture Knowledge Discovery. Practical examples are demonstrated to the students to enable a knowledge transfer of the theoretical aspects learned into practical application.

Contents of the lecture cover the entire machine learning and data mining process with topics on monitored and unsupervised learning processes and empirical evaluation. The learning methods covered range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:

Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (<http://www-stat.stanford.edu/~tibs/ElemStatLearn/>)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

T

6.183 Course: Lab Course Heterogeneous Computing [T-INFO-108447]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [M-INFO-104072 - Lab Course Heterogeneous Computing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

T

6.184 Course: Lab Project: Speech Translation [T-INFO-112175]

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: [M-INFO-105997 - Lab Project: Speech Translation](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	1

Events					
WT 23/24	2400150	Praktikum Speech Translation	4 SWS	Practical course / ●	Niehues

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

V

Praktikum Speech Translation

2400150, WS 23/24, 4 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
On-Site

Content

Through the use of deep learning technologies, the quality of machine translation of text and speech has improved significantly in recent years. In this internship, the students develop a language translation system for a new language pair using state-of-the-art methods.

In the first part of the internship, the students are introduced step-by-step to the development of a translation system and its evaluation. For this, the different subtasks have to be solved. In the second part of the internship, the students should investigate different improvements of the system independently.

Organizational issues

Findet im Raum 223 an unserem Institut statt:


Mittwochs, 11:30 - 13:00 Uhr





T

6.185 Course: Lab: Efficient Parallel C++ [T-INFO-106992]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-103506 - Lab: Efficient Parallel C++](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
WT 23/24	2400195	Efficient parallel C++	4 SWS	Practical course / 	Sanders, Witt, Schimek, Williams

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO).

Recommendation


At least basic knowledge of the C++ language is necessary for participation in the course. Students should be able to implement given algorithms.

T

6.186 Course: Lab: Graph Visualization in Practice [T-INFO-106580]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: [M-INFO-103302 - Lab: Graph Visualization in Practice](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Irregular	1

Events				
ST 2023	2400117	Graphvisualisierung in der Praxis		Practical course /  Wagner, Jungeblut
Exams				
ST 2023	7500347	Lab: Graph Visualization in Practice		Wagner



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.187 Course: Lab: Internet of Things (IoT) [T-INFO-107493]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [M-INFO-103706 - Lab: Internet of Things \(IoT\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	1

Events					
ST 2023	2424304	Internet of Things (IoT) Lab	4 SWS	Practical course / 	Balaskas, Siddhu, Henkel
WT 23/24	2424304	Internet of Things (IoT) Lab	4 SWS	Practical course / 	Henkel, Siddhu, Balaskas
Exams					
ST 2023	7500187	Lab: Internet of Things (IoT)			Henkel
WT 23/24	7500183	Lab: Internet of Things (IoT)			Henkel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Internet of Things (IoT) Lab

2424304, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

**Practical course (P)
Online**

Content

For registration please use ILIAS too, in order to follow the course!

Welcome to the Internet of Things (IoT) world, where millions of connected devices are now involved almost in our everyday life, including our homes, offices, transportation, and our healthcare, from home appliances, vehicles, smartphones to wearable devices like smartwatches. IoT is growing very fast and spreads very quickly.

Overview: This lab aims at providing the student with the practical concept of IoT systems design.

- It provides an overview of the IoT systems' aspects including embedded intelligence, connectivity, interaction with the physical world, etc.
- It covers the main design and implementation issues for IoT devices and their applications. These issues challenge the students to tailor smart techniques to optimize the embedded software on IoT devices to meet the constrained resources.
- The students gain in-depth practical experiences in embedded system design with a focus on IoT applications as well as communication in connected devices.

Lab's Goals:

- The students will understand the main concept of IoT systems including the design objectives, application domains, and their requirements, design challenges, etc.
- The students will gain the ability to develop software programs for the IoT embedded devices, implement the code on the hardware, conduct the tests, find the bugs and errors, and debug the software code on the hardware.
- The students shall be able to implement and apply the concepts that are critical in the IoT domain, e.g. low power design, security, etc.
- The students will be able to develop, integrate and evaluate a small IoT system with its main components: sensors to get data from the physical world, the embedded processor for control the device and process the data, wireless radio to transmit the data from the device to the Internet, storage (on the Internet or on a Smart Phone) to keep the data for further analysis.

Target Audience:

- This lab is also suitable for electrical engineering students and those who have an interest in embedded systems design.

Prerequisites:

- The ability to develop software programs in C or C++ is recommended.
- Basic knowledge about other programming languages can be helpful (e.g., Java or Python)

Details:

- The lab manuals and exercises are available in English.
- The lab is split into weekly sessions throughout the semester. Each session is approximate ~4hours per week. At the end of the semester, there would be a final project.
- The state-of-the-art low-power IoT boards and the corresponding development software, are used in the lab. Currently, Texas Instrument (TI) CC1350 microcontroller, and the latest version of Code Composer Studio is the base platform.
- The exercises in the lab are based on the TI repository. But for the final projects, the students have the flexibility to design their desired systems.

**Internet of Things (IoT) Lab**

2424304, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

**Practical course (P)
On-Site**

Content

Welcome to the Internet of Things (IoT) world, where millions of connected devices are now involved almost in our everyday life, including our homes, offices, transportation, and our healthcare, from home appliances, vehicles, smartphones to wearable devices like smartwatches. IoT is growing very fast and spreads very quickly.

Overview: This lab aims at providing the student with the practical concept of IoT systems design.

- It provides an overview of the IoT systems' aspects including embedded intelligence, connectivity, interaction with the physical world, etc.
- It covers the main design and implementation issues for IoT devices and their applications. These issues challenge the students to tailor smart techniques to optimize the embedded software on IoT devices to meet the constrained resources.
- The students gain in-depth practical experiences in embedded system design with a focus on IoT applications as well as communication in connected devices.

Lab's Goals:

- The students will understand the main concept of IoT systems including the design objectives, application domains, and their requirements, design challenges, etc.
- The students will gain the ability to develop software programs for the IoT embedded devices, implement the code on the hardware, conduct the tests, find the bugs and errors, and debug the software code on the hardware.
- The students shall be able to implement and apply the concepts that are critical in the IoT domain, e.g. low power design, security, etc.
- The students will be able to develop, integrate and evaluate a small IoT system with its main components: sensors to get data from the physical world, the embedded processor for control the device and process the data, wireless radio to transmit the data from the device to the Internet, storage (on the Internet or on a Smart Phone) to keep the data for further analysis.

Target Audience:

- This lab is also suitable for electrical engineering and informatics' students and those who have an interest in embedded systems design.

Prerequisites:

- The ability to develop software programs in C or C++ is recommended.
- Basic knowledge about other programming languages can be helpful (e.g., Java or Python)

Details:

- The lab manuals and exercises are conducted **only in English**.
- The lab is split into weekly sessions throughout the semester. Each session is approximately 3-4 hours per week. At the end of the semester, there would be a final project.
- The state-of-the-art low-power IoT boards and the corresponding development software, are used in the lab. Currently, Texas Instrument (TI) CC1350 microcontroller, and the latest version of Code Composer Studio is the base platform.
- The exercises in the lab are based on the TI repository. But for the final projects, the students have the flexibility to design their desired systems.

**6.188 Course: Lab: Low Power Design and Embedded Systems [T-INFO-108323]**

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [M-INFO-104031 - Lab: Low Power Design and Embedded Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	2

Events					
ST 2023	2424811	Low Power Design and Embedded Systems	3 SWS	Practical course /	Gonzalez, Khdr, Henkel
Exams					
ST 2023	7500158	Lab: Low Power Design and Embedded Systems			Henkel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Low Power Design and Embedded Systems**

2424811, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

**Practical course (P)
Blended (On-Site/Online)**

Content**Lab Description**

Nowadays, power and energy consumption are two of the most important criteria in the design of on-chip applications. Other design constraints, such as performance, were dominant in the past, but now it is imperative to optimize for low power, since on-chip temperature and battery life are limiting design factors on modern multi / many core systems.

This lab explores different software and hardware approaches for power and energy reduction on modern embedded systems, considering other relevant metrics and constraints (eg, temperature, performance, chip area).

First part: software effects on power and performance

The first part of the lab consists of an exploration and analysis of the effect of different resource management techniques on a many-core platform, to optimize for a specific metric (e.g. energy, power, temperature) under predefined application constraints (e.g. performance).

Second part: hardware / software co-design

The second part of the lab consists of a Hardware/Software Co-design exploration using the High-Level Synthesis (HLS) technique. This technique takes a C/C++ code implementation and produces a hardware accelerator module from a function, which is then synthesized for a Field Programmable Gate Array (FPGA) device.

This part explores the trade-off between performance, speed, power and area usage in the design of HW/SW systems.

Third Part: Demo in Thermal Lab

As part of the course, there will be access to the CES thermal lab, in which an experiment will be carried out to analyze the effect of power and temperature on a real board setup, using a thermal camera.

Preliminary discussion appointment: it will be announced via email to all registrants.

Note: The lab is given as a full week block.

T

6.189 Course: Laboratory Course Algorithm Engineering [T-INFO-104374]



Responsible: Prof. Dr. Peter Sanders
Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: [M-INFO-102072 - Laboratory Course Algorithm Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
WT 23/24	2424305	Practical Course in Algorithm Design	4 SWS	Practical course / 	Wagner, Sauer, Ueckerdt, Feilhauer, Bläsius, Zündorf

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Practical Course in Algorithm Design

2424305, WS 23/24, 4 SWS, Language: German, [Open in study portal](#)

Practical course (P)
On-Site

Content

In the practical course *Algorithm Engineering* the students are given miscellaneous questions from algorithmics, which they have to implement independently in small working groups. The main focus lies on object oriented programming with Java or C++. Linear programming may also occur.

Prerequisites: Knowledge of the lecture Algorithms II is recommended.

Learning Goals:

The purpose of the practical course in algorithm design is to make learned knowledge work. The students are given varying topics from algorithmics, which they have to implement in small working groups. Possible Topics are, for example, algorithms for flow problems, shortest path problems, or clustering techniques. In this way students learn to write efficient code.

Workload: Praktikum mit 4SWS, 6 LP
6 LP entspricht ca. 180 Arbeitsstunden

T

6.190 Course: Laboratory in Cryptoanalysis [T-INFO-102990]

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-101559 - Laboratory in Cryptoanalysis](#)


Type
Examination of another type





Credits
3

Grading scale
Grade to a third

Recurrence
Each term

Version
1

Events					
ST 2023	24881	Laboratory: Cryptanalysis	4 SWS	Practical course / 	Müller-Quade, Geiselmann
Exams					
ST 2023	7500111	Laboratory in Cryptanalysis			Geiselmann, Müller- Quade
WT 23/24	7500164	Laboratory in Cryptography			Geiselmann, Müller- Quade

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.191 Course: Laboratory in Cryptography [T-INFO-102989]





Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-101558 - Laboratory in Cryptography](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	24301	Laboratory Cryptography and Security	4 SWS	Practical course / 	Müller-Quade, Geiselmann
Exams					
WT 23/24	7500164	Laboratory in Cryptography			Geiselmann, Müller-Quade

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Laboratory Cryptography and Security

24301, WS 23/24, 4 SWS, [Open in study portal](#)

**Practical course (P)
On-Site**

Content

The lab covers different areas of computer security and cryptography. The topics are presented theoretically and are implemented afterwards. Covered topics are:

- Historical encryption
- EC-card PINs
- Block ciphers
- Efficient long number arithmetic
- ElGamal encryption / signature

T

6.192 Course: Laboratory in Security [T-INFO-102991]

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-101560 - Laboratory in Security](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	1

T

6.193 Course: Large-scale Optimization [T-WIWI-106549]**Responsible:** Prof. Dr. Steffen Rebennack**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Competence Certificate

The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites

None.

T

6.194 Course: Liberalised Power Markets [T-WIWI-107043]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101451 - Energy Economics and Energy Markets](#)
[M-WIWI-102808 - Digital Service Systems in Industry](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2581998	Liberalised Power Markets	2 SWS	Lecture / 🗎	Fichtner
WT 23/24	2581999	Übungen zu Liberalised Power Markets	2 SWS	Practice / 🗎	Signer, Fichtner, Beranek
Exams					
ST 2023	7900253	Liberalised Power Markets			Fichtner
WT 23/24	7900160	Liberalised Power Markets NEW			Fichtner
WT 23/24	7900193	Liberalised Power Markets			Fichtner

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Recommendation

None

Below you will find excerpts from events related to this course:

V

Liberalised Power Markets

2581998, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**1. Power markets in the past, now and in future****2. Designing liberalised power markets**

- 2.1. Unbundling Dimensions of liberalised power markets
- 2.2. Central dispatch versus markets without central dispatch
- 2.3. The short-term market model
- 2.4. The long-term market model
- 2.5. Market flaws and market failure
- 2.6. Regulation in liberalised markets

3. The power (sub)markets

- 3.1 Day-ahead market
- 3.2 Intraday market
- 3.3 (Long-term) Forwards and futures markets
- 3.4 Emission rights market
- 3.5 Market for ancillary services
- 3.6 The “market” for renewable energies
- 3.7 Future market segments

4. Grid operation and congestion management

- 4.1. Grid operation
- 4.2. Congestion management

5. Market power

- 5.1. Defining market power
- 5.2. Indicators of market power
- 5.3. Reducing market power

6. Future market structures in the electricity value chain**1. Power markets in the past, now and in future****2. Designing liberalised power markets**

- 2.2. Unbundling Dimensions of liberalised power markets
- 2.3. Central dispatch versus markets without central dispatch
- 2.4. The short-term market model
- 2.5. The long-term market model
- 2.6. Market flaws and market failure
- 2.7. Regulation in liberalised markets

3. The power (sub)markets

- 3.1 Day-ahead market
- 3.2 Intraday market
- 3.3 (Long-term) Forwards and futures markets
- 3.4 Emission rights market
- 3.5 Market for ancillary services
- 3.6 The “market” for renewable energies
- 3.7 Future market segments

4. Grid operation and congestion management

- 4.1. Grid operation
- 4.2. Congestion management

5. Market power

- 5.1. Defining market power
- 5.2. Indicators of market power
- 5.3. Reducing market power

6. Future market structures in the electricity value chain

Literature

Weiterführende Literatur:


Power System Economics; Steven Stoft, IEEE Press/Wiley-Interscience Press, 0-471-15040-1





T

6.195 Course: Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context [T-WIWI-113107]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581995	Life Cycle Assessment - Basics and Application Possibilities in an Industrial Context	2 SWS	Lecture / 	Steffl, Tremel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None.

Recommendation

None

Below you will find excerpts from events related to this course:

V

Life Cycle Assessment - Basics and Application Possibilities in an Industrial Context

Lecture (V)
On-Site

2581995, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Content

The lecture focuses on the analysis of the environmental impacts of products and processes using Life Cycle Assessment (short: LCA). Structure and steps are conveyed in detail and selected further developments are shown. In order to record the methodology and classify potential environmental impacts, the practical development of what has been learned is also focused on using LCA software and interactive formats.

Topics include:

- Significance and areas of application
- Calculation models
- Attributional/Consequential LCA
- Life Cycle Sustainability Assessment, Social LCA and Life Cycle Costing
- Limitations
- Development of a Case Study

Literature


werden in der Veranstaltung bekannt gegeben

T

6.196 Course: Localization of Mobile Agents [T-INFO-101377]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [M-INFO-100840 - Localization of Mobile Agents](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	24613	Localization of Mobile Agents	3 SWS	Lecture / 	Zea Cobo, Ernst
Exams					
ST 2023	7500004	Localization of Mobile Agents			Zea Cobo
WT 23/24	7500020	Localization of Mobile Agents			Zea Cobo

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Localization of Mobile Agents

24613, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

This module provides a systematic introduction into the topic of localization methods. In order to facilitate understanding, the module is divided into four main topics. Dead reckoning treats the instantaneous determination of a vehicle's position based on dynamic parameters like velocity or steering angle. Localization with the help of measurements of known landmarks is part of static localization. In addition to the closed-form solutions for particular measurements (distances and angles), the least squares method for fusion arbitrary measurements is also introduced. Dynamic localization treats the combination of dead reckoning and static localization. The central part of the lecture is the derivation of the Kalman filter, which has been successfully applied in several practical applications. Finally, simultaneous localization and mapping (SLAM) is introduced, which allows localization in case of (partly) unknown landmark positions.

Organizational issues

Prüfungsterminvorschläge und das Verfahren dazu sind auf der Webseite der Vorlesung zu finden.

Literature

Grundlegende Kenntnisse der linearen Algebra und Stochastik sind hilfreich.

T 6.197 Course: Logical Foundations of Cyber-Physical Systems [T-INFO-112360]

Responsible: Prof. Dr. André Platzer
Organisation: KIT Department of Informatics
Part of: [M-INFO-106102 - Logical Foundations of Cyber-Physical Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	2

Events					
WT 23/24	2400161	Logical Foundations of Cyber-Physical Systems	4 SWS	Lecture / 🗣️	Platzer
Exams					
WT 23/24	7500252	Logical Foundations of Cyber-Physical Systems			Platzer

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 120 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Durch die erfolgreiche Teilnahme am Übungsbetrieb kann ein Bonus erworben werden. Um einen Bonus zu bekommen, muss man jeweils 50% der Punkte für die Lösungen der Aufgaben in der ersten und 50% Punkte in der zweiten Hälfte erwerben. Liegt die Note der schriftlichen Prüfung zwischen 4,0 und 1,3, so verbessert der Bonus die Note um eine Notenstufe (0,3 oder 0,4).

Prerequisites
None.

Recommendation

The course assumes prior exposure to basic computer programming and mathematical reasoning. This course covers the basic required mathematical and logical background of cyber-physical systems. You will be expected to follow the textbook as needed: André Platzer. Logical Foundations of Cyber-Physical Systems. Springer 2018. DOI:10.1007/978-3-319-63588-0

Annotation

Course web page: <https://lfcps.org/course/lfcps.html>

Below you will find excerpts from events related to this course:

V

Logical Foundations of Cyber-Physical Systems

2400161, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Cyber-physical systems (CPSs) combine cyber capabilities (computation and/or communication) with physical capabilities (motion or other physical processes). Cars, aircraft, and robots are prime examples, because they move physically in space in a way that is determined by discrete computerized control algorithms. Designing these algorithms to control CPSs is challenging due to their tight coupling with physical behavior. At the same time, it is vital that these algorithms be correct, since we rely on CPSs for safety-critical tasks like keeping aircraft from colliding. In this course we will strive to answer the fundamental question posed by Jeannette Wing: "How can we provide people with cyber-physical systems they can bet their lives on?"

This course will give you the required skills to formally analyze the CPSs that are all around us -- from power plants to pace makers and everything in between -- so that when you contribute to the design of a CPS, you are able to understand important safety-critical aspects and feel confident designing and analyzing system models. It will provide an excellent foundation for students who seek industry positions and for students interested in pursuing research.

Organizational issues

The lectures will be English unless everyone prefers German. English videos, slides, and a textbook are available for most lectures.

Literature

André Platzer. *Logical Foundations of Cyber-Physical Systems*. Springer, Cham, 2018. DOI:10.1007/978-3-319-63588-0

**6.198 Course: Low Power Design [T-INFO-101344]**

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [M-INFO-100807 - Low Power Design](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2424672	Low Power Design	2 SWS	Lecture /	Henkel, Khdr, Siddhu, Pfeiffer
Exams					
ST 2023	7500200	VL: Low Power Design			Henkel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Low Power Design**

2424672, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Smart embedded devices driven by advances in fields as diverse as automotive smart home, to high-tech like lithography or battery technology for IoT devices are now omnipresent in our lives. Today's consumers have very high expectations from the embedded devices they own. Many emerging technologies such as virtual reality, robotics and artificial intelligence are limited in scope only by the performance of the underlying embedded devices. Unfortunately, performance of embedded devices is inherently constrained both by their limited cost, size as well as heat dissipating capacity and their limited on-board battery. The fact that all contemporary smartphones have multi-core chips running at low frequencies instead of single-core chips running at high frequencies can be attributed directly to the power consumption constraints imposed on them.

The constraints mandate highly optimized hardware-software co-design techniques for embedded devices that allows extraction of maximum performance with minimal power consumption. A good low power design requires all three building blocks of an embedded device – hardware, software and operating system – to work together synergistically. The lectures cover all the three aspects alongside their interactions from a low power design perspective in depth.

The lecture provides an overview of design methods, synthesis tools, estimation models, software techniques, operating system strategies, scheduling algorithms, etc., with the aim of minimizing the power consumption of embedded devices without compromising their performance. Both the research-relevant and industry-prevalent topics at different level of abstractions (from circuit to system) are discussed in this lecture.

Recommendations: Module "Entwurf und Architekturen für eingebettete Systeme". Basic knowledge from the module "Optimierung und Synthese Eingebetteter Systeme" is helpful but not essential for understanding of this lecture. The lecture is equally suitable for students from both computer science as well as electrical engineering department.


Students are made aware of various low power design optimizations employed in state-of-the-art embedded devices. At the end of the lecture, the students will be able to recognize the challenges involved in crafting efficient low power designs and how to tackle them.

T

6.199 Course: Machine Learning - Foundations and Algorithms [T-INFO-111558]

Responsible: Prof. Dr. Gerhard Neumann
Organisation: KIT Department of Informatics
Part of: [M-INFO-105778 - Machine Learning - Foundations and Algorithms](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2023	2400018	Machine Learning - Foundations and Algorithms	3 SWS	Lecture / Practice / 	Neumann
Exams					
ST 2023	7500215	Machine Learning - Foundations and Algorithms			Neumann
WT 23/24	7500292	Machine Learning - Foundations and Algorithms			Neumann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The success control takes place in the form of a written exam, usually 90 minutes in length, according to § 4 Abs. 2 Nr. 1 SPO.

A bonus can be acquired through successful participation in the exercise as a success control of a different kind (§4(2), 3 SPO 2008) or study performance (§4(3) SPO 2015). The exact criteria for awarding a bonus will be announced at the beginning of the lecture. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The bonus is only valid for the main and post exams of the semester in which it was earned. After that, the grade bonus expires.

Prerequisites

none.

Recommendation

- Attendance of the lecture "Foundations of Artificial Intelligence" ("Grundlagen der Künstlichen Intelligenz")
- Knowledge in python
- Mathematics-heavy lecture. The basics will be reviewed, but mathematical proficiency is helpful

**6.200 Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]**

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103356 - Machine Learning](#)

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
4

Events					
WT 23/24	2511500	Machine Learning 1 - Fundamental Methods	2 SWS	Lecture /	Zöllner
WT 23/24	2511501	Exercises to Machine Learning 1 - Fundamental Methods	1 SWS	Practice /	Zöllner, Polley, Fechner, Daaboul
Exams					
ST 2023	79AIFB_ML1_C4	Machine Learning 1 - Basic Methods (Registration until 17 July 2023)			Zöllner
WT 23/24	79AIFB_ML1_C5	Machine Learning 1 - Basic Methods			Zöllner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min):

The exam takes place every semester and can be repeated at every regular examination date.

A grade bonus can be earned by successfully completing practice exercises. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None.

Below you will find excerpts from events related to this course:

**Machine Learning 1 - Fundamental Methods**

2511500, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The course prepares students for the rapidly evolving field of machine learning by providing a solid foundation, covering core concepts and techniques to get started in the field. Students delve into different methods in supervised, unsupervised, and reinforcement learning, as well as various model types, ranging from basic linear classifiers to more complex methods, such as deep neural networks. Topics include general learning theory, support vector machines, decision trees, neural network fundamentals, convolutional neural networks, recurrent neural networks, unsupervised learning, reinforcement learning, and Bayesian learning.

The course is accompanied by a corresponding exercise, where students gain hands-on experience by implementing and experimenting with different machine learning algorithms, helping them to apply machine learning algorithms on real world problems.

By the end of the course, students will have acquired a solid foundation in machine learning, enabling them to apply state-of-the-art algorithms to solve complex problems, contribute to research efforts, and explore advanced topics in the field.

Learning objectives:

- Students acquire knowledge of the fundamental methods in the field of machine learning.
- Students can classify, formally describe and evaluate methods of machine learning.
- Students can use their knowledge to select suitable models and methods for selected problems in the field of machine learning.

Literature

Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Machine Learning - Tom Mitchell
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.

T 6.201 Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101637 - Analytics and Statistics](#)
[M-WIWI-103356 - Machine Learning](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	4

Events					
ST 2023	2511502	Machine Learning 2 - Advanced methods	2 SWS	Lecture / 🗣️	Zöllner
ST 2023	2511503	Exercises for Machine Learning 2 - Advanced Methods	1 SWS	Practice / 🗣️	Zöllner
Exams					
ST 2023	79AIFB_ML2_B1	Machine Learning 2 – Advanced Methods (Registration until 17 July 2023)			Zöllner
WT 23/24	79AIFB_ML2_B8	Machine Learning 2 – Advanced Methods			Zöllner

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

None.

Below you will find excerpts from events related to this course:

V

Machine Learning 2 - Advanced methods
 2511502, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)
On-Site**

Content

The subject area of machine intelligence and, in particular, machine learning, taking into account real challenges of complex application domains, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The lecture "Machine Learning 2" deals with modern advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning, CNNs, GANs, diffusion models, transformer, adversarial attacks) and hierarchical approaches, e.g. reinforcement learning. Another focus is the embedding and application of machine learning methods in real systems.

The lecture introduces the latest basic principles as well as extended basic structures and elucidates previously developed algorithms. The structure and the mode of operation of the methods and methods are presented and explained by means of some application scenarios, especially in the field of technical (sub) autonomous systems (vehicles, robotics, neurorobotics, image processing, etc.).

Learning objectives:

- Students understand extended concepts of machine learning and their possible applications.
- Students can classify, formally describe and evaluate methods of machine learning.
- In detail, methods of machine learning can be embedded and applied in complex decision and inference systems.
- Students can use their knowledge to select suitable models and methods of machine learning for existing problems in the field of machine intelligence.

Recommendations:

Attending the lecture **Machine Learning 1** or a comparable lecture is very helpful in understanding this lecture.

Literature

Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Deep Learning - Ian Goodfellow
- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville


Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.





T

6.202 Course: Machine Learning and Optimization in Energy Systems [T-WIWI-113073]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101452 - Energy Economics and Technology](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2581050	Machine Learning and Optimization in Energy Systems	3 SWS	Lecture / Practice / 	Dengiz, Yilmaz, Perau
Exams					
WT 23/24	7900179	Machine Learning and Optimization in Energy Systems			Fichtner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min) or an oral exam (30 min) depending on the number of participants.

Below you will find excerpts from events related to this course:

V

Machine Learning and Optimization in Energy Systems

2581050, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

Goals:

Participants should know about the most common optimization and machine learning approaches for the application in energy systems. They should understand the basic principles of the methods and should be able to apply them for solving important problems of future energy systems with high shares of renewable energy sources.

Content:

In the beginning, the essential transition of the energy system into a smart grid and the need for methods from the field of optimization and machine learning are explained. The course can be subdivided into an optimization part and a larger machine learning part. In the optimization part, the basics of optimization approaches that are used in energy systems are shown. Further, heuristic methods and approaches from the field of multiobjective optimization are introduced. In the machine learning part, the most important methods from the field of unsupervised learning, supervised learning and reinforcement learning are introduced and their application in future energy systems are investigated.

Amongst the considered applications are power plant dispatch, intelligent heating with heat pumps, charging strategies for electric vehicles, clustering of energy data for energy system models and electricity demand and renewable generation forecasting.

We also offer a voluntary computer exercise that deepens the understanding of the methods and applications covered in the lecture. The students will have the opportunity to solve problems from the energy domain by using optimization and machine learning approaches implemented in the programming language Python.

The course's general focus is on the application of the methods in the energy field and not on the mathematical details of the different approaches.

The total workload for this course is approximately 105 hours:

- Attendance: 30 hours
- Self-study: 30 hours
- Exam preparation: 45 hours

**6.203 Course: Machine Translation [T-INFO-101385]**

Responsible: Prof. Dr. Jan Niehues
Prof. Dr. Alexander Waibel

Organisation: KIT Department of Informatics

Part of: [M-INFO-100848 - Machine Translation](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	24639	Maschinelle Übersetzung	4 SWS	Lecture /	Niehues
Exams					
ST 2023	7500043	Machine Translation			Waibel, Niehues

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Maschinelle Übersetzung**

24639, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content**Inhalt:**

Wie kann ich verstehen, was meine internationalen Freunde auf ihren Social Media Kanälen in fremden sprachen posten? Für Probleme wie diese kann die Maschinelle Übersetzung einen Menschheitstraum erfüllen: Die Kommunikation über Sprachgrenzen. In dieser Vorlesung werden Sie die Grundlagen und Fähigkeiten erlernen, um Maschinelle Übersetzungssysteme auf dem aktuellen Stand der Technik zu entwickeln. Die Vorlesung wird zunächst eine kurze Einführung in die Maschinelle Übersetzung geben und traditionelle Ansätze der Maschinellen Übersetzung vorstellen. Danach werden wir den aktuellen Ansatz der Maschinellen Übersetzung, Neuronale Maschinelle Übersetzung, der dieses Problem mittels Neuronaler Netze adressiert, im Detail behandeln. Dazu werden sowohl die Grundlagen, wie auch diverse Herausforderungen, besprochen: die Evaluation von Maschineller Übersetzung, die Integration von weiteren Wissensquellen, die Modellierung von komplexer Morphologie, Multilingualität und Sprachübersetzung. Darüberhinaus wird das erworbene Wissen in mehreren praktischen Einheiten angewandt.

Lernziele:

Der Studierende soll in die Grundbegriffe verschiedener Ansätze zur Maschinellen Übersetzung eingeführt werden.

Der Studierende soll grundlegende Konzepte und Algorithmen der Neuronalen Maschinellen Übersetzung verstehen und anwenden lernen.

Der Studierende soll die grundlegenden Methoden zur Evaluation von Maschinellen Übersetzungssystemen lernen.

Der Studierende soll einen Einblick in die aktuelle Forschung im Bereich der Maschinellen Übersetzung erhalten und kann mit dem erworbenen Wissen an aktuellen Forschungsthemen arbeiten.

Der Studierende soll das erworbene Wissen praktisch anwenden und mit Hilfe der bestehenden Tools einen eigenen Übersetzer bauen und evaluieren.

Nach Vollendung der Vorlesung werden die Studierenden in der Lage sein, verschiedene Ansätze der Maschinellen Übersetzung zu vergleichen sowie Übersetzer für verschiedene Anwendungen zu entwickeln.

Literature**Weiterführende Literatur**

Philipp Koehn: Neural Machine Translation

T

6.204 Course: Management Accounting 1 [T-WIWI-102800]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101498 - Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2579900	Management Accounting 1	2 SWS	Lecture / 📱	Wouters
ST 2023	2579901	Tutorial Management Accounting 1 (Bachelor)	2 SWS	Practice / 🎧	Dickemann
ST 2023	2579902	Tutorial Management Accounting 1 (Master)	2 SWS	Practice / 🎧	Dickemann
Exams					
ST 2023	79-2579900-B	Management Accounting 1 (Bachelor)			Wouters
ST 2023	79-2579900-M	Management Accounting 1 (Mastervorzug und Master)			Wouters
WT 23/24	79-2579900-B	Management Accounting 1 (Bachelor)			Wouters
WT 23/24	79-2579900-M	Management Accounting 1 (Mastervorzug und Master)			Wouters

Legend: 📱 Online, 🎧 Blended (On-Site/Online), 🎧 On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Recommendation

We recommend that you take part in our exercise for the lecture.

Annotation

The exercise is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration:

- Bachelor students: 79-2579900-B Management Accounting 1 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579900-M Management Accounting 1 (Master's transfer and Master)

Below you will find excerpts from events related to this course:

V

Management Accounting 1

2579900, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Online

Content

The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics.
- They can use financial information for various purposes in organizations.

Examination:

- The assessment consists of a written exam (120 minutes) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Publisher: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- In addition, several papers that will be available on ILIAS.

**Tutorial Management Accounting 1 (Bachelor)**

2579901, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site

Content

see Module Handbook

**Tutorial Management Accounting 1 (Master)**

2579902, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site

Content

see Module Handbook

T

6.205 Course: Management Accounting 2 [T-WIWI-102801]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101498 - Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2579903	Management Accounting 2	2 SWS	Lecture / 📺	Wouters
WT 23/24	2579904	Tutorial Management Accounting 2 (Bachelor)	2 SWS	Practice / 🎧	Letmathe
WT 23/24	2579905	Tutorial Management Accounting 2 (Master)	2 SWS	Practice / 🎧	Letmathe
Exams					
ST 2023	79-2579903-B	Management Accounting 2 (Bachelor)			Wouters
ST 2023	79-2579903-M	Management Accounting 2 (Mastervorzug und Master)			Wouters
WT 23/24	79-2579903-B	Management Accounting 2 (Bachelor)			Wouters
WT 23/24	79-2579903-M	Management Accounting 2 (Mastervorzug und Master)			Wouters

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🎧 On-Site, ✕ Cancelled

Competence Certificate

The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites

None

Recommendation

It is recommended:

- to take part in the course "Management Accounting 1" before this course
- participation in the exercise for the lecture "Management Accounting 2"

Annotation

The exercise for the lecture is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration: Bachelor students:

- 79-2579903-B Management Accounting 2 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579903-M Management Accounting 2 (Master's transfer and Master)

Below you will find excerpts from events related to this course:

V

Management Accounting 2

2579903, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Online

Content

The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics. They can use financial information for various purposes in organizations.

Recommendations:

- It is recommended to take part in the course "Management Accounting 1" before this course.

Examination:

- The assessment consists of a written exam (120 min) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Verlag: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- Zusätzlich werden Artikel auf ILIAS zur Vergütung gestellt.

**Tutorial Management Accounting 2 (Bachelor)**

2579904, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site

Content
see ILIAS

**Tutorial Management Accounting 2 (Master)**

2579905, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site



Content
see ILIAS





T

6.206 Course: Management of IT-Projects [T-WIWI-112599]

Responsible: Dr. Roland Schätzle
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101477 - Development of Business Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2511214	Management of IT-Projects	2 SWS	Lecture / 	Schätzle
ST 2023	2511215	Übungen zu Management von IT-Projekten	1 SWS	Practice / 	Schätzle
Exams					
ST 2023	79AIFB_MvIP_A1	Management of IT-Projects (Registration until 17 July 2023)			Oberweis
WT 23/24	79AIFB_MvIP_C3	Management of IT-Projects			Oberweis

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment takes place in the form of a written examination (exam) in the amount of 60 minutes. The examination is offered every semester and can be repeated at any regular examination date.

Prerequisites

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

Below you will find excerpts from events related to this course:

V

Management of IT-Projects

2511214, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
 - plan of the project structure
 - flow chart
 - project schedule
 - plan of resources
- effort estimation
- project infrastructure
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Learning objectives:

Students

- explain the terminology of IT project management and typical used methods for planning, handling and controlling,
- apply methods appropriate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:

Knowledge from the lecture Software Engineering is helpful.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004
- Project Management Institute Standards Committee. A Guide to the Project Management Body of Knowledge (PMBok guide). Project Management Institute. Four Campus Boulevard. Newton Square. PA 190733299. U.S.A.

**Übungen zu Management von IT-Projekten**

2511215, SS 2023, 1 SWS, Language: German, [Open in study portal](#)

Practice (Ü)
On-Site

Content


The general conditions, influencing factors and methods in the planning, execution and control of IT projects are dealt with. In particular, the following topics will be dealt with: Project environment, project organization, project structure plan, effort estimation, project infrastructure, project control, decision-making processes, negotiation, time management. The lecture is accompanied by exercises in the form of tutorials. The date of the exercise will be announced later.





T

6.207 Course: Managing New Technologies [T-WIWI-102612]

Responsible: Dr. Thomas Reiß
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2023	2545003	Managing New Technologies	2 SWS	Lecture / 	Reiß
Exams					
ST 2023	7900169	Managing New Technologies			Reiß

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Written exam 100% following §4, Abs. 2.

Prerequisites

None

Recommendation

None

Annotation

The credit points for T-WIWI-102612 "Management of New Technologies" were reduced to 3 credit points in the 2019 summer semester.

Below you will find excerpts from events related to this course:

V

Managing New Technologies

2545003, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

Bitte melden Sie sich für die Prüfung Nr. 7900169 an, das ist die Prüfungs-Nr. für die schriftliche Prüfung.

(Die Prüfungs-Nr. 7900235 ist eine mündliche Prüfung, zu der sich Studierende nur nach Aufforderung durch das EnTechnon Sekretariat anmelden sollen, wenn Studierende eine mündliche Prüfung haben.)

Literature

- Hausschildt/Salomo: Innovationsmanagement; Borchert et al.: Innovations- und Technologiemanagement;
- Specht/Möhrle; Gabler Lexikon Technologiemanagement

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.

T

6.208 Course: Market Research [T-WIWI-107720]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)
[M-WIWI-101647 - Data Science: Evidence-based Marketing](#)
[M-WIWI-105312 - Marketing and Sales Management](#)
[M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2023	2571150	Market Research	2 SWS	Lecture /	Klarmann
ST 2023	2571151	Market Research Tutorial	1 SWS	Practice /	Pade
Exams					
ST 2023	7900015	Market Research			Klarmann
WT 23/24	7900053	Market Research			Klarmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment of success takes place through a written exam with additional aids in the sense of an open book exam. Further details will be announced during the lecture.

Prerequisites

None

Recommendation

None

Annotation

Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.

Below you will find excerpts from events related to this course:

V

Market Research

2571150, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Within the lecture, essential statistical methods for measuring customer attitudes (e.g. satisfaction measurement), understanding customer behavior and making strategic decisions will be discussed. The practical use as well as the correct handling of different survey methods will be taught, such as experiments and surveys. To analyze the collected data, various analysis methods are presented, including hypothesis tests, factor analyses, cluster analyses, variance and regression analyses. Building on this, the interpretation of the results will be discussed.

Topics addressed in this course are for example:

- Theoretical foundations of market research
- Statistical foundations of market research
- Measuring customer attitudes
- Understanding customer reactions
- Strategic decision making

The aim of this lecture is to give an overview of essential statistical methods. In the lecture students learn the practical use as well as the correct handling of different statistical survey methods and analysis procedures. In addition, emphasis is put on the interpretation of the results after the application of an empirical survey. The derivation of strategic options is an important competence that is required in many companies in order to react optimally to customer needs.

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

The total workload for this course is approximately 135.0 hours.

Presence time: 30 hours

Preparation and wrap-up of the course: 45.0 hours

Exam and exam preparation: 60.0 hours

Please note that this course has to be completed successfully by students interested in master thesis positions at the chair of marketing.

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

**6.209 Course: Marketing Analytics [T-WIWI-103139]****Responsible:** Prof. Dr. Martin Klarmann**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-101647 - Data Science: Evidence-based Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	5

Events					
WT 23/24	2572170	Marketing Analytics	2 SWS	Lecture /	Klarmann
WT 23/24	2572171		1 SWS	Practice /	Pade
Exams					
WT 23/24	7900082	Marketing Analytics			Klarmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative (according to §4(2), 3 of the examination regulation) exam assessment (working on tasks in groups during the lecture).

Prerequisites

The prerequisite for taking the course is the successful completion of the course "Market Research".

Recommendation

It is strongly recommended to complete the course "Market Research" prior to taking the "Marketing Analytics" course.

Annotation

"Marketing Analytics" is offered as a block course with an alternative exam assessment.

Starting in the winter semester 22/23, the course will be scheduled to be completed after two thirds of the semester. For further information, please contact the Marketing and Sales Research Group (marketing.iism.kit.edu). Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing and Sales Research Group.

Below you will find excerpts from events related to this course:

**Marketing Analytics**2572170, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)**Lecture (V)
On-Site****Content**

In this course various relevant market research questions are addressed, as for example measuring and understanding customer attitudes, preparing strategic decisions and sales forecasting. In order to analyze these questions, students learn to handle social media data, panel data, nested observations and experimental design. To analyze the data, advanced methods, as for example multilevel modeling and return on marketing models are taught. Also, problems of causality are addressed in-depth. The lecture is accompanied by a computer-based exercise, in the course of which the methods are applied practically.

Students

- receive based on the course market research an overview of advanced empirical methods
- learn in the course of the lecture to handle advanced data collection and data analysis methods
- are based on the acquired knowledge able to interpret results and derive strategic implications

Total workload for 4.5 ECTS: ca. 135 hours.

In order to attend Marketing Analytics, students are required to have passed the course Market Research.

Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

Literature

- Hanssens, Dominique M., Parsons, Leonard J., Schultz, Randall L. (2003), Market response models: Econometric and time series analysis, 2nd ed, Boston.
- Gelman, Andrew, Hill, Jennifer (2006), Data analysis using regression and multilevel/hierarchical models, New York.
- Cameron, A. Colin, Trivedi, Pravin K. (2005), Microeconometrics: methods and applications, New York.
- Chapman, Christopher, Feit, Elea M. (2015), R for Marketing Research and Analytics, Cham.
- Ledolter, Johannes (2013), Data mining and business analytics with R, New York.



2572171, WS 23/24, 1 SWS, Language: English, [Open in study portal](#)

**Practice (Ü)
On-Site**

Content

Tasks parallel to the lecture to work on in a group of students.

Organizational issues

Blockveranstaltung: genaue Uhrzeiten und Raum werden noch bekannt gegeben

T

6.210 Course: Marketing Strategy Business Game [T-WIWI-102835]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Irregular	1

Competence Certificate

The assessment (alternative exam assessment) consists of a group presentation and a subsequent round of questions totalling 20 minutes.

Prerequisites

None

Recommendation

None

Annotation

Please note that only one of the courses from the election block can be chosen in the module.

Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS points in the respective module to all students. Participation in a specific course cannot be guaranteed.

In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

T

6.211 Course: Master's Thesis [T-WIWI-103142]

Responsible: Studiendekan der KIT-Fakultät für Informatik
Studiendekan des KIT-Studienganges

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-104833 - Module Master's Thesis](#)

Type	Credits	Grading scale	Version
Final Thesis	30	Grade to a third	1

Competence Certificate

see module description

Prerequisites

see module description

Final Thesis

This course represents a final thesis. The following periods have been supplied:


Submission deadline	6 months
Maximum extension period	3 months
Correction period	8 weeks

T

6.212 Course: Matching Theory [T-WIWI-113264]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101500 - Microeconomic Theory](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2500042	Matching Theory	3 SWS	Lecture / Practice / 	Okulicz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Written examination (90 minutes)

Below you will find excerpts from events related to this course:

V

Matching Theory

2500042, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

How should we organize recruitment of students to schools? Could we improve the placement of doctors to hospitals? Why there always seems to be a better roommate to the one you currently have? Matching Theory answers all these questions and more. During the course we will formally study mathematical systems of allocating goods and people, and see their many real life applications from organizing kidney exchange to improving dating apps. The course will cover three main topics in Matching Theory and Market Design: (1) assignment problems (e.g., allocation of social housing), (2) two-sided matching (e.g., allocation of children to schools), (3) transferable-utility matching (e.g., labor market).

The students are expected to:

1. Understand the mathematical properties of allocations and commonly used mechanism
2. Understand the connection between Matching Theory and real-life allocation systems
3. Be able to use their knowledge to propose solutions for novel real-life problems

**6.213 Course: Mathematics for High Dimensional Statistics [T-WIWI-111247]**

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-101637 - Analytics and Statistics](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Irregular	1

Events					
ST 2023	2550562	Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Lecture /	Grothe
ST 2023	2550563	Übung zu Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Practice /	Grothe, Rieger
Exams					
ST 2023	7900362	Mathematics for High Dimensional Statistics			Grothe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of an oral exam (30 min.) taking place in the recess period.

Prerequisites

None

Recommendation

Basic knowledge of mathematics and statistics is assumed.

Knowledge in multivariate statistics is an advantage, but not necessary for the course.

Below you will find excerpts from events related to this course:

**Mathematische Grundlagen hochdimensionaler Statistik**

2550562, SS 2023, 2 SWS, [Open in study portal](#)

Lecture (V)
On-Site

Content**Content:**

The lecture focuses on modelling statistical objects (random vectors, random matrices and random graphs) in high dimensions. It deals with concentration inequalities that limit the fluctuations of such objects as well as complexity measures for quantities and functions. The theory is transferred to well-known and widespread applications such as neighbourhood detection in networks, statistical learning theory and LASSO.

Learning objectives:

Students are able to

- name and justify statistical properties of high-dimensional objects (vectors, matrices, functions).
- describe and explain differences in the behaviour between low- and high-dimensional random objects.
- name procedures for assess uncertainties in statistical models and apply them in simple examples.
- decide well-founded which modeling of high-dimensional structures is best suited in a specific situation.
- transform data into lower dimensions and quantify approximation errors.
- understand basic proofs in high-dimensional statistics using examples.
- develop, implement and evaluate smaller simulations in a programming language of their choice.

**6.214 Course: Media Management [T-WIWI-112711]**

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2572192	Media Management	2 SWS	Lecture /	Kupfer
WT 23/24	2572193	Media Management Exercise	1 SWS	Practice /	Mitarbeiter
Exams					
WT 23/24	7900135	Media Management			Kupfer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The control of success is done by the elaboration and presentation of a group task as well as a written exam. Further details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Students are highly encouraged to actively participate in class.

Annotation

The course will take place in the winter term 23/24 for the first time.

Below you will find excerpts from events related to this course:

**Media Management**

2572192, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Students learn the theoretical foundations of media management and its most important concepts. They learn both about the key characteristics of both media products and media markets. They further get to know essential business models of media markets. Special emphasis will be given to understanding media consumers and the marketing mix of media products. A tutorial offers the opportunity to apply the key learnings of the lecture.

The learning objectives are as follows:

- Getting to know the theoretical foundations of media management
- Evaluating strategies for media products and services as media-specific marketing mix instruments
- Fostering critical and analytical thinking skills and the application of knowledge to marketing problems
- Improvement of skills and competences in the area of project management within the framework of group work
- Improvement of foreign language skills (business English)

Total time required for 4.5 credit points: approx. 135 hours

Attendance time: 30 hours

Self-study: 105 hours

Organizational issues

Appointments to be announced.

T

6.215 Course: Meshes and Point Clouds [T-INFO-101349]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-100812 - Meshes and Point Clouds](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	1

Exams			
ST 2023	7500317	Meshes and Point Clouds	Prautzsch

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Prerequisites

None.

**6.216 Course: Methods in Economic Dynamics [T-WIWI-102906]**

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101514 - Innovation Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	2

Events					
ST 2023	2560240	Methods in Economic Dynamics	1 SWS	Lecture /	Ott
Exams					
ST 2023	7900108	Methods in Economic Dynamics			Ott

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment.

Prerequisites

None

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantitative-mathematical methods.

Below you will find excerpts from events related to this course:

**Methods in Economic Dynamics**

2560240, SS 2023, 1 SWS, Language: German/English, [Open in study portal](#)

**Lecture (V)
On-Site**

Content

The economic exploitation of inventions is an important part of innovation economics. Intellectual property rights such as patents or trademarks play a central role. Within this workshop, the recording, processing and analysis of such intellectual property rights will be deepened, e.g. considering specific technologies. Students will learn how to work with relational databases, the econometric evaluation of recorded data, and methods for visualising them.

Learning objectives:

The student

- learns to query data sources.
- is able to analyse data with statistical methods.
- visualises and interprets data evaluations (e.g. using dashboards or methods of network analysis).

Recommendations:

An interest in working with data, basic knowledge on databases as well as basic knowledge in economics and statistics are advantageous.

Workload:

The total workload for this course is approximately 45 hours.

- Classes: ca. 5 h
- Self-study: ca. 40 h

Assessment:

Non exam assessment according to § 4 paragraph 3 of the examination regulation (SPO 2015).

Organizational issues

The course is structured along two assignments, the first of which is an individual assignment, whereas the second assignment is a group project. Assignment 1 will be completed within one month's time, whereas assignment 2 will take place on a different date.

Assignment 1 will take place on **03.05.2023** in **Building 01.87, B5.25**. **Assignment 2** will take place on **23.06.2023** in **Building 01.87, B5.25**. The exact time will be announced later.

Students are offered the opportunity to participate in this course jointly with the course "Seminar in Economic Policy", within the module "Economics of Innovation". The work in both courses will be strongly related to each other, as students will work on the same topic from two different perspectives. Students in the course "Seminar in Economic Policy" will be provided with the opportunity to write a paper that addresses the results found by the students in the course "Methods in Economic Dynamics". Taking both courses together will enable the students to earn 4.5 ECTS.

Literature

Relevante Literatur wird in der Vorlesung bekanntgegeben.
(Relevant literature will be announced in the lecture.)

T

6.217 Course: Methods in Innovation Management [T-WIWI-110263]

Responsible: Dr. Daniel Jeffrey Koch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Competence Certificate

Alternative exam assessments (\$4(2), 3 SPO). The final grade is composed 75% of the grade of the written paper and 25% of the grade of the presentation.

Prerequisites

None.

Recommendation

Prior attendance of the course "Innovation Management: Concepts, Strategies and Methods" is recommended.

T

6.218 Course: Microeconometrics [T-WIWI-112153]

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105414 - Statistics and Econometrics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment consists of a written exam (60 min).

Prerequisites

None

Recommendation

Course participants are expected to know econometrics at the level of 'Volkswirtschaftslehre III: Einführung in die Ökonometrie'

T

6.219 Course: Mixed Integer Programming I [T-WIWI-102719]

Responsible: Prof. Dr. Oliver Stein**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
WT 23/24	2550138	Mixed-integer Programming I	2 SWS	Lecture /	Stein
WT 23/24	2550139	Exercises Mixed Integer Programming I		Practice /	Stein, Beck
Exams					
WT 23/24	7900180_WS2324_HK	Mixed Integer Programming I			Stein

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (kop.iior.kit.edu).

Below you will find excerpts from events related to this course:

V

Mixed-integer Programming I2550138, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)Lecture (V)
On-Site

Content

Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as with discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, and portfolio optimization with limitations on the number of securities. For the algorithmic identification of optimal points of such problems an interaction of ideas from discrete as well as continuous optimization is necessary.

The lecture focusses on mixed-integer *linear* optimization problems and is structured as follows:

- Introduction, solvability, and basic concepts
- LP relaxation and error bounds for roundings
- Branch-and-bound method
- Gomory's cutting plane method
- Benders decomposition

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of mixed-integer *nonlinear* optimization problems forms the contents of the lecture "Mixed-integer Programming II".

Learning objectives:

The student

- knows and understands the fundamentals of linear mixed integer programming,
- is able to choose, design and apply modern techniques of linear mixed integer programming in practice.

Literature

- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
- G.L. Nemhauser, L.A. Wolsey, Integer and Combinatorial Optimization, Wiley, 1988
- M. Tawarmalani, N.V. Sahinidis, Convexification and Global Optimization in Continuous and Mixed-Integer Nonlinear Programming, Kluwer, 2002.

T

6.220 Course: Mixed Integer Programming II [T-WIWI-102720]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of *Mixed Integer Programming I* [2550138]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (kop.iior.kit.edu).

T

6.221 Course: Mobile Communication [T-INFO-101322]

Responsible: Prof. Dr. Oliver Waldhorst
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: [M-INFO-100785 - Mobile Communication](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	24643	Mobile Communications	2 SWS	Lecture	Waldhorst, Mahrt
Exams					
ST 2023	7500073	Mobile Communication			Waldhorst, Zitterbart
WT 23/24	7500015	Mobile Communication			Waldhorst, Zitterbart

T

6.222 Course: Model Driven Software Development [T-INFO-101278]

Responsible: Prof. Dr. Ralf Reussner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100741 - Model-Driven Software Development](#)


Type
Oral examination




Credits
3

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1


Events					
WT 23/24	24657	Model-Driven Software Engineering	2 SWS	Lecture / 	Burger
Exams					
ST 2023	7500016	Model Driven Software Development			Burger, Reussner





Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T 6.223 Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102808 - Digital Service Systems in Industry](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 4
------------------------------------	-----------------------	--	---------------------------------------	---------------------

Events					
WT 23/24	2550490	Modellieren und OR-Software: Fortgeschrittene Themen	3 SWS	Practical course / 	Pomes, Linner, Nickel
Exams					
ST 2023	7900035	Modeling and OR-Software: Advanced Topics			Nickel
WT 23/24	7900071	Modeling and OR-Software: Advanced Topics			Nickel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is a written examination. The examination is held in every semester. The prerequisite can only be obtained in semesters in which the course exercises are offered.

Prerequisites

Prerequisite for admission to the exam is the successful participation in the exercises. This includes the processing and presentation of exercises.

Recommendation

Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

Successful completion of the course *Modeling and OR-Software: Introduction*.

Annotation

Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is held in every term. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

V	<p>Modellieren und OR-Software: Fortgeschrittene Themen 2550490, WS 23/24, 3 SWS, Language: German, Open in study portal</p>	<p>Practical course (P) Blended (On-Site/Online)</p>
----------	--	---

Content

The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis. We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling programming languages are OPL and ILOG Script.

Organizational issues

Link zur Bewerbung:

http://go.wiwi.kit.edu/OR_Bewerbung

Bewerberzeitraum:

01.09.2023 00:00 - 12.10.2023 23:55

T

6.224 Course: Modeling and Simulation [T-WIWI-112685]

Responsible: Prof. Dr. Sanja Lazarova-Molnar
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101456 - Intelligent Systems and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2511100	Modeling and Simulation	2 SWS	Lecture	Lazarova-Molnar
ST 2023	2511101	Exercises Modeling and Simulation	1 SWS	Practice	Lazarova-Molnar
Exams					
ST 2023	79AIFB_MaS_C6	Modeling and Simulation (Registration until 17 July 2023)			Lazarova-Molnar
WT 23/24	79AIFB_MaS_A6	Modeling and Simulation			Lazarova-Molnar

Competence Certificate

Depending on the number of participants in the course, the exam will be offered either as an oral exam (20 min), or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

None

Recommendation

Some experience in programming and knowledge of basic mathematics and statistics.

Annotation

Instruction is in the form of lectures and exercises. A detailed course schedule will be published before the start of the semester.

Below you will find excerpts from events related to this course:

V

Modeling and Simulation

2511100, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content

Modeling and Simulation is the most widely used operations research / systems engineering technique for designing new systems and optimizing the performance of existing systems. In one way or another, just about every engineering or scientific field uses simulation as an exploration, modeling, or analysis technique. The course is designed to provide students with basic knowledge of modeling and simulation approaches and to provide them with first experience of using a simulation package. The course will focus on modeling and simulation of real-world discrete event systems. Examples of discrete events are customer arrivals at a queue of a service desk, machine failures in manufacturing systems, telephone calls in a call center, etc. Moreover, continuous and hybrid models will be also discussed. Topics include Discrete-Event Simulation, Input Modeling, Output Analysis, Random Number Generation, Verification and Validation, Stochastic Petri Nets and Markov Chains.

Competence Certificate

Depending on the number of participants in the course, the exam will be offered either as an oral exam (20 min), or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Learning Objectives

Knowledge:

- Demonstrate knowledge about general and specific theories, challenges, algorithms, methods, technologies, and tools related to modelling and simulation
- Demonstrate knowledge of two important classes of simulation:
 - Discrete-event Monte-Carlo simulation,
 - Continuous simulation with ODEs
- Demonstrate knowledge of algorithms necessary to build a simulator

Skills:

- Analyse suitability of an approach/tool for a given modelling problem
- Understand simulation models of various types
- Demonstrate methods and techniques to overcome common challenges in modelling and simulation
- Model simulation input data
- Analyse and model discrete stochastic systems
- Analyse and interpret simulation results

Competences:

- Use different methods to conduct simulation-based analysis of real-world data
- Build and simulate stochastic models
- Use simulation software

Prerequisites

Some experience in programming and knowledge of basic mathematics and statistics

Form of instruction

Lectures and exercises. A detailed course plan will be published before the semester start.

Literature

Discrete-Event System Simulation, 5th Edition

Jerry Banks, John S. Carson, II, Barry L. Nelson and David M. Nicol

T

6.225 Course: Multicriteria Optimization [T-WIWI-111587]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Exams				
ST 2023	7900209_SS2023_NK	Multicriteria Optimization		Stein

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation

The course is offered every second winter semester (starting WiSe 22/23). The curriculum of the next three years is available online (www.ior.kit.edu).

Contents:

Multicriteria optimization deals with optimization problems with multiple objective functions. In practice, the minimization or maximization of several objectives often conflict with each other, such as weight and stability of mechanical components, return and risk of stock portfolios, or cost and duration of transports. Various scalarization approaches allow one to formulate single-objective problems that can be solved using nonlinear or global optimization techniques, and whose optimal points have a reasonable interpretation for the underlying multicriteria problem.

However, some seemingly obvious scalarization approaches suffer from various drawbacks, so that regardless of scalarization approaches, it is necessary to clarify what is meant by the solution of a multicriteria optimization problem in the first place. For such Pareto-optimal points, optimality conditions and solution procedures based on them can be formulated. From the usually non-unique Pareto set, decision makers finally choose an alternative based on their subjective preferences.

The lecture gives a mathematically sound introduction to multicriteria optimization and is structured as follows:

- Introductory examples and terminology
- Solution concepts
- Methods for the determination of the Pareto set
- Selection of Pareto-optimal points under subjective preferences

T

6.226 Course: Multivariate Statistical Methods [T-WIWI-103124]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-101637 - Analytics and Statistics](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2550554	Analysis of Multivariate Data	2 SWS	Lecture /	Grothe
ST 2023	2550555	Übung zu Multivariate Verfahren	2 SWS	Practice /	Kächele
Exams					
ST 2023	7900351	Multivariate Statistical Methods			Grothe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites

None

Recommendation

The course covers highly advanced statistical methods with a quantitative focus. Hence, participants are necessarily expected to have advanced statistical knowledge, e.g. acquired in the course "Advanced Statistics". Without this, participation in the course is not advised.

Previous attendance of the course Analysis of Multivariate Data is recommended. Alternatively, the script can be provided to interested students.

Below you will find excerpts from events related to this course:

V

Analysis of Multivariate Data

2550554, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature


Skript zur Vorlesung


T

6.227 Course: Natural Language Processing [T-INFO-112177]

Responsible: Prof. Dr. Jan Niehues
Organisation: KIT Department of Informatics
Part of: [M-INFO-105999 - Natural Language Processing](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 23/24	2400147	Natural Language Processing	4 SWS	Lecture / 	Niehues
Exams					
ST 2023	7500223	Natural Language Processing			Niehues
WT 23/24	7500286	Natural Language Processing			Niehues

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Natural Language Processing

2400147, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Summarize today's lecture? When were neural networks invented? An artificial intelligence that can answer these questions is a long dream of mankind. With the help of machine learning and in particular large language models (LLMs), we are seeing the first programs today that can solve these problems. This lecture provides the skills and knowledge to develop solutions to these natural language processing problems using state-of-the-art methods.

After an introduction to the challenges of natural language processing, the different tasks in natural language processing are discussed. A focus of the course is on methods from the field of deep learning and the new possibilities through large language models (ChatGPT). First, sequence classification tasks such as sentiment analysis are dealt with. Then methods of sequence labeling are discussed, such as those used to recognize proper names or determine part-of-speech tags. Afterwards the lecture will discuss sequence-to-sequence methods. These models are used in many natural language processing tasks, such as machine translation, automatic summarization, and automatic question answering.

In this course, the important challenges in the development of systems are covered: the representation of words, neural architectures to model language, methods to train complex models and finding the most likely output.

T


6.228 Course: Natural Language Processing and Software Engineering [T-INFO-101272]




Responsible: Prof. Dr.-Ing. Anne Koziolk

Organisation: KIT Department of Informatics

Part of: [M-INFO-100735 - Natural Language Processing and Software Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1


Events					
WT 23/24	24187	Natural Language Processing and Software Engineering	2 SWS	Lecture / 	Hey, Koziolk
Exams					
ST 2023	7500185	Natural Language Processing and Software Engineering			Koziolk
WT 23/24	7543231	Natural Language Processing and Software Engineering			Koziolk





Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.229 Course: Network Security: Architectures and Protocols [T-INFO-101319]

Responsible: Prof. Dr. Martina Zitterbart**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100782 - Network Security: Architectures and Protocols](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)**Type**
Oral examination**Credits**
4**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	24601	Netsicherheit: Architekturen und Protokolle	2 SWS	Lecture / 	Baumgart, Bless, Heseding, Zitterbart
Exams					
ST 2023	7500072	Network Security: Architectures and Protocols			Zitterbart
WT 23/24	7500014	Network Security: Architectures and Protocols			Zitterbart

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.230 Course: Next Generation Internet [T-INFO-101321]**

Responsible: Dr.-Ing. Roland Bless
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: [M-INFO-100784 - Next Generation Internet](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	24674	Next Generation Internet	2 SWS	Lecture /	Bless
Exams					
ST 2023	7500074	Next Generation Internet			Bless, Zitterbart
WT 23/24	7500016	Next Generation Internet			Bless, Zitterbart

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Next Generation Internet**

24674, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture focuses on current developments in Internet-based network technologies. First, architectural principles of today's Internet are presented and discussed, subsequently nowadays and future challenges are motivated. Methods for quality-of-service support and transport of multi-media stream as well as newer transport protocols and group communication support are presented. Deployment of the presented technologies in IP-based networks are discussed. The lecture presents advanced approaches such as programmable networks and network virtualization as well as newer approaches and protocols for routing, satellite networking, and peer-to-peer networks.

Literature

James F. Kurose, and Keith W. Ross *Computer Networking* 6th edition, Addison-Wesley/Pearson, 2013, ISBN 978-0-273-76896-8, Chapters 1, 2.6 (P2P), 4 (Network Layer), 7.5 (Scheduling, IntServ, DiffServ, RSVP)

Weiterführende Literatur

wird in der Vorlesung bekanntgegeben.

**6.231 Course: Non- and Semiparametrics [T-WIWI-103126]**

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
WT 23/24	2521300	Non- and Semiparametrics	2 SWS	Lecture	Schienle
WT 23/24	2521301		2 SWS	Practice	Schienle, Rüter, Wolffram
Exams					
WT 23/24	7900009	Non- and Semiparametrics			Schienle

Competence Certificate

The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites

None

Recommendation

Knowledge of the contents covered by the course "*Applied Econometrics*" [2520020]

Annotation

The course takes place every second winter semester: 2018/19 then 2020/21

Below you will find excerpts from events related to this course:

**Non- and Semiparametrics**

2521300, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)

Content**Learning objectives:**

The student

- has profound knowledge of non- and semiparametric estimation methods
- is capable of implementing these methods using statistical software and using them to assess empirical problems

Content:

Kernel density estimation, local constant and local linear regression, bandwidth choice, series and sieve estimators, additive models, semiparametric models

Requirements:

It is recommended to attend the course *Applied Econometrics* prior to this course.

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Literature

Li, Racine: *Nonparametric Econometrics: Theory and Practice*. Princeton University Press, 2007.

T

6.232 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
4

Events					
WT 23/24	2550111	Nonlinear Optimization I	2 SWS	Lecture /	Stein
WT 23/24	2550112	Exercises Nonlinear Optimization I + II		Practice /	Stein, Schwarze
Exams					
ST 2023	7900202_SS2023_NK	Nonlinear Optimization I			Stein
WT 23/24	7900001_WS2324_HK	Nonlinear Optimization I			Stein

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The exam takes place in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

Annotation

Part I and II of the lecture are held consecutively in the *same* semester.

Below you will find excerpts from events related to this course:

V

Nonlinear Optimization I

2550111, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

**6.233 Course: Nonlinear Optimization I and II [T-WIWI-103637]**

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each winter term	6

Events					
WT 23/24	2550111	Nonlinear Optimization I	2 SWS	Lecture /	Stein
WT 23/24	2550112	Exercises Nonlinear Optimization I + II		Practice /	Stein, Schwarze
WT 23/24	2550113	Nonlinear Optimization II	2 SWS	Lecture /	Stein
Exams					
ST 2023	7900204_SS2023_NK	Nonlinear Optimization I and II			Stein
WT 23/24	7900003_WS2324_HK	Nonlinear Optimization I and II			Stein

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

**Nonlinear Optimization I**

2550111, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

**Nonlinear Optimization II**

2550113, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

**6.234 Course: Nonlinear Optimization II [T-WIWI-102725]**

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 23/24	2550112	Exercises Nonlinear Optimization I + II		Practice /	Stein, Schwarze
WT 23/24	2550113	Nonlinear Optimization II	2 SWS	Lecture /	Stein
Exams					
ST 2023	7900203_SS2023_NK	Nonlinear Optimization II			Stein
WT 23/24	7900002_WS2324_HK	Nonlinear Optimization II			Stein

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of *Nonlinear Optimization I* [2550111]. In this case, the duration of the written exam takes 120 minutes.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

**Nonlinear Optimization II**

2550113, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:


- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000





T

6.235 Course: Online Concepts for Karlsruhe City Retailers [T-WIWI-111848]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)
[M-WIWI-105312 - Marketing and Sales Management](#)
[M-WIWI-106258 - Digital Marketing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	2

Events					
ST 2023	2571184	Online concepts for Karlsruhe city retailers	2 SWS	Others / 	Klarmann, Kupfer, Weber, Gerlach
Exams					
ST 2023	7900221	Online Concepts for Karlsruhe City Retailers			Klarmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate


Alternative exam assessment:

- presentations in teams (in each case to the extent of approx. 15 minutes per team with subsequent discussion)
- delivery of a written elaboration per team.

Annotation

Please note that an application is required to participate in this workshop. The application phase usually takes place at the beginning of the lecture period in the summer semester. More information on the application process is usually available on the Marketing and Sales Research Group website (marketing.iism.kit.edu) shortly before the start of the lecture period in the summer semester.

Below you will find excerpts from events related to this course:

	Online concepts for Karlsruhe city retailers 2571184, SS 2023, 2 SWS, Language: German, Open in study portal	Others (sonst.) On-Site
---	--	----------------------------

Content

Content

As part of a practical project in cooperation with the city marketing department of KME Karlsruhe Marketing und Event GmbH, students will have the opportunity to directly interact with retailers in Karlsruhe. Challenges of the digitalization of brick-and-mortar retailing will be analyzed and solutions will be developed and implemented.

In a theoretical part at the beginning of the event, students will gain an insight into the theoretical foundations of specific online marketing instruments. In cooperation with Karlsruhe City Marketing, students are taught application-oriented skills in online marketing tools, such as content management systems, social media platforms, search engine optimization or Google Ads campaigns.

In the practical part of the course, student teams cooperate with a real retailer in Karlsruhe's city center and learn how to analyze and optimize online presences and digital solutions based on key performance indicators. Possible use cases range from social media communication and website optimization to the introduction of innovative pricing and payment methods. In this way, students are given the tools for developing, maintaining and optimizing individual websites and digital solutions in stationary retailing.

Learning objectives result accordingly as follows:

- Learning of theoretical basics of central, application-oriented tools of online marketing
- Application and practical deep-dive of the acquired knowledge in a real case
- Concise and structured presentation of results

Total time required for 3 credit points: approx. 90.0 hours

Attendance time: 12 hours

Preparation and wrap-up of the course: 58 hours

Exam and exam preparation: 20 hours

T

6.236 Course: Operations Research in Health Care Management [T-WIWI-102884]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102805 - Service Operations](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Exams			
ST 2023	7900229	Operations Research in Health Care Management	Nickel

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).
 The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at <http://dol.ior.kit.edu/english/Courses.php>.

T

6.237 Course: Operations Research in Supply Chain Management [T-WIWI-102715]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102805 - Service Operations](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Events					
ST 2023	2550480	Operations Research in Supply Chain Management	2 SWS	Lecture / 🗸	Nickel
ST 2023	2550481	Übungen zu OR in Supply Chain Management	1 SWS	Practice / 🗸	Hoffmann
Exams					
ST 2023	00013	Operations Research in Supply Chain Management			Nickel
WT 23/24	7900076	Operations Research in Supply Chain Management			Nickel

Legend: 🗸 Online, 🗸 Blended (On-Site/Online), 🗸 On-Site, ✕ Cancelled

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM, Tactical and operational SCM is assumed.

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at <http://dol.ior.kit.edu/english/Courses.php>.

Below you will find excerpts from events related to this course:

V	Operations Research in Supply Chain Management 2550480, SS 2023, 2 SWS, Language: English, Open in study portal	Lecture (V) On-Site
----------	---	--------------------------------------

Content

Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.

In form and content, the lecture addresses multiple areas of Supply Chain Management: After a short introduction, inventory models, scheduling, assembly line balancing as well as cutting and packing will be discussed. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.


Literature





- Simchi-Levi, D.; Chen, X.; Bramel, J.: The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management, 2nd edition, Springer, 2005
- Simchi-Levi, D.; Kaminsky, P.; Simchi-Levi, E.: Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, McGraw-Hill, 2000
- Silver, E. A.; Pyke, D. F.; Peterson, R.: Inventory Management and Production Planning and Scheduling, 3rd edition, Wiley, 1998
- Blazewicz, J.: Handbook on Scheduling - From Theory to Applications, Springer, 2007
- Pinedo, M. L.: Scheduling - Theory, Algorithms, and Systems (3rd edition), Springer, 2008
- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
- Borodin, A.; El-Yaniv, R.: Online Computation and Competitive Analysis, Cambridge University Press, 2005
- Francis, R. L.; McGinnis, L. F.; White, A.: Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice-Hall, 1992

T

6.238 Course: Optimization and Synthesis of Embedded Systems (ES1) [T-INFO-101367]**Responsible:** Prof. Dr.-Ing. Jörg Henkel**Organisation:** KIT Department of Informatics**Part of:** M-INFO-100830 - Optimization and Synthesis of Embedded Systems (ES1)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2424143	Optimisation and synthesis of embedded systems (ES1)	2 SWS	Lecture / 	Bauer, Henkel
Exams					
WT 23/24	7500085	VL: Optimization and synthesis of embedded systems (ES1)			Henkel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.239 Course: Optimization Models and Applications [T-WIWI-110162]

Responsible: Dr. Nathan Sudermann-Merx
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The examination will take place for the last time in the winter semester 2020/2021.

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

The prerequisite for participation in the exam is the achievement of a minimum number of points in delivery sheets. Details will be announced at the beginning of the course.

Prerequisites

None.

Annotation

The course will take place for the last time in the winter semester 20/21.

T

6.240 Course: Optimization under Uncertainty [T-WIWI-106545]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103289 - Stochastic Optimization](#)



Type
Written examination





Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
3

Events					
WT 23/24	2550464	Optimization Under Uncertainty	2 SWS	Lecture / 	Rebennack
WT 23/24	2550465	Übungen zu Optimierungsansätze unter Unsicherheit	1 SWS	Practice / 	Rebennack
WT 23/24	2550466		2 SWS	Others	Rebennack
Exams					
ST 2023	7900309	Optimization under Uncertainty			Rebennack
ST 2023	7900322	Optimization under Uncertainty			Rebennack

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Prerequisites

None.

T

6.241 Course: Panel Data [T-WIWI-103127]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2520320	Panel Data	2 SWS	Lecture	Heller
ST 2023	2520321	Übungen zu Paneldaten	2 SWS	Practice	Heller
Exams					
ST 2023	7900115	Panel Data			Heller

Prerequisites
None

Below you will find excerpts from events related to this course:

V

Panel Data

2520320, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)

Content**Content:**

Fixed-Effects-Models, Random-Effects-Models, Time-Demeaning

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Literature

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge and London: MIT Press.


Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach* (5th ed.). Mason, Ohio: South-Western Cengage Learning.





T

6.242 Course: Parallel Algorithms [T-INFO-101333]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-100796 - Parallel Algorithms](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	3

Events					
WT 23/24	2400053	Parallel Algorithms	2/1 SWS	Lecture / 	Sanders, Hübner, Uhl
Exams					
ST 2023	7575489	Parallel Algorithms			Sanders

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The lecture consists of two partial achievements:

- an oral examination lasting 20 minutes.
- an exercise carried out as an examination of another type .

Final grade: 80% oral examination, 20% exercise

Recommendation

Knowledge from lectures such as Algorithms I/II is recommended.

T

6.243 Course: Parallel Algorithms Pass [T-INFO-111857]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: [M-INFO-100796 - Parallel Algorithms](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1	Grade to a third	Each winter term	1

Competence Certificate

The lecture consists of two partial achievements:

- an oral examination lasting 20 minutes.
- an exercise carried out as an examination of another type .

Final grade: 80% oral examination, 20% exercise

Recommendation

Knowledge from lectures such as Algorithms I/II is recommended.

T

6.244 Course: Parallel Computer Systems and Parallel Programming [T-INFO-101345]**Responsible:** Prof. Dr. Achim Streit**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100808 - Parallel Computer Systems and Parallel Programming](#)**Type**
Oral examination**Credits**
4**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	24617	Parallel computer systems and parallel programming	2 SWS	Lecture	Streit, Raffener, Barthel
Exams					
ST 2023	7500141	Parallel computer systems and parallel programming			Streit
ST 2023	7500369	Parallel computer systems and parallel programming			Streit
WT 23/24	7500241	Parallel computer systems and parallel programming			Streit

T

6.245 Course: Parametric Optimization [T-WIWI-102855]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation


The lecture is offered irregularly. The curriculum of the next three years is available online (www.iior.kit.edu).



T

6.246 Course: Patent Law [T-INFO-101310]

Responsible: Patric Werner
Organisation: KIT Department of Informatics
Part of: [M-INFO-101215 - Intellectual Property Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2023	24656	Patent Law	2 SWS	Lecture / 	Werner
Exams					
ST 2023	7500109	Patent Law			Dreier, Matz
WT 23/24	7500006	Patent Law			Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.247 Course: Pattern Recognition [T-INFO-101362]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Tim Zander

Organisation: KIT Department of Informatics

Part of: [M-INFO-100825 - Pattern Recognition](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	2

Events					
ST 2023	24675	Pattern Recognition	4 SWS	Lecture / Practice / 	Beyerer
Exams					
ST 2023	7500032	Pattern Recognition			Beyerer
WT 23/24	7500111	Pattern Recognition			Beyerer

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Pattern Recognition

24675, SS 2023, 4 SWS, Language: German, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Organizational issues

Vorlesung: montags 15:45 bis 16:30 Uhr und mittwochs 14:00 bis 15:30 Uhr

Übung: montags 16:30 bis 17:15 Uhr

Literature**Weiterführende Literatur**

- Richard O. Duda, Peter E. Hart, Stork G. David. Pattern Classification. Wiley-Interscience, second edition, 2001
- K. Fukunaga. Introduction to Statistical Pattern Recognition. Academic Press, second edition, 1997
- R. Hoffman. Signalanalyse und -erkennung. Springer, 1998
- H. Niemann. Pattern analysis and understanding. Springer, second edition, 1990
- J. Schürmann. Pattern classification. Wiley & Sons, 1996
- S. Theodoridis, K. Koutroumbas. Pattern recognition. London: Academic, 2003
- V. N. Vapnik. The nature of statistical learning theory. Springer, second edition, 2000

T

6.248 Course: Penetration Testing Lab [T-INFO-109929]

Responsible: Dr.-Ing. Ingmar Baumgart
Prof. Dr. Jörn Müller-Quade

Organisation: KIT Department of Informatics

Part of: [M-INFO-104895 - Penetration Testing Lab](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	1

Events					
ST 2023	2400058	Penetration Testing Lab	4 SWS	Practical course / 📱	Baumgart, Müller, Gröll
WT 23/24	2400115	Penetration Testing Lab	4 SWS	Practical course / 🎧	Baumgart, Müller, Dukek
Exams					
ST 2023	7500275	Penetration Testing Lab			Baumgart

Legend: 📱 Online, 🔄 Blended (On-Site/Online), 🎧 On-Site, ✕ Cancelled

T

6.249 Course: Photorealistic Rendering [T-INFO-101268]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100731 - Photorealistic Rendering](#)



Type
Oral examination

Credits
5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	24682	Fotorealistische Bildsynthese	2 SWS	Lecture / 	Schudeiske
WT 23/24	2400180	Fotorealistische Bildsynthese	2 SWS	Lecture / 	Schudeiske
Exams					
ST 2023	7500124	Photorealistic Rendering			Dachsbacher
WT 23/24	7500203	Photorealistic Rendering			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.250 Course: Planning and Management of Industrial Plants [T-WIWI-102631]**

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581952	Planning and Management of Industrial Plants	2 SWS	Lecture /	Schultmann, Rudi
WT 23/24	2581953	Übungen Anlagenwirtschaft	2 SWS	Practice /	Heck, Heinzmann
Exams					
ST 2023	7981952	Planning and Management of Industrial Plants			Schultmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

**Planning and Management of Industrial Plants**

2581952, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

Industrial plant management incorporates a complex set of tasks along the entire life cycle of an industrial plant, starting with the initiation and erection up to operating and dismantling.

During this course students will get to know special characteristics of industrial plant management. Students will learn important methods to plan, realize and supervise the supply, start-up, maintenance, optimisation and shut-down of industrial plants. Alongside, students will have to handle the inherent question of choosing between technologies and evaluating each of them. This course pays special attention to the specific characteristics of plant engineering, commissioning and investment.

Literature

Wird in der Veranstaltung bekannt gegeben.

T



6.251 Course: Platform & Market Engineering: Commerce, Media, and Digital Democracy [T-WIWI-112823]

Responsible: Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101409 - Electronic Markets](#)
[M-WIWI-101446 - Market Engineering](#)
[M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-102754 - Service Economics and Management](#)
[M-WIWI-104813 - Information Systems: Internet-Based Markets and Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2540460	Platform & Market Engineering: Commerce, Media, and Digital Democracy	2 SWS	Lecture / 	Fegert, Weinhardt
ST 2023	2540461	Übungen zu Platform & Market Engineering: Commerce, Media, and Digital Democracy	1 SWS	Practice / 	Jachimowicz, Stein, Bezzaoui, Fegert
Exams					
ST 2023	7979235	Platform & Market Engineering: Commerce, Media, and Digital Democracy			Weinhardt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) up to 6 bonus points can be obtained. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by max. one grade level (0.3 or 0.4).

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Platform & Market Engineering: Commerce, Media, and Digital Democracy

2540460, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

ehemals: "Market Engineering: Information in Institutions"

Literature

- Roth, A., The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools for Design Economics. *Econometrica* 70(4): 1341-1378, 2002.
- Weinhardt, C., Holtmann, C., Neumann, D., Market Engineering. *Wirtschaftsinformatik*, 2003.
- Wolfstetter, E., Topics in Microeconomics - Industrial Organization, Auctions, and Incentives. Cambridge, Cambridge University Press, 1999.
- Smith, V. "Theory, Experiments and Economics", *The Journal of Economic Perspectives*, Vol. 3, No. 1, 151-69 1989

**6.252 Course: Portfolio and Asset Liability Management [T-WIWI-103128]**

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2520357	Portfolio and Asset Liability Management	2 SWS	Lecture	Safarian
ST 2023	2520358	Übungen zu Portfolio and Asset Liability Management	2 SWS	Practice	Safarian
Exams					
ST 2023	7900116	Portfolio and Asset Liability Management			Safarian

Competence Certificate

The assessment of this course consists of a written examination (following §4(2), 1 SPOs, 180 min.).

Prerequisites

None

Below you will find excerpts from events related to this course:

**Portfolio and Asset Liability Management**

2520357, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content**Learning objectives:**

Knowledge of various portfolio management techniques in the financial industry.

Content:

Portfolio theory: principles of investment, Markowitz- portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorial CAPM, arbitragepricing theory (APT), arbitrage and hedging, multi factorial models, equity-portfolio management, passive strategies, active investment

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Organizational issues

Blockveranstaltung, Termine werden über Ilias bekanntgegeben

Literature

To be announced in the lecture

T

6.253 Course: Practical Course Applied Telematics [T-INFO-103585]**Responsible:** Prof. Dr. Martina Zitterbart**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101889 - Practical Course Applied Telematics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	3

Events					
WT 23/24	24316	Telematic Labs	1 SWS	Practical course	König, Mahrt, Zitterbart

T

6.254 Course: Practical Course Automatic Speech Recognition [T-INFO-104775]**Responsible:** Prof. Dr. Alexander Waibel**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-102411 - Practical Course Automatic Speech Recognition](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	24298	Praktikum Automatische Spracherkennung	2 SWS	Practical course	Waibel

Below you will find excerpts from events related to this course:

V

Praktikum Automatische Spracherkennung24298, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Practical course (P)

Content

- In a number of experiments different systems for automatic speech recognition will be built step-by-step
- The use of different tools and techniques from the area will be practiced


Literature**Weiterführende Literatur**





- A. Waibel, K.F. Lee: Readings in Speech Recognition
- F. Jelinek: Statistical Methods of Speech Recognition
- Schukat-Talamazzini: Automatische Spracherkennung

T

6.255 Course: Practical Course Computer Vision for Human-Computer Interaction [T-INFO-105943]**Responsible:** Prof. Dr.-Ing. Rainer Stiefelhagen**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-102966 - Practical Course Computer Vision for Human-Computer Interaction](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	3

Events					
ST 2023	2400123	Practical Course Computer Vision for Human-Computer Interaction	2 SWS	Practical course / 	Stiefelhagen
Exams					
ST 2023	7500279	Practical Course Computer Vision for Human-Computer Interaction			Stiefelhagen

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.256 Course: Practical Course Decentralized Systems and Network Services [T-INFO-106063]**Responsible:** Prof. Dr. Hannes Hartenstein**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-103047 - Practical Course Decentralized Systems and Network Services](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Irregular	1

Exams			
ST 2023	7500249	Practical Course Decentralized Systems and Network Services	Hartenstein

T


6.257 Course: Practical Course Digital Design & Test Automation Flow [T-INFO-105565]





Responsible: Prof. Dr. Mehdi Baradaran Tahoori

Organisation: KIT Department of Informatics

Part of: [M-INFO-102570 - Practical Course: Digital Design & Test Automation Flow](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 23/24	24318	Digital Design & Test Automation Flow	4 SWS	Practical course / 	Tahoori
Exams					
ST 2023	7500089	Practical Course Digital Design & Test Automation Flow			Tahoori
WT 23/24	7500084	Practical Course Digital Design & Test Automation Flow			Tahoori

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out in form of course work (German Studienleistung, § 4 Abs. 3 SPO). Students must give a presentation.

Prerequisites

None.

Recommendation

Knowledge of “Dependable Computing” and “Fault Tolerant Computing” and Computer Architecture is helpful.

Below you will find excerpts from events related to this course:

V

Digital Design & Test Automation Flow

24318, WS 23/24, 4 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
On-Site

Content

Electronic Design Automation (EDA) is used to develop nearly all novel electronic systems that we use in our daily lives, such as smartphones or laptops. In order to manage the high complexity of these systems, all steps in the design and verification phases are done automatically with the help of EDA tools.

The objective of this lab is to have a hands-on practice on major steps in digital design and test automation flow, from system-level specification to physical design and verification, using industrial EDA toolsets which are predominantly used in the industry and academia. The students will work on some sample designs and go through all major design and test steps, one by one, in different sessions of the lab. So, by the end of this lab, they become familiar with the steps and tool chain in the digital design and test automation flow. The topics include system-level specification and simulation; high-level synthesis; logic-level synthesis and simulation; design for testability; test pattern generation and fault simulation; physical design and verification; timing analysis and closure; area, delay, and power estimation and analysis.

Organizational issues

Ab 31.10.2023, alle 2 Wochen dienstags 14:00-15:30, Geb. 07.21, **Gebäudeteil B, 2.OG, Praktikumsraum B.312.4**

There are limited slots and the registration is handled in a first-come, first-served manner. So make sure you sign-up as early as possible. We can only consider registrations with the correct documents or from the online system (<https://campus.studium.kit.edu/exams/index.php>)

T

6.258 Course: Practical Course Engineering Approaches to Software Development [T-INFO-108791]**Responsible:** Prof. Dr. Ralf Reussner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-104254 - Practical: Course Engineering Approaches to Software Development](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
WT 23/24	2400093	Practical Course Engineering Approaches to Software Development	4 SWS	Practical course	Reussner
Exams					
ST 2023	7500184	Practical Course Engineering Approaches to Software Development			Burger, Reussner
WT 23/24	7500234	Practical Course Engineering Approaches to Software Development			Reussner

T

6.259 Course: Practical Course FPGA Programming [T-INFO-105576]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: [M-INFO-102661 - Practical Course FPGA Programming](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2400106	FPGA Programming	4 SWS	Practical course /	Tahoori
WT 23/24	2400106	FPGA Programming	4 SWS	Practical course /	Tahoori
Exams					
ST 2023	7500087	Practical Course FPGA Programming			Tahoori
WT 23/24	7500083	Practical Course FPGA Programming			Tahoori

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out in form of course work (German Studienleistung, § 4 Abs. 3 SPO). Students must give a presentation.

Prerequisites

None.

Recommendation

Knowledge of “Dependable Computing” and “Fault Tolerant Computing” and Computer Architecture is helpful.

Below you will find excerpts from events related to this course:

V

FPGA Programming

2400106, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Practical course (P)
On-Site

Content

This lab emphasizes on the practical aspects of Field Programmable Gate Arrays (FPGAs). In the beginning, a short background discussion of FPGAs is given, followed by a tutorial on the workflow of configuring and programming an FPGA. This lab includes FPGA design using schematic layouts as well as several example of VHDL/Verilog programming to implement some sample digital circuits. Students will be exposed to the processes used to design and simulate FPGAs as well as compile their design and see it run on an actual FPGA. The lab is designed around the DE2-115 prototyping board, which provides a programmer, program memory, and array of switches, buttons, LEDs, an LCD, and several I/O ports.

Organizational issues

ab 19.04.2023, alle 2 Wochen mittwochs 14:00-17:15, Geb. 07.21, Raum B.312.4

Since the number of seats is limited, a registration for this laboratory in the campussystem is necessary.

V

FPGA Programming

2400106, WS 23/24, 4 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
On-Site

Content

This lab emphasizes on the practical aspects of Field Programmable Gate Arrays (FPGAs). In the beginning, a short background discussion of FPGAs is given, followed by a tutorial on the workflow of configuring and programming an FPGA. This lab includes FPGA design using schematic layouts as well as several example of VHDL/Verilog programming to implement some sample digital circuits. Students will be exposed to the processes used to design and simulate FPGAs as well as compile their design and see it run on an actual FPGA.

Organizational issues

Ab 25.10.2023, alle 2 Wochen mittwochs 14:00-17:15, Geb. 07.21, **Gebäudeteil B, 2.OG**, Praktikumsraum B.312.4

Since the number of seats is limited, a registration for this laboratory in the campussystem is necessary.

T


6.260 Course: Practical Course Model-Driven Software Development [T-INFO-103029]





Responsible: Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: [M-INFO-101579 - Practical Course Model-Driven Software Development](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	1

Events					
ST 2023	2400091	Practical Course Model-Driven Software Development	4 SWS	Practical course / 	Burger
Exams					
ST 2023	7500017	Practical Course Model-Driven Software Development			Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.261 Course: Practical Course Natural Language Dialog Systems [T-INFO-104780]

Responsible: Prof. Dr. Jan Niehues
Prof. Dr. Alexander Waibel

Organisation: KIT Department of Informatics

Part of: [M-INFO-102414 - Natural Language Dialog Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	2

T

6.262 Course: Practical Course on Network Security Research [T-INFO-110938]

Responsible: Mario Hock
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: [M-INFO-105413 - Practical Course on Network Security Research](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Exams			
ST 2023	7500278	Practical Course on Network Security Research	Zitterbart

T

6.263 Course: Practical Course Protocol Engineering [T-INFO-104386]**Responsible:** Prof. Dr. Martina Zitterbart**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-102092 - Practical Course Protocol Engineering](#)


Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	1





Events					
WT 23/24	2400086	Protocol Engineering	4 SWS	Practical course	König, Mahrt, Zitterbart

T

6.264 Course: Practical Course Software Defined Networking [T-INFO-103587]**Responsible:** Prof. Dr. Martina Zitterbart**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101891 - Practical Course Software Defined Networking](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events				
ST 2023	2424899	Projektpraktikum: Software Defined Networking	4 SWS	Practical course /  König, Seehofer, Zitterbart
Exams				
ST 2023	7500167	Practical Course: Software Defined Networking		Zitterbart

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Projektpraktikum: Software Defined Networking2424899, SS 2023, 4 SWS, Language: German/English, [Open in study portal](#)**Practical course (P)
Blended (On-Site/Online)****Content**

Software-defined networking (SDN) is an emerging approach for controlling and managing network infrastructures. All control functionality (such as routing) is implemented in software and executed with the help of a centralized controller. As part of this practical course, we now want to find out how such SDN applications can be developed

T

**6.265 Course: Practical Course: Advanced Topics in High Performance Computing,
Data Management and Analytics [T-INFO-111803]****Responsible:** Prof. Dr. Achim Streit**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105870 - Practical Course: Advanced Topics in High Performance Computing, Data Management and Analytics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
ST 2023	2400068	Advanced Topics in High Performance Computing, Data Management and Analytics	3 SWS	Practical course	Streit, Schlitter
WT 23/24	2400043	Advanced Topics in High Performance Computing, Data Management and Analytics	3 SWS	Practical course	Farhadi, Streit

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO). The examination can consist of experiments or projects, each with a concluding presentation. Students may redraw from the assigned topic during the first two weeks after the topic has been communicated.

Prerequisites

none.

Recommendation

Knowledge in the area of databases, data management, data analytics, parallel computing is helpful.

T

6.266 Course: Practical Course: Biologically Inspired Robots [T-INFO-111039]**Responsible:** Dr.-Ing. Arne Rönnau**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105495 - Practical Course: Biologically Inspired Robots](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	1

Events					
WT 23/24	2400079	Practical Course: Biologically Inspired Robots	4 SWS	Practical course / 	Rönnau

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.267 Course: Practical Course: Current Topics of Quantum Computing [T-INFO-112741]

Responsible: Prof. Dr.-Ing. Ina Schaefer
Prof. Dr. Achim Streit

Organisation: KIT Department of Informatics

Part of: [M-INFO-106286 - Practical Course: Current Topics of Quantum Computing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events					
ST 2023	2400180	Current Topics of Quantum Computing	3 SWS	Practical course / 	Streit, Kühn, Schaefer
Exams					
ST 2023	7500368	Practical Course: Current Topics of Quantum Computing			Kühn

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO).

The overall impression is evaluated. The grading is based on a term paper and a presentation. Students may redraw from the examination during the first two weeks after the topic has been communicated.

Recommendation

- Knowledge of linear algebra is recommended
- Programming experience is helpful.

T

6.268 Course: Practical Course: Customized Embedded Processor Design [T-INFO-111457]**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105740 - Practical Course: Customized Embedded Processor Design](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	2

Exams			
ST 2023	7500203	Lab: Customized Embedded Processor Design	Henkel

T

6.269 Course: Practical Course: Data Science [T-INFO-111262]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [M-INFO-105632 - Practical Course: Data Science](#)

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	6	pass/fail	Each summer term	1


Exams			
ST 2023	7500091	Data Science - Laboratory Course	Böhm





T

6.270 Course: Practical Course: Data Science for Scientific Data [T-INFO-112844]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [M-INFO-106329 - Practical Course: Data Science for Scientific Data](#)

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	6	pass/fail	Irregular	1

Events					
ST 2023	242424	Data Science for Scientific Data	2 SWS	Practical course / 	Böhm
Exams					
ST 2023	75751	Practical Course: Data Science for Scientific Data			Böhm

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.271 Course: Practical Course: Database Systems [T-INFO-103201]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: [M-INFO-101662 - Practical Course: Database Systems](#)

Type
Completed coursework

Credits
4





Grading scale
pass/fail

Recurrence
Each winter term

Version
3

Events

WT 23/24	24286	Datenbankpraktikum	2 SWS	Practical course / 	Böhm, Richter
----------	-------	------------------------------------	-------	--	---------------



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.272 Course: Practical Course: Discrete Freeform Surfaces [T-INFO-103208]

Responsible: Prof. Dr. Hartmut Prautzsch**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101667 - Practical Course: Discrete Freeform Surfaces](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	1

Events					
ST 2023	24876	Praktikum Diskrete Freiformflächen	4 SWS	Practical course / 	Prautzsch, Xu
WT 23/24	2400059	Discrete freeform surfaces		Practical course / 	Prautzsch, Xu
Exams					
ST 2023	7500191	Practical Course Discrete Freeform Surfaces			Prautzsch

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Competence Certificate**

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO).

The overall impression is evaluated. Solutions to assignments and their presentations will be included in the grading. Implementations and their presentation

Prerequisites

None.



T





6.273 Course: Practical Course: General-Purpose Computation on Graphics Processing Units [T-INFO-109914]

Organisation: KIT Department of Informatics

Part of: [M-INFO-100724 - Practical Course: General-Purpose Computation on Graphics Processing Units](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	24911	Praktikum General-Purpose Computation on Graphics Processing Units	2 SWS	Practical course / 	Dereviannykh, Dolp
WT 23/24	24297	Praktikum General-Purpose Computation on Graphics Processing Units	2 SWS	Practical course / 	Dereviannykh, Grauer
Exams					
ST 2023	7500134	Practical Course: General-Purpose Computation on Graphics Processing Units			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Praktikum General-Purpose Computation on Graphics Processing Units

24911, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Practical course (P)
On-Site

Content



The kickoff meeting will be held on 19.04.2022 at 15:45 in 50.34 room 131.

T

6.274 Course: Practical Course: Geometric Modeling [T-INFO-103207]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101666 - Practical Course: Geometric Modeling](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
ST 2023	2400107	Praktikum Geometrisches Modellieren	2 SWS	Practical course / 	Xu, Prautzsch
WT 23/24	2400024	Geometric Modelling		Practical course / 	Prautzsch, Xu
Exams					
ST 2023	7500212	Practical course: Geometric Modeling			Prautzsch

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO).



The overall impression is evaluated. Solutions to assignments and their presentations will be included in the grading.

T

6.275 Course: Practical Course: Graphics and Game Development [T-INFO-110872]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105384 - Practical Course: Graphics and Game Development](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
ST 2023	24912	Praktikum Graphics and Game Development	4 SWS	Practical course / 	Dereviannykh, Dolp
WT 23/24	24287	Praktikum Graphics and Game Development	4 SWS	Practical course / 	Dereviannykh, Grauer
Exams					
ST 2023	7500135	Practical Course: Graphics and Game Development			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Recommendation**

Knowledge of basics or algorithms of computer graphics are recommended.

Below you will find excerpts from events related to this course:

V

Praktikum Graphics and Game Development24912, SS 2023, 4 SWS, Language: English, [Open in study portal](#)Practical course (P)
On-Site**Content**

The kickoff meeting will be held on 19.04.2022 at 15:45 in 50.34 room 131.

T

6.276 Course: Practical Course: Hot Research Topics in Computer Graphics [T-INFO-109577]**Responsible:** Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-104699 - Practical Course: Hot Research Topics in Computer Graphics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1


T





6.277 Course: Practical Course: Machine Learning and Intelligent Systems [T-INFO-112104]**Responsible:** Michael Fennel

Prof. Dr.-Ing. Uwe Hanebeck

Organisation: KIT Department of Informatics**Part of:** [M-INFO-105958 - Practical Course: Machine Learning and Intelligent Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	8	Grade to a third	Each term	1

Events					
ST 2023	24871	Practical Course Machine Learning and Intelligent Systems	4 SWS	Practical course / 	Hanebeck, Fennel
Exams					
ST 2023	7500050	Practical Course Machine Learning and Intelligent Systems			Hanebeck
WT 23/24	7500103	Practical Course Machine Learning and Intelligent Systems			Hanebeck

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.278 Course: Practical Course: Neural Network Exercises [T-INFO-106259]

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: [M-INFO-103143 - Practical Course: Neural Network Exercises](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

T

6.279 Course: Practical Course: Programme Verification [T-INFO-102953]**Responsible:** Prof. Dr. Bernhard Beckert**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101537 - Practical Course: Programme Verification](#)





Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Exams			
ST 2023	7500281	Practical Course: Programme Verification	Beckert
WT 23/24	7500260	Practical Course: Programme Verification	Beckert

T

6.280 Course: Practical Course: Scientific Data Management [T-INFO-112810]**Responsible:** Prof. Dr.-Ing. Klemens Böhm**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-106312 - Practical Course: Scientific Data Management](#)**Type**
Completed coursework**Credits**
4**Grading scale**
pass/fail**Recurrence**
Irregular**Version**
1**Events**

WT 23/24	2400212	Practical Course Scientific Data Management	2 SWS	Practical course / 	Böhm, Betsche
----------	---------	---	-------	--	---------------

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Modeled Conditions**

The following conditions have to be fulfilled:


1. The course [T-INFO-112689 - Practical Course: Graph Databases](#) must not have been started.




T

6.281 Course: Practical Course: Smart Data Analytics [T-INFO-106426]

Responsible: Prof. Dr.-Ing. Michael Beigl**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-103235 - Practical Course: Smart Data Analytics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events					
ST 2023	24895	Practical Course: Smart Data Analytics	4 SWS	Practical course / 	Beigl, Riedel, Zhou, Huang
Exams					
ST 2023	7500088	Practical Course: Smart Data Analytics			Beigl, Riedel



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.282 Course: Practical Course: Smart Energy System Lab [T-INFO-112030]

Responsible: Dr.-Ing. Simon Waczowicz**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105955 - Practical Course: Smart Energy System Lab](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
ST 2023	2400082	Laboratory: Smart Energy System Lab	4 SWS	Practical course / 	Hagenmeyer, Waczowicz, Süß, Turowski
WT 23/24	2400159	Laboratory: Smart Energy System Lab	4 SWS	Practical course / 	Hagenmeyer, Süß, Grafenhorst, Waczowicz
Exams					
ST 2023	7500318	Practical Course: Smart Energy System Lab			Hagenmeyer



Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled




T

6.283 Course: Practical Course: Visual Computing [T-INFO-103000]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher
Organisation: KIT Department of Informatics
Part of: [M-INFO-101567 - Practical Course: Visual Computing](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	4

Events					
ST 2023	24909	Praktikum GPU-Computing	4 SWS	Practical course / 	Dereviannykh, Dolp
WT 23/24	24283	Praktikum GPU-Computing	4 SWS	Practical course / 	Dereviannykh, Grauer
Exams					
ST 2023	7500125	Practical Course GPU-Computing	Dachsbacher		

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.284 Course: Practical Course: Web Applications and Service-Oriented Architectures (II) [T-INFO-103121]





Responsible: Prof. Dr. Sebastian Abeck

Organisation: KIT Department of Informatics

Part of: [M-INFO-101635 - Practical Course: Web Applications and Service-Oriented Architectures \(II\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2023	24873	Practical Course: Web Applications and Service-Oriented Architectures (II)	2 SWS	Practical course / 	Abeck, Schneider, Sanger, Throner
Exams					
ST 2023	7500139	Practical Course: Web Applications and Service-Oriented Architectures (II)			Abeck

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T 6.285 Course: Practical Introduction to Hardware Security [T-INFO-108920]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: [M-INFO-104357 - Practical Introduction to Hardware Security](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
ST 2023	2400009	Practical Introduction in Hardware Security (will not take place in SS 2023)	4 SWS	Lecture / Practice /	Tahoori
WT 23/24	2400033	Practical Introduction in Hardware Security	4 SWS	Lecture / Practice /	Gnad, Tahoori
Exams					
WT 23/24	7500226	Practical Introduction to Hardware Security			Tahoori

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO). 4 topics will be covered in this lecture. After each topic the student will receive an assignment. The quality of his tasks will be evaluated afterwards of its correctness.

Prerequisites

None.

Recommendation

Knowledge of Digital Design (lecture TI)

Practical Course “FPGA Programming”

Below you will find excerpts from events related to this course:

V Practical Introduction in Hardware Security (will not take place in SS 2023) Lecture / Practice (VÜ) On-Site
 2400009, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Content

4 SWS / 6 ECTS = 180h

1. Hardware security primitives (PUF, TRNG)
2. Hardware Implementation of encryption modules (AES)
3. Passive Attack with side channel (on AES)
4. Active fault attack (on simple circuits, if feasible also on AES)

Security is a major concern for a variety of domains like embedded and cyber-physical systems in which threats in hardware and software components may pose catastrophic consequences. Software security has been studied extensively, since the majority of security attacks were typically at the software level. However, currently hardware becomes the Achilles heel for on-chip system security as recent events show. There is evidence of hardware security breaches and hence, there is a growing emphasize in hardware security from academic, industry, and government sectors. In this regard, physical attacks, side-channel analysis and fault-injection attacks for security-enabled application domains is becoming a real-world challenge.

V Practical Introduction in Hardware Security Lecture / Practice (VÜ) On-Site
 2400033, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Content

4 SWS / 6 ECTS = 180h

Organizational issues

Ab 26.10.2023 - 1x wöchentlich donnerstags: Vorlesung von 14:00-15:30, im Anschluß Übung von 15:30-17:00, Geb. 07.21, Gebäudeteil B, 2.OG, Seminarraum B316.4

There are limited slots and the registration is handled in a first-come, first-served manner. So make sure you sign-up as early as possible. We can only consider registrations with the correct documents or from the online system (<https://campus.studium.kit.edu/exams/index.php>)

T

6.286 Course: Practical Project Robotics and Automation I (Software) [T-INFO-104545]

Responsible: Prof. Dr.-Ing. Björn Hein
Prof. Dr.-Ing. Thomas Längle

Organisation: KIT Department of Informatics

Part of: [M-INFO-102224 - Practical Project Robotics and Automation I \(Software\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
WT 23/24	24282	Project practical Robotics and Automation I (Software)	4 SWS	Practical course	Hein, Längle
Exams					
ST 2023	750003	Project practical Robotics and Automation I (Software)			Hein, Längle

T

6.287 Course: Practical Project Robotics and Automation II (Hardware) [T-INFO-104552]

Responsible: Prof. Dr.-Ing. Björn Hein
Prof. Dr.-Ing. Thomas Längle

Organisation: KIT Department of Informatics

Part of: [M-INFO-102230 - Practical Project Robotics and Automation II \(Hardware\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
WT 23/24	24290	Robotics and Automation II (Hardware)	4 SWS	Practical course	Hein, Längle
Exams					
ST 2023	750004	Project practical Robotics and Automation II (Hardware)			Hein, Längle

T

6.288 Course: Practical SAT Solving [T-INFO-105798]

Responsible: Dr. Tomas Balyo
 Dr. Markus Iser
 Prof. Dr. Peter Sanders
 Dominik Schreiber

Organisation: KIT Department of Informatics

Part of: [M-INFO-102825 - Practical SAT Solving](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	3

Events					
ST 2023	2400115	Practical SAT Solving	3 SWS	Lecture / Practice	Sanders, Iser, Schreiber, Balyo
Exams					
ST 2023	7500341	Practical SAT Solving			Sanders

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) usually lasting 30 minutes.

Prerequisites

none.

Recommendation

Relevant literature will be announced in the lecture.

**6.289 Course: Practical Seminar Digital Service Systems [T-WIWI-106563]**

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-102808 - Digital Service Systems in Industry](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Events					
ST 2023	2540554	Practical Seminar: Information Systems & Service Design (Master)	3 SWS	Lecture /	Mädche
WT 23/24	2540554	Practical Seminar: Information Systems & Service Design	3 SWS	Lecture /	Mädche
Exams					
ST 2023	7900293	Service Design Thinking			Satzger
ST 2023	7900301	Practical Seminar Service Innovation			Satzger
ST 2023	7900314	Practical Seminar Digital Service Systems			Satzger
WT 23/24	7900341	Practical Seminar: Information Systems and Service Design			Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

None

Annotation

New course title starting summer term 2017: "Practical Seminar Digital Service Systems".

The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.

Below you will find excerpts from events related to this course:

**Practical Seminar: Information Systems & Service Design (Master)**

2540554, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.

**Practical Seminar: Information Systems & Service Design**

2540554, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

T

6.290 Course: Practical Seminar: Advanced Analytics [T-WIWI-108765]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate

The assessment consists of practical work in the field of advanced analytics, a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

At least one module offered by the institute should have been chosen before attending this seminar.

Annotation

The course is held in English. The course is not offered regularly.

T

6.291 Course: Practical Seminar: Artificial Intelligence in Service Systems [T-WIWI-112152]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101506 - Service Analytics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2023	7900301	Practical Seminar Service Innovation	Satzger

Competence Certificate

The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites

None.

Recommendation

Knowledge in the field of Artificial Intelligence in Service Systems is assumed. Therefore, it is recommended to attend the course [Artificial Intelligence in Service Systems \[2595650\]](#) beforehand.

T

6.292 Course: Practical Seminar: Data-Driven Information Systems [T-WIWI-106207]

Responsible: Prof. Dr. Alexander Mädche
 Prof. Dr. Gerhard Satzger
 Prof. Dr. Thomas Setzer
 Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams				
ST 2023	7900165	Practical Seminar: Data Science for Industrial Applications	Satzger	

Competence Certificate

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

At least one module offered by the institute should have been chosen before attending this seminar.

Annotation

The course is held in english. The course is not offered regularly.

T



6.293 Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]





Responsible: Prof. Dr. Stefan Nickel

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-102805 - Service Operations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
ST 2023	2550498	Practical seminar: Health Care Management	3 SWS	Seminar / 	Nickel, Mitarbeiter
WT 23/24	2500008	Practical seminar: Health Care Management	3 SWS	Others / 	Nickel, Mitarbeiter
Exams					
ST 2023	7900312	Practical Seminar: Health Care Management (with Case Studies)			Nickel

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Due to a research semester of Professor Nickel in WS 19/20, the courses *Location Planning and Strategic SCM* and *Practice Seminar: Health Care Management* do NOT take place in WS 19/20. Please also refer to the information at <https://dol.iior.kit.edu/Lehrveranstaltungen.php> for further details.

The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

Prerequisites

None.

Recommendation

Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

Annotation

The credits have been reduced to 4,5 starting summer term 2016.

The lecture is offered every term.


The planned lectures and courses for the next three years are announced online.

T

6.294 Course: Practical Seminar: Information Systems and Service Design [T-WIWI-108437]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102806 - Service Innovation, Design & Engineering](#)
[M-WIWI-104068 - Information Systems in Organizations](#)
[M-WIWI-104080 - Designing Interactive Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
ST 2023	2540554	Practical Seminar: Information Systems & Service Design (Master)	3 SWS	Lecture / 	Mädche
Exams					
WT 23/24	7900341	Practical Seminar: Information Systems and Service Design			Mädche

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

Prerequisites

None.

Recommendation

Attending the course „Digital Service Design“ is recommended, but not mandatory.

Annotation

The course is held in English.

Below you will find excerpts from events related to this course:

V

Practical Seminar: Information Systems & Service Design (Master)

2540554, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.

T

6.295 Course: Practical Seminar: Service Innovation [T-WIWI-110887]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101410 - Business & Service Engineering](#)
[M-WIWI-102806 - Service Innovation, Design & Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2023	7900293	Service Design Thinking	Satzger
ST 2023	7900301	Practical Seminar Service Innovation	Satzger

Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites

None

Recommendation

Knowledge of Service Innovation Methods is assumed. Therefore it is recommended to attend the course Service Innovation [2540468] beforehand.

Annotation

Due to the project work, the number of participants is limited and participation requires knowledge about models, concepts and approaches that are taught in the Service Innovation lecture. Having taken the Service Innovation lecture or demonstrating equivalent knowledge is a prerequisite for participating in this Practical Seminar. Details for registration will be announced on the web pages for this course.

The seminar is not offered regularly.

T

6.296 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101453 - Applied Strategic Decisions](#)
[M-WIWI-101505 - Experimental Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites

None

Annotation

The course is given every second fall term, e.g., WS2017/18, WS2019/20, ...

The retake exam is given in the summer term subsequent to the fall term where the course (lecture and final exam) is given.

**6.297 Course: Predictive Modeling [T-WIWI-110868]**

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Events					
ST 2023	2521311	Predictive Modeling	2 SWS	Lecture /	Krüger, Eberl, Koster
ST 2023	2521312	Predictive Modeling (Tutorial)	2 SWS	Practice /	Koster, Eberl
Exams					
ST 2023	7900298	Predictive Modeling			Krüger
WT 23/24	7900014	Predictive Modeling			Krüger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment of this course is a written examination (90 minutes) according to §4(2), 1 of the examination regulation. A bonus can be acquired by successful completion of an assignment (written report + short in-class presentation) during the semester. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4).

Prerequisites

None

Below you will find excerpts from events related to this course:

**Predictive Modeling**

2521311, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content
Contents

This course presents methods for making and evaluating statistical predictions based on data. We consider various types of predictions (mean, probability, quantile, and full distribution), all of which are practically relevant. In each case, we discuss selected modeling approaches and their implementation using R software. We consider various economic case studies. Furthermore, we present methods for absolute evaluation (assessing whether a given model is compatible with the data) and relative evaluation (comparing the predictive performance of alternative models).

Learning objectives

Students have a good conceptual understanding of statistical prediction methods. They are able to implement these methods using statistical software, and can assess which method is suitable in a given situation.

Prerequisites

Students should know econometrics on the level of the course 'Applied Econometrics' [2520020]

Literature

- Elliott, G., und A. Timmermann (Hrsg.): "Handbook of Economic Forecasting", vol. 2A und 2B, 2013.
- Gneiting, T., und M. Katzfuss: "Probabilistic Forecasting", Annual Review of Statistics and Its Application 1, 125-151, 2014.
- Hastie, T., Tibshirani, R., and J. Friedman: "The Elements of Statistical Learning", 2. Ausgabe, Springer, 2009.
- Weitere Literatur wird in der Vorlesung bekanntgegeben.

**Predictive Modeling (Tutorial)**

2521312, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Practice (Ü)
On-Site

T


6.298 Course: Price Management [T-WIWI-105946]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr Paul Glenn

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101409 - Electronic Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2540529	Price Management	2 SWS	Lecture / 	Glenn
Exams					
ST 2023	7900139	Price Management			Geyer-Schulz
WT 23/24	7900170	Price Management (Nachklausur SS 2023)			Geyer-Schulz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Lecture and exam will not be offered in summer semester 2019. The next examination is in the summer semester 2020.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Annotation

The lecture is offered for the first time in summer term 2016.

Below you will find excerpts from events related to this course:

V

Price Management

2540529, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Organizational issues

Termine:

Samstags von 9:00 - 19:00 Uhr

29.04.2023 => (verschoben auf **06.05.2023**) - **Termin 1**

20.05.2023 => (verschoben auf **03.06.2023**) - **Termin 2**

17.06.2023 - Termin 3

08.07.2023 - Termin 4

Literature


- H. Simon and M. Fassnacht, *Preismanagement*, vol. 4. Wiesbaden: Springer Gabler, 2016.
- T. T. Nagle, J. E. Hogan, und J. Zalee, *The Strategy and Tactics of Pricing: A guide to growing more profitably*. New Jersey: Prentice Hall, 2010.





T

6.299 Course: Pricing [T-WIWI-102883]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-105312 - Marketing and Sales Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 23/24	2572199	Pricing	3 SWS	Block / 	Bill, Klarmann, Schröder

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment. The examination (and thus the grade) is composed of three parts:

1. The design and execution of your own small experimental study around the topic of behavioral pricing (as group work).
2. The processing and presentation of a case study on pricing (as group work).
3. The execution of a simulated price negotiation based on a systematic preparation (usually in teams of two).

Prerequisites

Since the earlier course (a) "Pricing Excellence" and (b) "Price Negotiations and Sales Presentations" become parts of the Pricing course, Pricing cannot be taken if (a) and/or (b) have already been completed.

Recommendation

Students are highly encouraged to actively participate in class.

Annotation

A small application is required for participation in this class. The application phase usually takes place at the beginning of the lecture period in the winter semester. More information on the application process will be made available on the Marketing and Sales Research Group website (marketing.iism.kit.edu) shortly before the start of the winter semester lecture period. This course is limited to 24 participants.

Below you will find excerpts from events related to this course:

V

Pricing

2572199, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Block (B)
On-Site

Content

At the Pricing lecture, students learn about current research and best practices in price management. Delivered in workshop format, the lecture has three key elements:

1. "Behavioral Pricing" workshop
In this part of the course, central concepts and findings from behavioral pricing research (e.g. price information processing, reference prices, price fairness and mental accounting) are presented and discussed on the basis of important behavioral theories (e.g. prospect theory and information economics). After a brief introduction to experimental research, participants will then conduct their own small experimental study in the form of group work on a hypothesis they have developed on pricing behavior, analyze the data, and present it.
2. "Pricing Excellence" workshop
In a theory section at the beginning of the course, students are taught theoretical principles of pricing. This includes an introduction to (1) pricing of product prices as well as (2) pricing of net customer prices (development of discount systems). Furthermore, theoretical basics of price enforcement and price monitoring are discussed. This will be followed by a practical application of what has been learned by working on a case study in small groups with a concluding presentation.
3. "Price Negotiation" workshop
After an introduction to key theories and concepts of negotiation, students prepare and then conduct a simulated price negotiation in small groups with guidance.

Learning Objectives:

Students...

- are familiar with central theories explaining behavioral phenomena regarding consumers dealing with prices
- are able to describe and explain central phenomena of behavioral science with regard to price behavior and derive implications from them
- can formulate their own hypotheses on price behavior and design, conduct and evaluate a suitable experimental study for this purpose
- learn theoretical basics of pricing behavior
- learn the theoretical basics of price enforcement and price monitoring
- apply the acquired knowledge in a practical case study
- know important conceptual basics on the subject of price negotiations
- can prepare and competently conduct price negotiations
- present the results of their group work in a concise and structured manner

All events will take place in presence with compulsory attendance at all dates.

Total time required for 4.5 credit points: approx. 135 hours

Attendance time: 30 hours

Self-study: 105 hours

Organizational issues

Dates will be announced.

T

6.300 Course: Principles of Automatic Speech Recognition [T-INFO-101384]**Responsible:** Prof. Dr. Alexander Waibel**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100847 - Principles of Automatic Speech Recognition](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Exams			
ST 2023	7500042	Principles of Automatic Speech Recognition	Waibel

T

6.301 Course: Probabilistic Time Series Forecasting Challenge [T-WIWI-111387]

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	2

Events					
WT 23/24	2500080	Probabilistic Time Series Forecasting Challenge	2 SWS	Practice / 📱	Bracher, Koster, Lerch
WT 23/24	2500081	Probabilistic Time Series Forecasting Challenge		Project / 🔄	Bracher, Koster, Lerch

Legend: 📱 Online, 🔄 Blended (On-Site/Online), 📍 On-Site, ✕ Cancelled

Competence Certificate

Alternative exam assessment. Necessary conditions to pass the course:

1. Weekly submission of statistical forecasts during the semester (excluding the Christmas break),
2. Submission of a final report (10-15 pages) at the end of the semester, describing the forecasting methods and their statistical evaluation.

Grading is based on the final report.

Prerequisites

Good methodological knowledge in statistics and data science.
 Good knowledge in applied data analysis, incl. programming skills in R, Python or similar.
 Knowledge of time series analysis is helpful, but not required.

Annotation

The course is limited in participation. Participants will be selected via the WIWI portal.

Below you will find excerpts from events related to this course:

V

Probabilistic Time Series Forecasting Challenge

2500081, WS 23/24, SWS, Language: English, [Open in study portal](#)

Project (PRO)
Blended (On-Site/Online)

Content

Statistical forecasts are relevant across all fields of society. In this data science project, students make, evaluate and communicate their own statistical forecasts in a real-time setting. We consider probabilistic forecasts that involve a measure of uncertainty in addition to a point forecast. Students are asked to make forecasts of several real-world time series (including weather variables and the DAX stock market index). Historical data on all series are available from public sources that are updated as time proceeds. While the time series differ from each other in important ways, statistical methods can meaningfully be used for prediction in all cases. We focus on quantile forecasts which are useful to measure forecast uncertainty in a relatively simple way.

Organizational issues**Short description**

In this data science project, students make and evaluate statistical forecasts in a realistic setup (involving real-time predictions and real-world time series data). A kick-off meeting will take place in mid October. During the semester, there will be a weekly meeting in which students and instructors discuss the current state of the forecasting challenge.

Prerequisites

Students should have a good working knowledge of statistics and data science, including proficiency in a programming language like R, Python, or Matlab. Knowledge of time series analysis is helpful but not strictly required. Motivation and curiosity are particularly important in this course format that requires regular, active participation over the whole semester.

Please note that the number of participants is limited due to the interactive course format. Application takes place via the Wiwi portal, where further information is available.

Examination rules

The project seminar counts for 4.5 credit points (Leistungspunkte). Examination is via an alternative exam assessment (§4(2), 3 SPO). Necessary conditions to pass the course: 1) Weekly submission of statistical forecasts during the semester (excluding the Christmas break), 2) Submission of a final report (10-15 pages) at the end of the semester, describing the forecasting methods and their statistical evaluation. Grading is based on the final report.

T


6.302 Course: Probability and Computing [T-INFO-113082]


Responsible: TT-Prof. Dr. Thomas Bläsius
Maximilian Katzmann
Prof. Dr. Peter Sanders

Organisation: KIT Department of Informatics

Part of: [M-INFO-106469 - Probability and Computing](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 23/24	2400153	Probability and Computing	3 SWS	Lecture / Practice / 	Bläsius, Katzmann, Sanders, Lehmann, Walzer

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Prerequisites

None.

Below you will find excerpts from events related to this course:

V

Probability and Computing

2400153, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

Randomized algorithms and data structures rely on random experiments. While the design of deterministic algorithms is often driven by a pessimistic view of worst-case behavior, randomized algorithms employ approaches that occasionally fail but perform much better most of the time.

The running time of such algorithms, as well as the solution quality (in the case of optimization problems) and sometimes correctness (in the case of computation problems), are subject to randomness. Therefore, a formal analysis focuses on expected values and success probabilities. We will explore both classical examples and current research topics in the areas of hashing and graph theory. Specialised design methods (such as probability amplification) and advanced analysis tools from probability theory (such as coupling, Poissonization, and concentration bounds) will be applied. We will often see that randomized approaches are more efficient or simpler than all (or at least all known) deterministic approaches.

We will briefly address, on the theory side, how randomized complexity classes relate to well-known classes such as P and NP and, on the practical side, how to implement randomized algorithms on common (essentially deterministic) computers using pseudo-randomness.

Competence Goals:

Students will be able to:


- understand when and why randomization is useful or necessary to solve an algorithmic problem,
- explain central design methods and analysis tools in the context of randomized algorithms,
- design and explain simple randomized algorithms and data structures to solve a given problem,
- determine which tools are suitable for analyzing a given randomized algorithm or data structure, and apply them.





T

6.303 Course: Product and Innovation Management [T-WIWI-109864]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101510 - Cross-Functional Management Accounting](#)
[M-WIWI-101514 - Innovation Economics](#)
[M-WIWI-105312 - Marketing and Sales Management](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2023	2571154	Product and Innovation Management	2 SWS	Lecture / 	Klarmann
Exams					
ST 2023	7900024	Product and Innovation Management			Klarmann
WT 23/24	7900055	Product and Innovation Management			Klarmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment of success takes place through a written exam with additional aids in the sense of an open book exam. Further details will be announced during the lecture.

Prerequisites

None

Annotation

Please note that Product and Innovation Management will not be offered again until summer semester 2026. The course will not take place in the summer semester 2024 and 2025.

For further information, please contact Marketing & Sales Research Group (marketing.ism.kit.edu).

Below you will find excerpts from events related to this course:

V

Product and Innovation Management

2571154, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

This course addresses topics around the management of new as well as existing products. After the foundations of product management, especially the product choice behavior of customers, students get to know in detail different steps of the innovation process. Another section regards the management of the existing product portfolio.

Students

- know the most important terms of the product and innovation concept
- understand the models of product choice behavior (e.g., the Markov model, the Luce model)
- are familiar with the basics of network theory (e.g. the Triadic Closure concept)
- know the central strategic concepts of innovation management (especially the market driving approach, pioneer and successor, Miles/Snow typology, blockbuster strategy)
- master the most important methods and sources of idea generation (e.g. open innovation, lead user method, crowdsourcing, creativity techniques, voice of the customer, innovation games, conjoint analysis, quality function deployment, online toolkits)
- are capable of defining and evaluating new product concepts and know the associated instruments like focus groups, product testing, speculative sales, test market simulation Assessor, electronic micro test market
- have advanced knowledge about market introduction (e.g. adoption and diffusion models Bass, Fourt/Woodlock, Mansfield)
- understand important connections of the innovation process (cluster formation, innovation culture, teams, stage-gate process)

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

Total effort for 3 credit points: approx. 90 hours

Presence time: 30 hours

Preparation and wrap-up of LV: 45.0 hours

Exam and exam preparation: 15.0 hours

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Literature



Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T

6.304 Course: Production and Logistics Management [T-WIWI-102632]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each summer term	1

Events					
ST 2023	2581954	Production and Logistics Management	2 SWS	Lecture / 	Schultmann, Rudi
ST 2023	2581955	Production and Logistics Management	2 SWS	Practice / 	Huster, Tremel
Exams					
ST 2023	7981954	Production and Logistics Management	Schultmann		

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Production and Logistics Management

2581954, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

This course covers central tasks and challenges of operative production and logistics management. Students get to know the set-up and mode of planning systems such as production planning and control systems, enterprise resource planning systems and advanced planning systems to cope with the accompanying planning tasks in supply chain management. Methods to solve these tasks from the field of operational research will be explored with respect to manufacturing program planning, material requirement planning, lot size problems and scheduling. Alongside to MRP II (Manufacturing Resources Planning), students will be introduced to integrated supply chain management approaches. Finally, commercially available planning systems will be presented and discussed.

Literature

Wird in der Veranstaltung bekannt gegeben.

**6.305 Course: Project Lab Cognitive Automobiles and Robots [T-WIWI-109985]**

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103356 - Machine Learning](#)
[M-WIWI-106491 - Project Lab Applied Machine Learning](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	3

Events					
WT 23/24	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course /	Zöllner, Daaboul

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

Prerequisites

None

Below you will find excerpts from events related to this course:

**Practical Course Cognitive automobiles and robots (Master)**

2512501, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content

The lab is intended as a practical supplement to courses such as "Machine Learning 1/2".

Scientific topics, mostly in the area of autonomous driving and robotics, will be addressed in joint work with ML/KI methods. The goal of the internship is for participants to design, develop, and evaluate ML Software system.

In addition to the scientific goals, such as the study and application of methods, the aspects of project-specific teamwork in research (from specification to presentation of results) are also worked on in this internship.

The individual projects require the analysis of the set task, selection of appropriate methods, specification and implementation and evaluation of the solution approach. Finally, the selected solution is to be documented and presented in a short lecture.

Learning Objectives:

- Students will be able to practically apply theoretical knowledge from lectures on machine learning to a selected area of current research.
- Students will be proficient in analyzing and solving thematic problems.
- Students will be able to evaluate, document, and present their concepts and results.

Recommendations:

- Theoretical knowledge of machine learning and/or AI.
- Python knowledge
- Initial experience with deep learning frameworks such as PyTorch/Jax/Tensorflow may be beneficial.

Workload:

The workload of 5 credit points consists of practical implementation of the selected solution, as well as time for literature research and planning/specification of the selected solution. In addition, a short report and presentation of the work performed will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.


Registration and further information can be found in the WiWi-portal.





T

6.306 Course: Project Lab Machine Learning [T-WIWI-109983]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103356 - Machine Learning](#)
[M-WIWI-106491 - Project Lab Applied Machine Learning](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2023	2512500	Project Lab Machine Learning	3 SWS	Practical course / 	Zöllner
Exams					
ST 2023	7900086	Project Lab Machine Learning	Zöllner		

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

Prerequisites

None

Below you will find excerpts from events related to this course:

V

Project Lab Machine Learning

2512500, SS 2023, 3 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content

The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:

The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

T

6.307 Course: Project Lab: Image Analysis and Fusion [T-INFO-104746]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: [M-INFO-102383 - Project Lab: Image Analysis and Fusion](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	1

Events					
WT 23/24	2424299	Project Lab: Image Analysis and Fusion	4 SWS	Practical course	Beyerer

Below you will find excerpts from events related to this course:

V

Project Lab: Image Analysis and Fusion2424299, WS 23/24, 4 SWS, [Open in study portal](#)**Practical course (P)****Organizational issues**

Die Erfolgskontrolle erfolgt durch Bewertung der Projektdokumentation sowie der Präsentation der Projektergebnisse als Erfolgskontrolle anderer Art nach § 4 Abs. 2 Nr. 3 der SPO.

Die Note setzt sich zusammen aus der Note der schriftlichen Ausarbeitung und den Präsentationen.

Das Projektpraktikum Bildauswertung und-fusion findet im Fraunhofer IOSB, Fraunhoferstr. 1, 76131 KA statt.

Treffpunkt ist im Foyer.

Die 4 offiziellen Pflichttermine sowie der Termin für die Abschlusspräsentation werden noch bekanntgegeben.

Der Anmeldezeitraum steht noch nicht fest, voraussichtlich November-Dezember 2023.

Weitere Infos folgen.

Literature**Empfehlungen:**

Hilfreich sind:

- Kenntnisse der Grundlagen der Stochastik und Signal- und Bildverarbeitung
- Kenntnisse der Vorlesungen Einführung in die Informationsfusion [IN4INEIF], Automatische Sichtprüfung und Bildverarbeitung [IN4INASB], Mustererkennung [IN4INME], Probabilistische Planung.

T

6.308 Course: Project Management [T-WIWI-103134]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581963	Project Management	2 SWS	Lecture / 🗣️	Schultmann, Volk
Exams					
ST 2023	7981963	Project Management			Schultmann

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Project Management

2581963, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

1. Introduction
2. Principles of Project Management
3. Project Scope Management
4. Time Management and Resource Scheduling
5. Cost Management
6. Quality Management
7. Risk Management
8. Stakeholder
9. Communication, Negotiation and Leadership
10. Project Controlling
11. Agile Project Management

Literature


Wird in der Veranstaltung bekannt gegeben.

T

6.309 Course: Public Management [T-WIWI-102740]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101504 - Collective Decision Making](#)
[M-WIWI-101511 - Advanced Topics in Public Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2561127	Public Management	3 SWS	Lecture / Practice / 	Wigger
Exams					
ST 2023	790puma	Public Management			Wigger
WT 23/24	790puma	Public Management			Wigger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites

None

Recommendation

Basic knowledge of Public Finance is required.

Below you will find excerpts from events related to this course:

V

Public Management

2561127, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Literature**Weiterführende Literatur:**

- Damkowski, W. und C. Precht (1995): Public Management; Kohlhammer
- Richter, R. und E.G. Furubotn (2003): Neue Institutionenökonomik; 3. Auflage, Mohr
- Schedler, K. und I. Proeller (2003): New Public Management; 2. Auflage; UTB
- Mueller, D.C. (2009): Public Choice III; Cambridge University Press
- Wigger, B.U. (2006): Grundzüge der Finanzwissenschaft; 2. Auflage; Springer

**6.310 Course: Public Revenues [T-WIWI-102739]**

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101511 - Advanced Topics in Public Finance](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2560120	Public Revenues	2 SWS	Lecture /	Wigger
ST 2023	2560121	Übung zu Öffentliche Einnahmen	1 SWS	Practice /	Wigger, Schmelzer
Exams					
ST 2023	790oeff	Public Revenues			Wigger
WT 23/24	790oeff	Public Revenues			Wigger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites

None

Recommendation

Basic knowledge of Public Finance is required.

Below you will find excerpts from events related to this course:

**Public Revenues**

2560120, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

The *Public Revenues* lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

Learning goals:

See German version.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature**Literatur:**

- Homburg, S.(2000): *Allgemeine Steuerlehre*, Vahlen
- Rosen, H.S.(1995): *Public Finance*; 4. Aufl., Irwin
- Wellisch, D.(2000): *Finanzwissenschaft I und Finanzwissenschaft III*, Vahlen
- Wigger, B. U.(2006): *Grundzüge der Finanzwissenschaft*; 2. Aufl., Springer

**6.311 Course: Quantitative Methods in Energy Economics [T-WIWI-107446]**

Responsible: Dr. Patrick Plötz
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101451 - Energy Economics and Energy Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3,5	Grade to a third	Each winter term	3

Events					
WT 23/24	2581007	Quantitative Methods in Energy Economics	2 SWS	Lecture /	Plötz
WT 23/24	2581008	Übungen zu Quantitative Methods in Energy Economics	1 SWS	Practice /	Plötz, Britto
Exams					
ST 2023	7981007	Quantitative Methods in Energy Economics	Fichtner		

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) exam (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

**Quantitative Methods in Energy Economics**

2581007, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Energy economics makes use of many quantitative methods in exploration and analysis of data as well as in simulations and modelling. This lecture course aims at introducing students of energy economics into the application of quantitative methods and techniques as taught in elementary courses to real problems in energy economics. The focus is mainly on regression, simulation, time series analysis and related statistical methods as applied in energy economics.

Learning Goals:

The student

- knows and understands selected quantitative methods of energy economics
- is able to use selected quantitative methods of energy economics
- understands they range of usage, limits and is autonomously able to adress new problems by them.

Literature

Wird in der Vorlesung bekannt gegeben.

T

6.312 Course: Rationale Splines [T-INFO-103544]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101857 - Rationale Splines](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	2

T

6.313 Course: Rationale Splines [T-INFO-103543]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101853 - Rationale Splines](#)


Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1





T

6.314 Course: Real-Time Systems [T-INFO-101340]

Responsible: Prof. Dr.-Ing. Thomas Längle
Organisation: KIT Department of Informatics
Part of: [M-INFO-100803 - Real-Time Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2023	24576	Real-Time Systems	4 SWS	Lecture / Practice / 	Längle, Ledermann
Exams					
ST 2023	750002	Real-Time Systems			Längle

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.315 Course: Recommender Systems [T-WIWI-102847]

Responsible: Prof. Dr. Andreas Geyer-Schulz**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-101410 - Business & Service Engineering](#)[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)[M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2540506	Recommender Systems	2 SWS	Lecture / 🗎	Geyer-Schulz
WT 23/24	2540507	Exercise Recommender Systems	1 SWS	Practice / 🗎	Geyer-Schulz, Nazemi
Exams					
ST 2023	7900138	Recommender Systems			Geyer-Schulz
WT 23/24	7900310	Recommender Systems (WS 2023/2024)			Geyer-Schulz

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Recommender Systems2540506, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)Lecture (V)
On-Site

Content

At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Learning objectives:

The student

- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Exam:

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from exercise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Literature

Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.

Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.

Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. *Journal of Marketing Research*, 37:363 – 375, Aug 2000.

Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. *American Economic Review*, 89(3):564 – 584, 1999.

Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. *Communications of the ACM*, 43(8):136 – 141, Aug 2000.

Richard O. Duda, Peter E. Hart, and David G. Stork. *Pattern Classification*. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints, volume 2356 of Lecture Notes in Artificial Intelligence LNAI, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. *JACM*, 46(5):604–632, sep 1999.

Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usenet News. *Communications of the ACM*, 40(3):77 – 87, Mar 1997.

Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.

Weiterführende Literatur:

Antoinette Alexander. The return of hardware: A necessary evil? *Accounting Technology*, 15(8):46 – 49, Sep 1999.

Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. *Communications of the ACM*, 40(3):88 – 89, Mar 1997.

Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. *Communications of the ACM*, 42(12):32 – 38, Dec 1999.

Thomas J. Blischok. Every transaction tells a story. *Chain Store Age Executive with Shopping Center Age*, 71(3):50–56, Mar 1995.

Hans Hermann Bock. *Automatische Klassifikation*. Vandenhoeck und Ruprecht, Göttingen, 1974.

Andrew S.C. Ehrenberg. *Repeat-Buying: Facts, Theory and Applications*. Charles Griffin & Company Ltd, London, 2 edition, 1988.

Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. *Marketing ZFP*, 24:47 – 55, 2002.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, *Data Analysis – Scientific Modeling and Practical Applications*, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. *International Journal of Engineering Education*, 17(2):153 – 163, 2001.

Mark-Edward Grey. *Recommendersysteme auf Basis linearer Regression*, 2004.

John A. Hartigan. *Clustering Algorithms*. John Wiley and Sons, New York, 1975.

Kevin Kelly. *New Rules for the New Economy: 10 Radical Strategies for a Connected World*. Viking, 1998.

Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, *E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France*, volume 2455 of Lecture Notes in Computer Science, pages 254–261, Berlin, Sep 2002. Springer-Verlag.

Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. *Data Mining and Knowledge Discovery*, 6:5 – 8, 2002.

G. S. Maddala. *Introduction to Econometrics*. John Wiley, Chichester, 3 edition, 2001.

Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? *Journal of Targeting, Measurement and Analysis for Marketing*, 10(4):304 – 313, Jan 2002.

Andreas Mild and Thomas Reutterer. An improved collaborative filtering approach for predicting cross-category purchases based on binary market basket data. *Journal of Retailing & Consumer Services*, 10(3):123–133, may 2003.

Paul Resnick and Hal R. Varian. Recommender Systems. *Communications of the ACM*, 40(3):56 – 58, Mar 1997.

Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences, pages 345 – 354, New York, 1998. ACM Press.

J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.

Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating "word of mouth". In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

T 6.316 Course: Reconfigurable and Adaptive Systems [T-INFO-101258]

Responsible: Prof. Dr.-Ing. Jörg Henkel
Organisation: KIT Department of Informatics
Part of: [M-INFO-100721 - Reconfigurable and Adaptive Systems](#)

Type Oral examination	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 1
---------------------------------	---------------------	--	---------------------------------------	---------------------

Events					
ST 2023	2424662	Reconfigurable and Adaptive Systems	2 SWS	Lecture / 🗣️	Bauer, Henkel
Exams					
ST 2023	7500201	VL: Reconfigurable and Adaptive Systems			Henkel

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✖ Canceled

Below you will find excerpts from events related to this course:

V

Reconfigurable and Adaptive Systems

2424662, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Overview:

The requirements regarding performance, flexibility and energy efficiency of today's embedded systems are increasing continuously and the market has to react faster than before to changing trends and developments (e.g. for smartphones, netbooks, etc.). Established approaches based on standard processors, application-specific circuits (ASICs) or application-specific processors (ASIPs) are no longer able to adequately meet all of the above criteria.

Reconfiguration is a technique that allows parts of the hardware circuits to be changed at runtime. This is achieved, for example, by field-programmable logic arrays (FPGAs) or ALU arrays that are integrated into the corresponding ICs. Reconfigurable adaptive systems use this potential to adapt dynamically to changing requirements. In addition, the reconfigurability of the hardware can be used in a targeted manner to improve the reliability / failure safety of the systems, as is already used today, for example, in radiation-polluted environments such as Mars probes or at CERN.

Organisation:

In summer term 2023 the lecture will take place in presence in -102. Details can be found in the ILAS course.

The lecture slides are in English, but the lecture language is German.

Exams:

Exam number: 7500201

For exam dates, please fill out the form on our website: <https://ces.itec.kit.edu/972.php>

The success control takes place in the form of an oral examination of usually 25-30 minutes according to § 4 Abs. 2 Nr. 2 SPO.

Learning objectives: The students

- learn the basics of reconfigurable systems.
- understand the different characterizations of reconfigurable systems and their effects on the potential for adaptivity.
- have an overview of the methods for managing adaptivity (runtime system).
- are able to design and use adaptive systems for a given problem by applying the conveyed characterizations and runtime systems.
- get access to current research topics.

Recommendations:

Knowledge of the basics from "Rechnerstrukturen" is helpful.

Knowledge of the basics from "Optimierung und Synthese Eingebetteter Systeme (ES1)" is helpful.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

T

6.317 Course: Regulation Theory and Practice [T-WIWI-102712]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101406 - Network Economics](#)
[M-WIWI-101451 - Energy Economics and Energy Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	see Annotations	2

Competence Certificate

The lecture is not offered for an indefinite period of time.

Result of success is made by a 20-30 minutes oral examination. Examination is offered every semester and can be retried at any regular examination date.

Prerequisites

None

Recommendation

Basic knowledge and skills of microeconomics from undergraduate studies (bachelor's degree) are expected.

Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture *Competition in Networks* [26240] is helpful in any case but not considered a formal precondition.

Annotation


The lecture is not offered for an indefinite period of time.

T

6.318 Course: Reliable Computing I [T-INFO-101387]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: [M-INFO-100850 - Reliable Computing I](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	24071	Reliable Computing I	2 SWS	Lecture / 	Tahoori
Exams					
ST 2023	7500027	Reliable Computing I			Tahoori
WT 23/24	7500167	Reliable Computing I			Tahoori

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Prerequisites

None.

Recommendation

Knowledge of Digital Design and Computer Architecture is helpful.

Below you will find excerpts from events related to this course:

V

Reliable Computing I

24071, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

**6.319 Course: Requirements Engineering [T-INFO-101300]**

Responsible: Prof. Dr.-Ing. Anne Kozirolek
Organisation: KIT Department of Informatics
Part of: [M-INFO-100763 - Requirements Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2023	2400050	Requirements Engineering	2 SWS	Lecture /	Kozirolek
Exams					
ST 2023	7500346	Requirements Engineering			Kozirolek
WT 23/24	7500040	Requirements Engineering			Kozirolek

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Recommendation

Das Modul Softwaretechnik II wird empfohlen.

Below you will find excerpts from events related to this course:

**Requirements Engineering**

2400050, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Having a good requirements specification is a critical prerequisite for any successful software project. This lecture gives an introduction to processes, methods and representation forms for specifying and managing requirements.

The topics include background and general overview, processes and methods for requirements elicitation, specification with natural language, object-oriented specification, use cases, UML, specification of quality requirements and constraints, as well as requirements validation and management.

General remarks: The lecture is held in English and all lecture material is in English. The lecture has been recorded and the recordings will be made available on the Ilias platform.

Literature

The lecture is based on slides and works by Martin Glinz, which is why there is no book that accompanies the lecture. Students are welcome to discuss differences between the lecture and the content of the course in class.

Main suggestion: Pohl, K. (2010). Requirements Engineering: Fundamentals, Principles, and Techniques. Springer Verlag. (will be available in library)


Further reading:


- I. Alexander, R. Stevens (2002). Writing Better Requirements. London: Addison-Wesley.
- A. Davis (2005). Just Enough Requirements Management. New York: Dorset House.
- D.C. Gause, G.M. Weinberg (1989). Exploring Requirements: Quality before Design. New York: Dorset House.
- M. Glinz (2013). A Glossary of Requirements Engineering Terminology, Version 1.5. International Requirements Engineering Board (IREB). Originally published in 2011. Available at <http://www.ireb.org> (check-out CPRE Glossary)
- E. Gottesdiener (2002). Requirements by Collaboration: Workshops for Defining Needs. Boston: Addison-Wesley.
- M.A. Jackson (1995). Software Requirements and Specifications: A Lexicon of Practice, Principles and Prejudices. Addison-Wesley (ACM Press books): Wokingham, etc.
- A. van Lamsweerde (2009). Requirements Engineering: From System Goals to UML Models to Software Specifications. Chichester: John Wiley & Sons.
- S. Robertson, J. Robertson (2006). Mastering the Requirements Process. 2nd edition. Boston: Addison-Wesley.
- K. Wiegers (2006). More About Software Requirements: Thorny Issues and Practical Advice. Redmond: Microsoft Press.

T

6.320 Course: Research Focus Class: Blockchain & Payment Channel Networks [T-INFO-111251]**Responsible:** Prof. Dr. Hannes Hartenstein**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105620 - Research Focus Class: Blockchain & Payment Channel Networks](#)

Type	Credits	Grading scale	Version
Completed coursework	3	pass/fail	1

Events					
ST 2023	2400041	Research Focus Class: Blockchain & Payment Channel Networks Lecture	1 SWS	Lecture / 	Droll, Hartenstein, Grundmann, Stengele
Exams					
ST 2023	7500304	Research Focus Class: Blockchain & Payment Channel Networks			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.321 Course: Research Focus Class: Blockchain & Payment Channel Networks - Seminar [T-INFO-111252]



Responsible: Prof. Dr. Hannes Hartenstein

Organisation: KIT Department of Informatics

Part of: [M-INFO-105620 - Research Focus Class: Blockchain & Payment Channel Networks](#)

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	1

Events					
ST 2023	2400039	Research Focus Class: Blockchain & Payment Channel Networks Seminar	2 SWS	Seminar / 	Droll, Hartenstein, Grundmann, Stengele
Exams					
ST 2023	7500302	Research Focus Class: Blockchain & Payment Channel Networks - Seminar			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.322 Course: Research Project (Project, 1st Semester) - Oral Exam [T-INFO-110218]

Responsible: Prof. Dr. Bernhard Beckert

Organisation: KIT Department of Informatics

Part of: [M-INFO-105037 - Research Project \(Project, 1st Semester\)](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	2


Events					
ST 2023	2400047	Research Project (Project, first semester)	6,5 SWS	/ ●	Beckert, Beigl, Reussner, Kirsten
Exams					
ST 2023	7500114	Research Project (Project, 1st Semester) - Oral Exam			Beckert, Beigl, Reussner
WT 23/24	7500079	Research Project (Project, 1st Semester) - Oral Exam			Beckert, Beigl, Reussner


Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

T

6.323 Course: Research Project (Project, 1st Semester) - Presentation [T-INFO-110219]**Responsible:** Prof. Dr. Bernhard Beckert**Organisation:** KIT Department of Informatics**Part of:** M-INFO-105037 - Research Project (Project, 1st Semester)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events				
ST 2023	2400047	Research Project (Project, first semester)	6,5 SWS	/  Beckert, Beigl, Reussner, Kirsten
Exams				
ST 2023	7500130	Research Project (Project, 1st Semester) - Presentation		Beckert, Beigl, Reussner
WT 23/24	7500080	Research Project (Project, 1st Semester) - Presentation		Beckert, Beigl, Reussner


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.324 Course: Research Project (Project, 1st Semester) - Project Proposal [T-INFO-110220]**Responsible:** Prof. Dr. Bernhard Beckert**Organisation:** KIT Department of Informatics**Part of:** M-INFO-105037 - Research Project (Project, 1st Semester)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	1

Events					
ST 2023	2400047	Research Project (Project, first semester)	6,5 SWS	/	Beckert, Beigl, Reussner, Kirsten
Exams					
ST 2023	7500131	Research Project (Project, 1st Semester) - Project Proposal			Beckert, Beigl, Reussner
WT 23/24	7500081	Research Project (Project, 1st Semester) - Written Exam			Beckert, Beigl, Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.325 Course: Research Project (Project, 2nd Semester) - Oral Exam [T-INFO-110221]

Responsible: Prof. Dr. Bernhard Beckert**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105038 - Research Project \(Project, 2nd Semester\)](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	2

Events					
ST 2023	2400053	Research Project (Project, second semester)	6,5 SWS	/ ●	Beckert, Beigl, Reussner, Kirsten
WT 23/24	2400070	Research Project (Project, second semester)	6,5 SWS	/ ●	Beckert, Beigl, Reussner, Kirsten
Exams					
ST 2023	7500126	Research Project (Project, 2nd Semester) - Oral Exam			Beckert, Beigl, Reussner
WT 23/24	7500171	Research Project (Project, 2nd Semester) - Oral Exam			Beckert, Beigl, Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T



6.326 Course: Research Project (Project, 2nd Semester) - Presentation [T-INFO-110222]





Responsible: Prof. Dr. Bernhard Beckert

Organisation: KIT Department of Informatics

Part of: M-INFO-105038 - Research Project (Project, 2nd Semester)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2400053	Research Project (Project, second semester)	6,5 SWS	/ 	Beckert, Beigl, Reussner, Kirsten
WT 23/24	2400070	Research Project (Project, second semester)	6,5 SWS	/ 	Beckert, Beigl, Reussner, Kirsten
Exams					
ST 2023	7500132	Research Project (Project, 2nd Semester) - Presentation			Beckert, Beigl, Reussner
WT 23/24	7500077	Research Project (Project, 2nd Semester) - Presentation			Beckert, Beigl, Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T



6.327 Course: Research Project (Project, 2nd Semester) - Scientific Report [T-INFO-110223]





Responsible: Prof. Dr. Bernhard Beckert

Organisation: KIT Department of Informatics

Part of: M-INFO-105038 - Research Project (Project, 2nd Semester)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	1

Events					
ST 2023	2400053	Research Project (Project, second semester)	6,5 SWS	/ 	Beckert, Beigl, Reussner, Kirsten
WT 23/24	2400070	Research Project (Project, second semester)	6,5 SWS	/ 	Beckert, Beigl, Reussner, Kirsten
Exams					
ST 2023	7500133	Research Project (Project, 2nd Semester) - Scientific Report			Beckert, Beigl, Reussner
WT 23/24	7500078	Research Project (Project, 2nd Semester) - Written Exam			Beckert, Beigl, Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.328 Course: Research Project Autonomous Learning Robots [T-INFO-110861]**

Responsible: Prof. Dr. Gerhard Neumann
Organisation: KIT Department of Informatics
Part of: [M-INFO-105378 - Research Project Autonomous Learning Robots](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events					
ST 2023	2400112	Research Laboratory Autonomous Learning Robots	4 SWS	Practical course /	Neumann
Exams					
ST 2023	7500274	Research Project Autonomous Learning Robots			Neumann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

- The discussed algorithms have to be implemented successfully.
- The experiments need to be conducted scientifically and need to be well documented.
- The final report is well written and well structured

Below you will find excerpts from events related to this course:

**Research Laboratory Autonomous Learning Robots**

2400112, SS 2023, 4 SWS, Language: German/English, [Open in study portal](#)

Practical course (P)
Blended (On-Site/Online)

Content**Inhalt**

Each student has to choose one of the offered topics from the area of robot learning / reinforcement learning / imitation learning or deep learning for robotics. The students will conduct a literature survey to acquire an understanding of the field and then implement one or several algorithms. The algorithms need to be evaluated against available baselines on standard benchmark tasks as well as on (custom-made) physically realistic simulations and/or a real robot platform. The experiments have to be documented in a report

Experience in Machine Learning is recommended

Organizational issues

Ein Rücktritt ist innerhalb von zwei Wochen nach Vergabe des Themas möglich.



Arbeitsaufwand 180h

T

6.329 Course: Responsible Artificial Intelligence [T-WIWI-111385]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103117 - Data Science: Data-Driven Information Systems](#)
[M-WIWI-103118 - Data Science: Data-Driven User Modeling](#)
[M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2545164	Responsible Artificial Intelligence	2 SWS	Lecture / 	Hoffmann, Miskiw
WT 23/24	2545165	Responsible Artificial Intelligence	1 SWS	Practice / 	Hoffmann, Miskiw

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The final grade is based on an examination of other type according to § 4 Par. 2 No. 3. It consists of

- The completion of an exercise including a short presentation (15 min)(max. 30 points)
- The completion of a case study including an oral exam (max. 60 points).

Further details are explained during the lecture.

Prerequisites


Prior to the start of the lecture, introductory materials will be provided for self-study. The lecture has a limitation of participants. Therefore, prior registration via the Wiwi-Portal is mandatory.

T

6.330 Course: Risk Management in Industrial Supply Networks [T-WIWI-102826]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2581992	Risk Management in Industrial Supply Networks	2 SWS	Lecture / 	Schultmann, Kaiser
Exams					
ST 2023	7981992	Risk Management in Industrial Supply Networks			Schultmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Risk Management in Industrial Supply Networks

2581992, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

Students learn methods and tools to manage risks in complex and dynamically evolving supply chain networks. Students learn the key terms and concepts of risk management and decision theory, in particular expected utility theory. Based on the theoretic prerequisites, students are able to determine and analyze risk diversification, risk pooling, insurance mechanisms and get an overview on statistical risk measures and real options. These approaches are adapted to analyze supply chain risks in a network context. In this manner, students gain knowledge in basic notions of network theory, network metrics and network-strategies for supply chain decisions.

- Introduction
- Risks in decisions under uncertainty: Expected Utility Theory & risk preferences
- The newsvendor model; multivariate risks and insurance
- Risk measures & evaluation techniques: Value-at-Risk, Conditional Value at Risk, Monte Carlo and Real Options
- Transparency in complex supply chains
- Network risk: network basics and criticality
- Risk in supply networks: empirical approaches and insights

Literature

Wird in der Veranstaltung bekannt gegeben.

T

6.331 Course: Roadmapping [T-WIWI-102853]

Responsible: Dr. Daniel Jeffrey Koch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)
[M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Competence Certificate

Non exam assessment (§4 (2), 3 SPO 2007) respectively alternative exam assessments (§4(2), 3 SPO).

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management is recommended.

Annotation


See German version.





T

6.332 Course: Robotics - Practical Course [T-INFO-105107]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: [M-INFO-102522 - Robotics - Practical Course](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	2

Events					
ST 2023	24870	Robotics - Practical Course	4 SWS	Practical course / 	Asfour
Exams					
ST 2023	7500261	Robotics - Practical Course			Asfour

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO). It is composed of several sub-tasks.

Prerequisites

Knowledge of the programming language C++ is required.

Recommendation

Attending the lectures Robotics I – Introduction to Robotics, Robotics II: Humanoid Robotics, Robotics III - Sensors and Perception in Robotics and Mechano-Informatics and Robotics is recommended.

Below you will find excerpts from events related to this course:

V

Robotics - Practical Course

24870, SS 2023, 4 SWS, Language: German, [Open in study portal](#)

**Practical course (P)
On-Site**

Content

The practical course is offered as an accompanying course to the lectures Robotics I-III. Every week, a small team of students will work on solving a given robotics problem. The list of topics includes robot modeling and simulation, inverse kinematics, robot programming via statecharts, collision-free motion planning, grasp planning, robot vision and robot learning.

Learning Objectives:

The student knows concrete solutions for different problems in robotics. He/she uses methods of inverse kinematics, grasp and motion planning, and visual perception. The student can implement solutions in the programming language C++ with the help of suitable software frameworks.

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer Prüfungsleistung anderer Art nach § 4 Abs. 2 Nr. 3 SPO und besteht aus mehreren Teilaufgaben.

Arbeitsaufwand: 180 h

Voraussetzungen: Kenntnisse in der Programmiersprache C++ werden vorausgesetzt.

Empfehlungen: Der Besuch der Vorlesungen *Robotik I – Einführung in die Robotik*, *Robotik II: Humanoide Robotik*, *Robotik III - Sensoren und Perception in der Robotik* sowie *Mechano-Informatik in der Robotik* wird empfohlen.


Attending the lectures *Robotics I – Introduction to Robotics*, *Robotics II: Humanoid Robotics*, *Robotics III - Sensors and Perception in Robotics* and *Mechano-Informatics and Robotics* is recommended.





Zielgruppe: **Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik**

T

6.333 Course: Robotics I - Introduction to Robotics [T-INFO-108014]

Responsible: Prof. Dr.-Ing. Tamim Asfour**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100893 - Robotics I - Introduction to Robotics](#)**Type**
Written examination**Credits**
6**Grading scale**
Grade to a third**Recurrence**
Each winter term**Version**
1

Events					
WT 23/24	2424152	Robotics I - Introduction to Robotics	3/1 SWS	Lecture / 	Asfour
Exams					
ST 2023	7500218	Robotik I - Einführung in die Robotik			Asfour
WT 23/24	7500106	Robotics I - Introduction to Robotics			Asfour

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled**Competence Certificate**

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites

none.

T 6.334 Course: Robotics II - Humanoid Robotics [T-INFO-105723]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: [M-INFO-102756 - Robotics II - Humanoid Robotics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	4

Events					
ST 2023	2400074	Robotics II: Humanoid Robotics	2 SWS	Lecture /	Asfour
Exams					
ST 2023	7500086	Robotics II: Humanoid Robotics			Asfour
WT 23/24	7500211	Robotics II: Humanoid Robotics			Asfour

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Recommendation

Attending the lectures Robotics I – Introduction to Robotics and Mechano-Informatics and Robotics is recommended.

Below you will find excerpts from events related to this course:

V

Robotics II: Humanoid Robotics

2400074, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture presents current work in the field of humanoid robotics that deals with the implementation of complex sensorimotor and cognitive abilities. In the individual topics different methods and algorithms, their advantages and disadvantages, as well as the current state of research are discussed.

The topics addressed are: Applications and real world examples of humanoid robots; biomechanical models of the human body, biologically inspired and data-driven methods of grasping, imitation learning and programming by demonstration; semantic representations of sensorimotor experience as well as cognitive software architectures of humanoid robots.

Learning Objectives:

The students have an overview of current research topics in autonomous learning robot systems using the example of humanoid robotics. They are able to classify and evaluate current developments in the field of cognitive humanoid robotics.

The students know the essential problems of humanoid robotics and are able to develop solutions on the basis of existing research.

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Arbeitsaufwand: 90 h

Empfehlungen: Der Besuch der Vorlesungen *Robotik I – Einführung in die Robotik* und *Mechano-Informatik in der Robotik* wird empfohlen

Zielgruppe: **Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik**

Literature

Weiterführende Literatur

Wissenschaftliche Veröffentlichungen zum Thema, werden auf der VL-Website bereitgestellt.

**6.335 Course: Robotics III - Sensors and Perception in Robotics [T-INFO-109931]**

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: [M-INFO-104897 - Robotics III - Sensors and Perception in Robotics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2023	2400067	Robotics III - Sensors and Perception in Robotics	2 SWS	Lecture /	Asfour
Exams					
ST 2023	7500242	Robotics III - Sensors and Perception in Robotics			Asfour
WT 23/24	7500207	Robotics III - Sensors and Perception in Robotics			Asfour

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites

none.

Recommendation

Attending the lecture Robotics I – Introduction to Robotics is recommended.

Below you will find excerpts from events related to this course:

**Robotics III - Sensors and Perception in Robotics**

2400067, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture supplements the lecture Robotics I with a broad overview of sensors used in robotics. The lecture focuses on visual perception, object recognition, simultaneous localization and mapping (SLAM) and semantic scene interpretation. The lecture is divided into two parts:

In the first part a comprehensive overview of current sensor technologies is given. A basic distinction is made between sensors for the perception of the environment (exteroceptive) and sensors for the perception of the internal state (proprioceptive).

The second part of the lecture concentrates on the use of exteroceptive sensors in robotics. The topics covered include tactile exploration and visual data processing, including advanced topics such as feature extraction, object localization, simultaneous localization and mapping (SLAM) and semantic scene interpretation.

Learning Objectives:

Students know the main sensor principles used in robotics and understand the data flow from physical measurement through digitization to the use of the recorded data for feature extraction, state estimation and environmental modeling.

Students are able to propose and justify suitable sensor concepts for common tasks in robotics.

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik

Empfehlungen: **Der Besuch der Vorlesung Robotik I – Einführung in die Robotik wird empfohlen**

Zielgruppe: Die Vorlesung richtet sich an Studierende der Informatik, der Elektrotechnik und des Maschinenbaus sowie an alle Interessenten an der Robotik.

Arbeitsaufwand: 90 h

Literature

Eine Foliensammlung wird im Laufe der Vorlesung angeboten.

Begleitende Literatur wird zu den einzelnen Themen in der Vorlesung bekannt gegeben.

T


6.336 Course: Scientific Methods to Design and Analyze Secure Decentralized Systems [T-INFO-111568]





Responsible: Prof. Dr. Hannes Hartenstein

Organisation: KIT Department of Informatics

Part of: [M-INFO-105780 - Scientific Methods to Design and Analyze Secure Decentralized Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 23/24	2400009	Scientific Methods to Design and Analyze Secure Decentralized Systems	3 SWS	Lecture / Practice / 	Hartenstein, Jacob
Exams					
WT 23/24	7500050	Scientific Methods to Design and Analyze Secure Decentralized Systems			Hartenstein

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Recommendation

Prior knowledge on the abstract concepts as well as concrete use cases of decentralized systems is strongly recommended. The “Decentralized Systems: Fundamentals, Modeling, and Applications” lecture covers all necessary aspects, but equivalent lectures and / or self-study can also be sufficient.

Below you will find excerpts from events related to this course:

V

Scientific Methods to Design and Analyze Secure Decentralized Systems

2400009, WS 23/24, 3 SWS, Language: English, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content**Content:**

Decentralized Systems (like peer-to-peer- or blockchain-based systems) are systems controlled by multiple parties who make their own independent decisions to reach a common goal. However, not knowing which parties are trustworthy and which are betrayers requires a radically different way of thinking. Based on the lecture “Decentralized Systems: Fundamentals, Modeling, and Applications”, in this lecture, we cover the necessary scientific methods to analyze existing and to create new decentralized systems. We treat both, selected empirical and formal methods and their tradeoffs, as well as the overarching philosophy of science behind the research process. Together with its practical parts, this lecture provides the foundational scientific toolbox to work on the decentralized systems of the future.

Competency Goals:

1. Philosophy of Science: The student understands epistemological principles like the scientific and mathematical process, within the context of networked and decentralized systems. The student knows about the current limits of scientific research, especially in regards to the security of a given decentralized system.
2. Empirical Methods: Observation / Monitoring: The student is able to construct setups to monitor system properties related to performance or security. The student knows how to observe a decentralized system like an overlay network without interference, i.e., without impact on the behavior to measure as well as the overall system functionality.
3. Combined Empirical / Formal Methods: The student has a fundamental understanding of Discrete Event Simulations, as well as stochastic modelling and random number generation. The student is able to conduct a simulation study consisting of observation, modelling, simulation, validation, and result analysis.
4. Formal Methods: The student knows how to apply formal methods like formal verification / model checking and model comparison / simulation-based proofs to decentralized systems. The student understands tradeoffs between empirical and formal methods, and can choose suitable methods for given research tasks.
5. Applications in Research: The student understands how the methods of this lecture are applied to practical examples, and knows how to apply the methods on problems of a researcher’s everyday life.

Workload

Lecture workload:

1. Attendance time (Course, exercise,): 3 SWS: 15 x 3h = 45h
2. Self-study (e.g. independent review of course material,

work on homework assignments)

Weeklypreparation and follow-up ofthelecture/exercise: 15 x 3 SWS x 1,5h = 67,5hh

3. Preparation for the exam: 37,5h

$\Sigma = 150h = 5$ ECTS

Competency certificate:

- The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Depending on the number of participants, it will be announced six weeks before the examination (§ 6 Abs. 3 SPO) whether the success control


- in the form of an oral examination pursuant to § 4 Abs. 2 Nr. 2 SPO or
- in the form of a written examination in accordance with § 4 Abs. 2 Nr. 1 SPO

takes place.

T

6.337 Course: Selected Legal Issues of Internet Law [T-INFO-108462]**Responsible:** N.N.**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101215 - Intellectual Property Law](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2023	24821	Selected legal issues of Internet law	2 SWS	Colloquium / 	Dreier
Exams					
ST 2023	7500099	Selected Legal Issues of Internet Law			Dreier, Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.338 Course: Semantic Web Technologies [T-WIWI-110848]**

Responsible: Dr.-Ing. Tobias Christof Käfer
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101455 - Web Data Management](#)
[M-WIWI-101456 - Intelligent Systems and Services](#)
[M-WIWI-105366 - Artificial Intelligence](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2511310	Semantic Web Technologies	2 SWS	Lecture /	Färber, Käfer, Braun
ST 2023	2511311	Exercises to Semantic Web Technologies	1 SWS	Practice /	Färber, Käfer
Exams					
ST 2023	79AIFB_SWebT_A4	Semantic Web Technologies (Registration until 17 July 2023)			Färber
WT 23/24	79AIFB_SWebT_A2	Semantic Web Technologies			Käfer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites

None

Recommendation

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required.

Below you will find excerpts from events related to this course:

**Semantic Web Technologies**

2511310, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals

Central concepts are the representation of knowledge in form of RDF and ontologies, the access via Linked Data, as well as querying the data by using SPARQL. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:

The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: *Semantic Web – Grundlagen*. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). *Handbook of Semantic Web Technologies*. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). *Handbook on Ontologies*. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. *Weaving the Web*. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. *Architecture of the World Wide Web, Volume One*. W3C Recommendation 15 December 2004. <http://www.w3.org/TR/webarch/>
- Dean Allemang. *Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL*. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. *Linked Data: Evolving the Web into a Global Data Space*. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.

**Exercises to Semantic Web Technologies**

2511311, SS 2023, 1 SWS, Language: English, [Open in study portal](#)

**Practice (Ü)
On-Site**

Content

The exercises are related to the lecture Semantic Web Technologies.

Multiple exercises are held that capture the topics, held in the lecture Semantic Web Technologies, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:

The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Organizational issues

Die Übungen finden im Rahmen der Termine der Blockvorlesung statt.

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web – Grundlagen. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. Weaving the Web. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. <http://www.w3.org/TR/webarch/>
- Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.




**6.339 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]****Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre**Organisation:** KIT Department of Economics and Management**Part of:** M-WIWI-102736 - Seminar Module Economic Sciences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2400121	Interactive Analytics Seminar	2 SWS	/ 📱	Beigl, Mädche
ST 2023	2500018	Successful transformation through innovation	2 SWS	Seminar / 🗣️	Busch
ST 2023	2500020	Digital Democracy - Challenges and opportunities of the digital society	2 SWS	Seminar / 🔄	Fegert
ST 2023	2500027	Design Seminar: Digital Citizen Science	2 SWS	Seminar	Mädche
ST 2023	2500125	Engineering Seminar: Human-Centered Systems	3 SWS	Seminar / 🔄	Mädche
ST 2023	2530580	Seminar in Finance (Master)	2 SWS	Seminar / 🗣️	Uhrig-Homburg, Müller, Thimme
ST 2023	2540472	Digital Citizen Science	2 SWS	Seminar	Weinhardt, Knierim, Mädche
ST 2023	2540475	Positive Information Systems	2 SWS	Seminar	Knierim, del Puppo, Bartholomeyczik
ST 2023	2540477	Digital Experience & Participation	2 SWS	Seminar	Peukert, Fegert
ST 2023	2540478	Smart Grid Economics & Energy Markets	2 SWS	Seminar	Henni, Semmelmann, Bluhm, Golla
ST 2023	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar	Geyer-Schulz
ST 2023	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar / 🔄	Mädche, Beigl
ST 2023	2540557	Research Seminar: Human-Centered Systems	3 SWS	Seminar / 🔄	Mädche
ST 2023	2545002	Entrepreneurship Research	2 SWS	Seminar / 🗣️	Terzidis
ST 2023	2550493	Hospital Management	2 SWS	Block / 📱	Hansis
ST 2023	2571180	Seminar in Marketing and Sales (Master)	2 SWS	Seminar / 🗣️	Klarmann, Mitarbeiter
ST 2023	2571182	Seminar "The Future of Marketing" (Master)	2 SWS	Seminar / 🗣️	Kupfer
ST 2023	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar / 🗣️	Nieken, Mitarbeiter, Gorny
ST 2023	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar / 🗣️	Nieken, Mitarbeiter, Walther
ST 2023	2579909	Seminar Management Accounting - Special Topics	2 SWS	Seminar / 🗣️	Wouters, Jaedeke, Kepl
ST 2023	2579910	Entrepreneurial Strategy and Financing of Start-Ups	2 SWS	Seminar / 🔄	Burkardt
ST 2023	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar / 🗣️	Letmathe
ST 2023	2581030	Seminar Energiewirtschaft IV	2 SWS	Seminar / 🗣️	Fichtner
ST 2023	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar / 🗣️	Volk, Schultmann
ST 2023	2581980	Seminar Energiewirtschaft II	2 SWS	Seminar / 🗣️	Kraft, Fichtner

WT 23/24	2500006	Digital Citizen Science	2 SWS	Seminar / 🎤	Woll, Bachert, Weinhardt, Volkamer, Mädche, Scheibehenne, Nieken, Szech
WT 23/24	2500125	Engineering Seminar: Human-Centered Systems	2 SWS	Seminar / 🧩	Mädche
WT 23/24	2530293		2 SWS	Seminar / 📱	Ruckes, Hoang, Benz, Luedecke, Silbereis, Wiegratz, Kohl
WT 23/24	2530586			Seminar / 🎤	Uhrig-Homburg, Eska, Molnar
WT 23/24	2540473	Business Data Analytics	2 SWS	Seminar / 🎤	Badewitz, Grote, Schulz, Motz
WT 23/24	2540475	Positive Information Systems	2 SWS	Seminar / 🎤	Knierim, del Puppo
WT 23/24	2540478	Smart Grids and Energy Markets	2 SWS	Seminar / 🎤	Weinhardt, Semmelmann, Miskiw
WT 23/24	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar / 🧩	Geyer-Schulz, Nazemi, Schweizer
WT 23/24	2540557	Research Seminar: Human-Centered Systems	2 SWS	Seminar / 🧩	Mädche
WT 23/24	2550493	Hospital Management	2 SWS	Block / 📱	Hansis
WT 23/24	2571181	Seminar Digital Marketing (Master)	2 SWS	Seminar / 🎤	Kupfer
WT 23/24	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar / 🎤	Nieken, Mitarbeiter
WT 23/24	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar / 🎤	Nieken, Mitarbeiter
WT 23/24	2579911	Seminar Management Accounting - Special Topics	2 SWS	Seminar / 🎤	Wouters, Dickemann, Letmathe
WT 23/24	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar / 🎤	Wouters, Dickemann
WT 23/24	2581030	Seminar in Energy Economics	2 SWS	Seminar / 🎤	Fichtner, Sloot
WT 23/24	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar / 🎤	Schultmann, Rudi
WT 23/24	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar / 🎤	Volk, Schultmann
WT 23/24	2581978	Seminar Produktionswirtschaft und Logistik III	2 SWS	Seminar / 🎤	Schultmann, Kaiser
WT 23/24	2581979	Seminar in Energy Economics	2 SWS	Seminar / 🎤	Fichtner, Kleinebrahm, Finck
WT 23/24	2581980	Seminar in Energy Economics	2 SWS	Seminar / 🎤	Fichtner
WT 23/24	2581981	Seminar in Energy Economics	2 SWS	Seminar / 🎤	Ardone, Fichtner
Exams					
ST 2023	00018	Seminar Digital Democracy – Challenges and Opportunities of the Digital Society			Weinhardt
ST 2023	7900008	Hospital Management			Nickel
ST 2023	7900019	Master Seminar in Data Science and Machine Learning			Geyer-Schulz
ST 2023	7900025	Successful Transformation Through Innovation			Busch
ST 2023	7900052	Entrepreneurship Research			Terzidis
ST 2023	7900093	Seminar in Business Administration A			Weinhardt
ST 2023	7900101	Seminar Human Resource Management (Master)			Nieken
ST 2023	7900127	Seminar in Finance (Master)			Uhrig-Homburg
ST 2023	7900165	Practical Seminar: Data Science for Industrial Applications			Satzger
ST 2023	7900166	Home Office Design Seminar: Digital Citizen Science			Mädche
ST 2023	7900167	Design Seminar: Digital Citizen Science			Mädche
ST 2023	7900180	Seminar in Business Administration			Weinhardt

ST 2023	7900190	Engineering Seminar: Human-Centered Systems	Mädche
ST 2023	7900214	Seminar Business Data Analytics	Weinhardt
ST 2023	7900231	Seminar Human Resources and Organizations (Master)	Nieken
ST 2023	7900233	Seminar in Marketing and Sales (Master)	Klarmann
ST 2023	7900238	Technology Assessment	Weissenberger-Eibl
ST 2023	7900240	Seminar "The Future of Marketing" (Master)	Kupfer
ST 2023	7900256	Seminar Positive Information Systems	Weinhardt
ST 2023	7900261	Research Seminar: Human-Centered Systems	Mädche
ST 2023	7900265	User-adaptive Systems Seminar	Mädche
ST 2023	7900284	Digital Transformation and Business Models	Weissenberger-Eibl
ST 2023	7900293	Service Design Thinking	Satzger
ST 2023	7900301	Practical Seminar Service Innovation	Satzger
ST 2023	7900328	Seminar - Basics and Concepts for Affordable Housing Using the Example of RoofKIT	Lützkendorf
ST 2023	7900372	Seminar Digital Citizen Science	Weinhardt
ST 2023	79-2579909-M	Seminar Management Accounting - Special Topics (Master)	Wouters
ST 2023	79-2579919-M	Seminar Management Accounting - Sustainability Topics (Master)	Wouters
ST 2023	792581030	Seminar Energy Economics IV	Fichtner
ST 2023	792581031	Seminar Energy Economics V	Plötz
ST 2023	7981976	Seminar in Production and Operations Management I	Schultmann
ST 2023	7981979	Seminar Energy Economics I	Fichtner
ST 2023	7981980	Seminar Energy Economics II	Fichtner
ST 2023	7981981	Seminar Energy Economics III	Fichtner
WT 23/24	7900069	Engineering Seminar: Human-Centered Systems	Mädche
WT 23/24	7900106	Hospital Management	Hansis
WT 23/24	7900163	Seminar Human Resource Management (Master)	Nieken
WT 23/24	7900164	Seminar Human Resources and Organizations (Master)	Nieken
WT 23/24	7900184	Seminar in Finance (Master)	Ruckes
WT 23/24	7900203	Seminar in Finance	Uhrig-Homburg
WT 23/24	7900233	Research Seminar: Human-Centered Systems	Mädche
WT 23/24	7900237	Case Studies Seminar: Innovation Management	Weissenberger-Eibl
WT 23/24	79-2579911-M	Seminar Management Accounting - Special Topics (Master) - Porsche	Wouters
WT 23/24	79-2579919-M	Seminar Management Accounting - Sustainability Topics (Master)	Wouters
WT 23/24	7981976	Seminar in Production and Operations Management I	Schultmann
WT 23/24	7981977	Seminar in Production and Operations Management II	Schultmann
WT 23/24	7981978	Seminar in Production and Operations Management III	Schultmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation

See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

**Interactive Analytics Seminar**

2400121, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Online**Content**

Providing new and innovative ways for interacting with data is becoming increasingly important. In this seminar, an interdisciplinary team of students engineers a running software prototype of an advanced interactive system leveraging state-of-the-art hardware and software focusing on an analytical use case. The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). This seminar follows an interdisciplinary approach. Students the fields of computer science, information systems and industrial engineering work together in teams.

Learning Objectives

- Explore and specify a data-driven interaction challenge
- Suggest and evaluate different design solutions for addressing the identified problem
- Build interactive analytics prototypes using advanced interaction concepts and pervasive computing technologies

Prerequisites

Strong analytic abilities and profound skills in SQL as wells as Python and/or R are required.

Literature

Further literature will be made available in the seminar.

Organizational issues

nach Vereinbarung

**Successful transformation through innovation**

2500018, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S)
On-Site****Content**

This seminar uses strategic innovation management theory and concepts such as organisational ambidexterity, boundary spanning and stakeholder approaches how companies can increase their innovative capacity through innovation. The students will use a core paper to illustrate the steps towards becoming an innovative organisation. The aim is to understand how -with the help of the concepts mentioned above - medium-sized companies, in the context of organisational inertia and path dependency, may become innovation-driven organisations. The seminar will analyse the role of different stakeholders, which role the different stakeholders play and how companies may become part of an innovation ecosystems. Based on the core paper, the students will apply the concepts they have learned to selected companies and present the results in class. In addition to a presentation, the students will submit the results in seminar papers.

Organizational issues

Weblink: https://itm.entechnon.kit.edu/192_1281.php

**Design Seminar: Digital Citizen Science**

2500027, SS 2023, 2 SWS, [Open in study portal](#)

Seminar (S)**Content**

TBA

**Master Seminar in Data Science and Machine Learning**

2540510, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)

**User-Adaptive Systems Seminar**2540553, SS 2023, 2 SWS, Language: English, [Open in study portal](#)**Seminar (S)**
Blended (On-Site/Online)**Content**

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school "KD2School: Designing Adaptive Systems for Economic Decisions" (<https://kd2school.info/>)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

**Research Seminar: Human-Centered Systems**2540557, SS 2023, 3 SWS, Language: English, [Open in study portal](#)**Seminar (S)**
Blended (On-Site/Online)

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group "Information Systems I" (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

**Entrepreneurship Research**

2545002, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content**Content**

The students independently develop a topic from entrepreneurship research in an international setting as a tandem with a partner. At first, there will be an introduction to the methodologies used such as systematic literature review, design science, qualitative and quantitative data analysis and more. As part of a written elaboration, the seminar topic must be presented scientifically on 15-20 pages. The results of the seminar paper will be presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives

As part of the written elaboration, the basics of independent scientific work (literature research, argumentation + discussion, citing literature sources, application of qualitative, quantitative and simulative methods) are trained. The skills acquired in the seminar are used to prepare for a potential master thesis. The course is therefore particularly aimed at students who want to write their thesis at the Chair for Entrepreneurship and Technology Management.

Organizational issues

The dates will be announced.

Registration is via the Wiwi-Portal.

Literature

Will be announced in the seminar.

**Hospital Management**

2550493, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Block (B)
Online

Content

The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals und relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

The assessment consists of attendance and a presentation or a case study.

Organizational issues

Das Seminar wird als Blockveranstaltung vom 08.05.-12.05. (jeweils 8-10:30 Uhr) stattfinden mit Eigenstudiumsphasen an den Nachmittagen. Zusätzlich wird eine Vorbesprechung am Freitag, 5. Mai um 16 Uhr stattfinden.

**Seminar Human Resource Management (Master)**

2573012, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h

Preparation of lecture: 45h

Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

**Seminar Human Resources and Organizations (Master)**

2573013, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h

Preparation of lecture: 45h

Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

**Seminar Management Accounting - Special Topics**

2579909, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:

- Maximum of 16 students.

Organizational issues

Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature

Will be announced in the course.

**Seminar Management Accounting - Sustainability Topics**

2579919, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:

- Maximum of 16 students.

Organizational issues

Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature

Will be announced in the course.



2530586, WS 23/24, SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

Within this seminar eLearning videos are produced to different topics out of the contents of our lectures. The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance. Through conduction of the video the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

The success is monitored by the development of an eLearning video and by the writing of a project report (according to §4(2), 3 SPO).

The overall grade is made up of these partial performances.

Recommendations:

Knowledge of the content of the modules *Essentials of Finance* [WW3BWLFBV1] (for bachelor students) and *F1 (Finance)* [WW4BWLFBV1] (for master students) is assumed.

The total workload for this course is approximately 90 hours. For further information see German version.

Organizational issues

Zwischenpräsentation am 11.12.23, 16 Uhr und Abschlusspräsentation am 23.01.24, 17:30 Uhr, beides am Campus B (Geb. 09.21), Raum 209

**Business Data Analytics**

2540473, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
On-Site

Content

wird auf deutsch und englisch gehalten

Organizational issues

Blockveranstaltung, siehe WWW

**Master Seminar in Data Science and Machine Learning**

2540510, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

**Hospital Management**

2550493, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Block (B)
Online

**Seminar Human Resource Management (Master)**

2573012, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h

Preparation of lecture: 45h

Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Blockveranstaltung siehe Homepage

**Seminar Human Resources and Organizations (Master)**

2573013, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h

Preparation of lecture: 45h

Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Blockveranstaltung siehe Homepage

**Seminar Management Accounting - Special Topics**

2579911, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscbed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 12 students.

Organizational issues

Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature

Will be announced in the course.

**Seminar Management Accounting - Sustainability Topics**

2579919, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscbed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 8 students.

Organizational issues

Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature

Will be announced in the course.

T

6.340 Course: Seminar in Economic Policy [T-WIWI-102789]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101514 - Innovation Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Exams			
ST 2023	7900051	Seminar in Economic Policy	Ott
WT 23/24	7900212	Seminar in Economic Policy	Ott

Competence Certificate

The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO).

The final grade is composed of the weighted scored examinations (Essay 50%, 40% oral presentation, active participation 10%).

Prerequisites

None

Recommendation

At least one of the lectures "Theory of Endogenous Growth" or "Innovation Theory and Policy" should be attended in advance, if possible.

**6.341 Course: Seminar in Economics A (Master) [T-WIWI-103478]****Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre**Organisation:** KIT Department of Economics and Management**Part of:** M-WIWI-102736 - Seminar Module Economic Sciences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2500004	Predictive Data Analytics - An Introduction to Statistical Machine Learning	2 SWS	Seminar /	Schienle, Lerch
ST 2023	2520367	Strategische Entscheidungen	2 SWS	Seminar /	Ehrhart
ST 2023	2520536	Seminar in Economic Theory II	2 SWS	Seminar /	Müller, Ammann, Kretz, Puppe
ST 2023	2520563	Wirtschaftstheoretisches Seminar III	2 SWS	Seminar /	Müller, Ammann, Kretz, Puppe
ST 2023	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Pavlova, Bracher
ST 2023	2560282	Seminar in economic policy	2 SWS	Seminar /	Ott, Assistenten
ST 2023	2560552	Shaping AI and Digitization for Society (Master)	2 SWS	Seminar /	Zhao
ST 2023	2560555	Bounded Rationality - Theory and Experiments (Bachelor)	2 SWS	Seminar /	Szech, Rau
ST 2023	2560557	Law and Economics (Master)	2 SWS	Seminar /	Okulicz
ST 2023	2560560	Co-Opetition: A practical perspective to game theory in the game of business (Bachelor & Master)	2 SWS	Seminar /	Rosar
WT 23/24	2500024	Wirtschaftstheoretisches Seminar IV (Master)	2 SWS	Seminar /	Puppe, Kretz, Ammann
WT 23/24	2500032	Disruption and the Digital Economy: Markets, Strategies, and Society (Master)	2 SWS	Seminar /	Rosar
WT 23/24	2500051	Die Herausforderungen der Mobilitätswende im urbanen Bereich - welche Beiträge kann das Serious Game "MobileCityGame" liefern?	2 SWS	Seminar	Szimba
WT 23/24	2520367	Strategische Entscheidungen		Seminar	Ehrhart
WT 23/24	2520405	Topics in Experimental Economics		Seminar /	Reiß, Peters
WT 23/24	2520500	Workshop on Economics, Finance and Statistics	2 SWS	Seminar	Puppe, Brumm, Nieken, Ott, Reiß, Ruckes, Schienle, Szech, Uhrig-Homburg, Wigger, Krüger
WT 23/24	2520563	Wirtschaftstheoretisches Seminar III (Master)	2 SWS	Seminar /	Puppe, Ammann, Kretz
WT 23/24	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Rüter
WT 23/24	2560130	Seminar Public Finance	2 SWS	Seminar /	Wigger, Setio, Schmelzer
WT 23/24	2560142	Lying and Cheating in Economic Experiments (Master)	2 SWS	Seminar /	Rau

WT 23/24	2560143	AI and Digitization for Society (Master)	2 SWS	Seminar / 🔄	Zhao
WT 23/24	2560282	Seminar in Economic Policy	2 SWS	Seminar / 🗎	Ott, Assistenten
WT 23/24	2560400	Seminar in Macroeconomics I	2 SWS	Seminar / 🔄	Brumm, Krause, Pegorari, Hußmann
WT 23/24	2560401	Seminar in Macroeconomics II	2 SWS	Seminar / 🔄	Brumm, Krause, Pegorari, Hußmann
WT 23/24	2561208	Selected aspects of European transport planning and -modelling	2 SWS	Seminar	Szimba
Exams					
ST 2023	7900051	Seminar in Economic Policy			Ott
ST 2023	7900059	Bounded Rationality - Theory and Experiments (Master)			Szech
ST 2023	7900131	Shaping AI and Digitization for Society (Master)			Szech
ST 2023	7900204	Predictive Data Analytics - An Introduction to Statistical Machine Learning			Lerch
ST 2023	7900205	Law and Economics (Master)			Szech
ST 2023	7900222	Co-Opetition (Bachelor & Master)			Szech
ST 2023	7900226	What's up Inflation? Recent Advances in Theory and Empirics			Brumm
ST 2023	7900228	Digitalization, AI, and the Future Economy			Brumm
ST 2023	7900260	Seminar: Capital in the Twenty-First Century			Puppe
ST 2023	7900266	Seminar: Market Design			Puppe
ST 2023	7900282	Digital IT-Solutions and Services Transforming the Field of Public Transportation			Mitusch
ST 2023	7900285	Strategic Decision (Master)			Ehrhart
ST 2023	79100003	Seminar Topics in Applied Microeconomics			Reiß
ST 2023	79100005	Seminar on Topics in Experimental Economics			Reiß
ST 2023	79sefi2	Seminar Public Finance A (Master)			Wigger
WT 23/24	7900212	Seminar in Economic Policy			Ott

Legend: 🗎 Online, 🔄 Blended (On-Site/Online), 🗎 On-Site, ✖ Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation

See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

V	Predictive Data Analytics - An Introduction to Statistical Machine Learning 2500004, SS 2023, 2 SWS, Language: German/English, Open in study portal	Seminar (S) Blended (On-Site/Online)
----------	---	---

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

**Advanced Topics in Econometrics**

2521310, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

**Shaping AI and Digitization for Society (Master)**

2560552, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Participation will be limited to 12 students.

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Econometrics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Blockveranstaltung:

Introductory Meeting April 19, 11.00 - 12.00 Uhr (online)

Seminar Presentations June 7, 2023, 14.00 - 18.30 Uhr (in person)

**Bounded Rationality - Theory and Experiments (Bachelor)**

2560555, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Econometrics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper + individual abstract (60%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Blockveranstaltung:

Introductory Meeting April 18 at 2pm (in person)

Seminar Presentations June 5 (in person)

**Law and Economics (Master)**

2560557, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Participation will be limited to 12 students.

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Blockveranstaltung

Kick-off 19.04.2023, 10.45 - 11.30 (online)

Presentations 26.05.2023, 14.00 - 18.30 Uhr



Co-Opetition: A practical perspective to game theory in the game of business (Bachelor & Master)

Seminar (S)
On-Site

2560560, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Content

Participation will be limited to 12 students.

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Blockseminar:

Kick-off 19.04.2023

Präsentation 22.05.2023, 14.00 - 18.30 Uhr, Geb. 10.50, Raum 604



Disruption and the Digital Economy: Markets, Strategies, and Society (Master)

Seminar (S)
On-Site

2500032, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Content

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering, Economathematics or Digital Economics.

Objective: The student investigates a market that was (or might be) disrupted from a strategic perspective. Students work in groups. For more information, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of microeconomics and game theory may be helpful.

Organizational issues

Application is possible via <https://portal.wiwi.kit.edu/Seminare>

Kick-off: 27.10.2023, 14.00 - 15.30 Uhr, Geb. 01.85, KD2Lab (1. OG über Außentreppe), Teamraum

Präsentationen: 15.01.2024 14.00 - 18.00 Uhr, Geb. 01.85, KD2Lab (1. OG über Außentreppe), Teamraum

**Topics in Experimental Economics**

2520405, WS 23/24, SWS, Language: English, [Open in study portal](#)

**Seminar (S)
Online**

Organizational issues

(im WS2021/22 online; sonst Blockseminar; Blücherstraße 17); Termine werden separat bekannt gegeben

Literature

Als Pflichtliteratur dienen ausgewählte Paper.

**Topics in Econometrics**

2521310, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

**Lying and Cheating in Economic Experiments (Master)**

2560142, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
Blended (On-Site/Online)**

Content

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Econometrics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Application is possible via <https://portal.wiwi.kit.edu/Seminare>

Kick-off: 24.10.23, 14.00 - 15.30 h, Geb. 01.85, KD2Lab (1. OG über Außentreppe), Teamraum

Präsentationen: 08.01.2024, 14.00 - 18.00 h, Geb. 01.85, KD2Lab (1. OG über Außentreppe), Teamraum

**AI and Digitization for Society (Master)**

2560143, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

**Seminar (S)
Blended (On-Site/Online)**

Content

For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Econometrics.

The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see <http://polit.econ.kit.edu> or <https://portal.wiwi.kit.edu/Seminare>

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Application is possible via <https://portal.wiwi.kit.edu/Seminare>

Kick-off: 25.10.2023, 11.00 - 12.00 (online)

Presentations: 12.01.2024, 14.00 - 18.00, Geb. 01.85, KD2Lab (1. OG über Außentreppe), Teamraum

**6.342 Course: Seminar in Informatics B (Master) [T-WIWI-103480]**

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: [M-INFO-102822 - Seminar Module Informatics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar / ☼	Oberweis, Forell, Frister, Fritsch, Rybinski, Schreiber, Schüler, Ullrich, Schiefer
ST 2023	2513309	Seminar Knowledge Discovery and Data Mining (Master)	3 SWS	Seminar / ●	Färber, Noullet, Saier, Popovic, Qu
ST 2023	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar / ●	Färber, Käfer, Kulbach, Thoma
ST 2023	2513317	Seminar Anwendungen von Semantic MediaWiki (Master)	3 SWS	Seminar / ●	Färber, Saier
ST 2023	2513319	Seminar Graph Representation Learning (Master)	3 SWS	Seminar / ●	Färber, Shao
ST 2023	2513403	Seminar Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar / ☼	Sunyaev, Toussaint, Brecker, Danylak
ST 2023	2513405	Seminar Emerging Trends in Digital Health (Master)	2 SWS	Seminar / ☼	Sunyaev, Toussaint, Brecker, Danylak
ST 2023	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar / 📱	Zöllner
WT 23/24	2400125	Security and Privacy Awareness	2 SWS	Seminar / ☼	Seidel-Saul, Volkamer, Boehm, Aldag, Veit
WT 23/24	2500044	Machine Learning on Graphs (Master)		Seminar / ●	Shao, Färber
WT 23/24	2513100	Seminar Data-driven Simulation for Industrial Systems (Master)	2 SWS	Seminar / ●	Lazarova-Molnar, Götz, Khodadadi
WT 23/24	2513313	Seminar Linked Data and the Semantic Web (Master)	3 SWS	Seminar / ●	Färber, Käfer, Braun
WT 23/24	2513314	Seminar Real-World Challenges in Data Science and Analytics (Bachelor)	3 SWS	/ ●	Färber, Höllig, Thoma
WT 23/24	2513315	Seminar Real-World Challenges in Data Science and Analytics (Master)	3 SWS	/ ●	Färber, Höllig, Thoma
WT 23/24	2513451	Seminar Cooperative Autonomous Vehicles (Master)	2 SWS	Seminar / ●	Vinel
WT 23/24	2513500	Seminar Cognitive Automobiles and Robots (Master)	2 SWS	Seminar / ☼	Zöllner, Daaboul
Exams					
ST 2023	7900031	Seminar Selected Issues in Critical Information Infrastructures (Master)			Sunyaev
ST 2023	7900088	Seminar Business Information Systems (Master)			Oberweis
ST 2023	7900128	Seminar Emerging Trends in Internet Technologies (Master)			Sunyaev
ST 2023	7900146	Seminar Emerging Trends in Digital Health (Master)			Sunyaev
ST 2023	7900147	Cognitive Automobiles and Robots			Zöllner
ST 2023	7900191	Seminar Applications of Semantic MediaWiki (Master)			Färber
ST 2023	7900198	Seminar Data Science & Real-time Big Data Analytics (Master)			Färber

ST 2023	7900202	Seminar Knowledge Discovery and Data Mining (Master)	Färber
ST 2023	7900203	Seminar Graph Representation Learning (Master)	Färber
ST 2023	7900330	Generative Language Models	Färber

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation

See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

Placeholder for seminars offered by the Institute AIFB.

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

	<p>Seminar Knowledge Discovery and Data Mining (Master) 2513309, SS 2023, 3 SWS, Language: English, Open in study portal</p>	<p>Seminar (S) On-Site</p>
--	---	--

Content

In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market
- Scientific Publications

Further Information: https://aifb.kit.edu/web/Lehre/Praktikum_Knowledge_Discovery_and_Data_Science

The exact dates and information for registration will be announced at the event page.

Organizational issues

Die Anmeldung erfolgt über das WiWi Portal <https://portal.wiwi.kit.edu/>.

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.

Literature

Detaillierte Referenzen werden zusammen mit den jeweiligen Themen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B. aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning
- McGraw Hill, Cook, D.J. and Holder, L.B. (Editors) Mining Graph Data, ISBN:0-471-73190-0
- Wiley, Manning, C. and Schütze, H.; Foundations of Statistical NLP, MIT Press, 1999.

	<p>Seminar Data Science & Real-time Big Data Analytics (Master) 2513311, SS 2023, 2 SWS, Language: English, Open in study portal</p>	<p>Seminar (S) On-Site</p>
--	---	--

Content

In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link:

<http://seminar-cep.fzi.de>

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues

Further information as well as the registration form can be found under the following link:

<http://seminar-cep.fzi.de>

Questions are answered via the e-mail address sem-ep@fzi.de.

**Seminar Graph Representation Learning (Master)**

2513319, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content

Graphs are a natural way to represent the information of objects and the topological relationship between them. They are the basis for various applications ranging from recommender systems, finance, social networks, and personal assistants (e.g., Alexa).

In this seminar, students will read, discuss, and work on graph algorithms based on scientific literature, including most recent methods for analyzing and creating large graphs (e.g., link prediction on knowledge graphs using graph neural networks), and methods for making the behavior of neural networks based on graphs explainable (e.g., generating text based on a subgraph).

**Cognitive Automobiles and Robots**

2513500, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Online

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

**Security and Privacy Awareness**

2400125, WS 23/24, 2 SWS, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Note: The link to enrol is for every student, regardless of the study background!

Dates:

- Kick-Off : 23.10.23 14:00 o'clock, Room 1C-03, building 5.20
- First version: 07.01.24
- Final version: 17.02.24
- Presentation: CW 12

Topics will be assigned after the kick-off.

Consider that legal-focused topics require you to speak and understand German legal texts.

Topics:

1: Literature review on reporting obligations / information security incidents (literature - seminar)

2: Privacy Awareness with electronic patient file

4: Ethical analysis of so-called attacker studies that gather security awareness data in public space.

5: Collecting data: The boundaries of consent

Further Topics TBA!

ATTENTION: The seminar is only for MASTER students!

**Machine Learning on Graphs (Master)**

2500044, WS 23/24, SWS, Language: English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

Graph representation learning deals with capturing and understanding the complex relationships and patterns inherent in graph-structured data. It focuses on developing techniques and algorithms to extract meaningful representations from graphs, enabling tasks such as node classification, link prediction, community detection, and graph generation.

This seminar will cover the fundamental concepts of graph representation learning, such as knowledge graphs, graph theory, and graph spectral theory. Additionally, you will have the chance to engage in collaborative reading of recent technical reports and research papers with your peers, encompassing machine learning algorithms pertaining to large language models, knowledge embedding, and social attribute prediction.

**Seminar Linked Data and the Semantic Web (Master)**

2513313, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

**Seminar (S)
On-Site**

Content

Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

**Seminar Real-World Challenges in Data Science and Analytics (Bachelor)**2513314, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

On-Site

Content

In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

**Seminar Real-World Challenges in Data Science and Analytics (Master)**2513315, WS 23/24, 3 SWS, Language: German/English, [Open in study portal](#)

On-Site

Content

In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

**Seminar Cognitive Automobiles and Robots (Master)**2513500, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)Seminar (S)
Blended (On-Site/Online)**Content**

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

**6.343 Course: Seminar in Information Systems (Master) [T-WIWI-109827]**

Responsible: Studiendekan der KIT-Fakultät für Informatik
Studiendekan des KIT-Studienganges

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-104815 - Seminar Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2500020	Digital Democracy - Challenges and opportunities of the digital society	2 SWS	Seminar /	Fegert
ST 2023	2500027	Design Seminar: Digital Citizen Science	2 SWS	Seminar	Mädche
ST 2023	2500125	Engineering Seminar: Human-Centered Systems	3 SWS	Seminar /	Mädche
ST 2023	2540472	Digital Citizen Science	2 SWS	Seminar	Weinhardt, Knierim, Mädche
ST 2023	2540475	Positive Information Systems	2 SWS	Seminar	Knierim, del Puppo, Bartholomeyczik
ST 2023	2540477	Digital Experience & Participation	2 SWS	Seminar	Peukert, Fegert
ST 2023	2540478	Smart Grid Economics & Energy Markets	2 SWS	Seminar	Henni, Semmelmann, Bluhm, Golla
ST 2023	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar	Geyer-Schulz
ST 2023	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar /	Mädche, Beigl
ST 2023	2540557	Research Seminar: Human-Centered Systems	3 SWS	Seminar /	Mädche
WT 23/24	2500006	Digital Citizen Science	2 SWS	Seminar /	Woll, Bachert, Weinhardt, Volkamer, Mädche, Scheibehenne, Nieken, Szech
WT 23/24	2500125	Engineering Seminar: Human-Centered Systems	2 SWS	Seminar /	Mädche
WT 23/24	2540473	Business Data Analytics	2 SWS	Seminar /	Badewitz, Grote, Schulz, Motz
WT 23/24	2540475	Positive Information Systems	2 SWS	Seminar /	Knierim, del Puppo
WT 23/24	2540478	Smart Grids and Energy Markets	2 SWS	Seminar /	Weinhardt, Semmelmann, Miskiw
WT 23/24	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar /	Geyer-Schulz, Nazemi, Schweizer
Exams					
ST 2023	00018	Seminar Digital Democracy – Challenges and Opportunities of the Digital Society			Weinhardt
ST 2023	7900019	Master Seminar in Data Science and Machine Learning			Geyer-Schulz
ST 2023	7900093	Seminar in Business Administration A			Weinhardt
ST 2023	7900165	Practical Seminar: Data Science for Industrial Applications			Satzger
ST 2023	7900166	Home Office Design Seminar: Digital Citizen Science			Mädche
ST 2023	7900167	Design Seminar: Digital Citizen Science			Mädche
ST 2023	7900180	Seminar in Business Administration			Weinhardt
ST 2023	7900190	Engineering Seminar: Human-Centered Systems			Mädche
ST 2023	7900214	Seminar Business Data Analytics			Weinhardt

ST 2023	7900256	Seminar Positive Information Systems	Weinhardt
ST 2023	7900261	Research Seminar: Human-Centered Systems	Mädche
ST 2023	7900265	User-adaptive Systems Seminar	Mädche
ST 2023	7900317	Seminar in Information Systems (Master) - Process Mining in Production	Satzger
ST 2023	7900323	Seminar in Information Systems (Master) - Comparing Post-Hoc Explanation Methods for Vision Transformers: A Practical Framework	Satzger
ST 2023	7900372	Seminar Digital Citizen Science	Weinhardt
WT 23/24	7900069	Engineering Seminar: Human-Centered Systems	Mädche
WT 23/24	7900233	Research Seminar: Human-Centered Systems	Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation

See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places for WIWI-seminars are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

Design Seminar: Digital Citizen Science

2500027, SS 2023, 2 SWS, [Open in study portal](#)

Seminar (S)

Content

TBA

Master Seminar in Data Science and Machine Learning

2540510, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)

User-Adaptive Systems Seminar

2540553, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school "KD2School: Designing Adaptive Systems for Economic Decisions" (<https://kd2school.info/>)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

**Research Seminar: Human-Centered Systems**

2540557, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group "Information Systems I" (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

**Business Data Analytics**

2540473, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
On-Site

Content

wird auf deutsch und englisch gehalten

Organizational issues

Blockveranstaltung, siehe WWW

**Master Seminar in Data Science and Machine Learning**

2540510, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

T

6.344 Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102736 - Seminar Module Economic Sciences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2550131	Seminar on Methodical Foundations of Operations Research (B)	2 SWS	Seminar / ●	Stein, Beck, Schwarze
ST 2023	2550132	Seminar on Mathematical Optimization (MA)	2 SWS	Seminar / ●	Stein, Beck, Schwarze
ST 2023	2550462	Seminar: Trending Topics in Machine Learning and Optimization (Master)	2 SWS	Seminar / ☼	Rebennack, Warwicker
ST 2023	2550473	Seminar: Energy and Power Systems Optimization (Master)	2 SWS	Seminar / ☼	Rebennack, Warwicker
ST 2023	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / ☼	Nickel, Mitarbeiter
WT 23/24	2550131	Seminar on Methodical Foundations of Operations Research (B)	2 SWS	Seminar / ●	Stein, Beck, Schwarze
WT 23/24	2550132	Seminar zur Mathematischen Optimierung (MA)	2 SWS	Seminar / ●	Stein, Beck, Schwarze
WT 23/24	2550462	Seminar on Trending Topics in Optimization and Machine Learning (Master)	2 SWS	Seminar / ☼	Rebennack, Warwicker
WT 23/24	2550473	Seminar on Energy and Power Systems Optimization (Master)	2 SWS	Seminar / ☼	Rebennack, Warwicker
WT 23/24	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / ☼	Nickel, Mitarbeiter
Exams					
ST 2023	7900026	Seminar Modern OR and Innovative Logistics			Nickel
ST 2023	7900200_SS2023	Seminar in Operations Research A (Master)			Stein
ST 2023	7900201_SS2023	Seminar in Operations Research (Bachelor)			Stein
ST 2023	7900267	Digitalization in the Steel Industry			Nickel
ST 2023	7900295	Seminar Trending Topics in Machine Learning and Opt. - Operations Research A (Master)			Rebennack
ST 2023	7900349	Seminar on Power Systems Optimization (Master)			Rebennack
WT 23/24	7900342	Seminar Modern OR and Innovative Logistics			Nickel

Legend: ☼ Online, ☼ Blended (On-Site/Online), ● On-Site, x Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation


See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

	Seminar on Methodical Foundations of Operations Research (B) 2550131, SS 2023, 2 SWS, Language: German, Open in study portal	Seminar (S) On-Site
---	--	--------------------------------------

Content

The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor students are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientific reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation. The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.


Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature

Die Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

	Seminar: Modern OR and Innovative Logistics 2550491, SS 2023, 2 SWS, Language: German, Open in study portal	Seminar (S) Blended (On-Site/Online)
---	---	---

Content

The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:

The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:

If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:

The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.


As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues

wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature

Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

	Seminar on Methodical Foundations of Operations Research (B) 2550131, WS 23/24, 2 SWS, Language: German, Open in study portal	Seminar (S) On-Site
---	---	--------------------------------------

Content

The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor student are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientific reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation. The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature

Die Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

**Seminar: Modern OR and Innovative Logistics**

2550491, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S)
Blended (On-Site/Online)**

Content

The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues

Anmeldezeitraum: 11.09.23 bis 30.09.23 im Wiwi Portal

Literature

Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

**6.345 Course: Seminar in Statistics A (Master) [T-WIWI-103483]**

Responsible: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-102736 - Seminar Module Economic Sciences](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2500004	Predictive Data Analytics - An Introduction to Statistical Machine Learning	2 SWS	Seminar /	Schienle, Lerch
ST 2023	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Pavlova, Bracher
ST 2023	2550561	Spezielle fortgeschrittene Themen der Datenanalyse und Statistik	2 SWS	Seminar /	Grothe, Kaplan, Kächele
WT 23/24	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Rüter
Exams					
ST 2023	00010	Seminar in Statistics A (Master)			Grothe
ST 2023	7900204	Predictive Data Analytics - An Introduction to Statistical Machine Learning			Lerch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites

None.

Recommendation

See seminar description in the course catalogue of the KIT (<https://campus.kit.edu/>)

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: <https://portal.wiwi.kit.edu>.

Below you will find excerpts from events related to this course:

**Predictive Data Analytics - An Introduction to Statistical Machine Learning**

2500004, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

**Advanced Topics in Econometrics**2521310, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

**Topics in Econometrics**2521310, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

**6.346 Course: Seminar Informatics A [T-INFO-104336]**

Responsible: Prof. Dr. Sebastian Abeck
Organisation: KIT Department of Informatics
Part of: M-INFO-102822 - Seminar Module Informatics

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	1

Events					
ST 2023	2400011	Hot Topics in Bioinformatics	2 SWS	Seminar / 🗣️	Stamatakis
ST 2023	2400072	Seminar: Service-oriented Architectures		Seminar / 🗣️	Abeck, Schneider, Sanger
ST 2023	2400137	Embedded Machine Learning		Seminar / 🗣️	Sikal, Pfeiffer, Balaskas, Khdr, Henkel
ST 2023	2400144	Can Statistics Prove Cause and Effect?	2 SWS	Seminar / 🗣️	Janzing
ST 2023	2400148	Embedded Security and Architectures		Seminar / 🗣️	Hussain, Nassar, Bauer, Khdr, Gonzalez, Henkel, Sikal
ST 2023	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / 🗣️	Hanebeck, Reith-Braun
ST 2023	2500125	Engineering Seminar: Human-Centered Systems	3 SWS	Seminar / 🗣️	Madche
ST 2023	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar / 🗣️	Madche, Beigl
ST 2023	2540557	Research Seminar: Human-Centered Systems	3 SWS	Seminar / 🗣️	Madche
WT 23/24	2400137	Embedded Machine Learning Seminar		Seminar / 🗣️	Sikal, Balaskas, Ahmed, Khdr, Demirdag, Henkel
WT 23/24	2400148	Embedded Security and Architectures		Seminar / 🗣️	Hussain, Nassar, Bauer, Khdr, Gonzalez, Sikal, Henkel
WT 23/24	2400210	Seminar: Critical topics in AI		Seminar / 🗣️	Friederich, Zhou, Reiser, Torresi, Neubert, Eberhard, Schloder
WT 23/24	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / 🗣️	Hanebeck, Reith-Braun
WT 23/24	24844	Seminar: Ubiquitous Systems	2 SWS	Seminar	Beigl, Zhou
WT 23/24	2500125	Engineering Seminar: Human-Centered Systems	2 SWS	Seminar / 🗣️	Madche
Exams					
ST 2023	7500013	Advanced Methods of Information Fusion			Hanebeck
ST 2023	7500014	Seminar: Hot Topics in Bioinformatics			Stamatakis
ST 2023	7500040	Seminar Information Systems			Bohm
ST 2023	7500106	Title not available			Bless, Hartenstein, Madche, Zitterbart, Boehm, Sunyaev
ST 2023	7500162	Seminar: Ubiquitous Systems			Beigl, Riedel
ST 2023	7500177	Seminar Hot Topics in Networking			Zitterbart
ST 2023	7500276	Seminar: Can Statistics Prove Cause and Effect?			Janzing
ST 2023	7500301	Seminar: Proofs from THE BOOK			Sanders
ST 2023	7500335	CES - Seminar: Machine Learning			Henkel

ST 2023	7500350	Seminar in Security	Geiselman, Müller-Quade
ST 2023	75104740	Seminar: Service-Oriented Architectures	Abeck
ST 2023	7900190	Engineering Seminar: Human-Centered Systems	Mädche
ST 2023	7900261	Research Seminar: Human-Centered Systems	Mädche
ST 2023	7900265	User-adaptive Systems Seminar	Mädche
WT 23/24	7500021	Advanced Methods of Information Fusion	Hanebeck
WT 23/24	7500311	Seminar: Critical topics in AI	Friederich
WT 23/24	7900069	Engineering Seminar: Human-Centered Systems	Mädche
WT 23/24	7900233	Research Seminar: Human-Centered Systems	Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

Hot Topics in Bioinformatics

2400011, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content

Prerequisites: CS Master's level seminar. Participants must have attended and passed the course on "Introduction to Bioinformatics for Computer Scientists" in one of the preceding winter terms.

Task: You will need to select papers to present, give a presentation and write a report.

This main seminar allows students to understand and present the contents of current papers in Bioinformatics such as published for instance in the journals *Bioinformatics*, *BMC Bioinformatics*, *Journal of Computational Biology* etc. or at conferences such as *ISMB* or *RECOMB*.

We will provide a list of interesting papers, but students can also propose papers they are interested in. Students may also chose to cover broader topics of more general interest such as multiple sequence alignment, Bayesian phylogenetic inference, read assembly etc.

Each student will be assigned a lab member for help with understanding the article and preparing the slides as well as the report.

Students should give a 35 minute presentation on their topic of choice and write a report (Seminararbeit) comprising 8 pages.

Goals: Participants are able to understand, critically assess, and compare current research papers in Bioinformatics. They are able to present algorithms and models from current research papers in oral and written form at a level that corresponds to that of scientific publications and conference presentations. Participants are able to suggest extension to current methods.

Credits: 3 ECTS

Organizational issues

IMPORTANT: Register for the seminar mailing list by sending an email to Alexandros.Stamatakis@h-its.org

Please also register for the seminar via the campus system.

All information on the seminar is provided at: [Seminar page](#).

We will start with a kick-off meeting in the first week of the summer term on Thursday April 20.

Seminar presentations will be conducted in a block toward the end of the semester - date and time to be determined.

Embedded Machine Learning

2400137, SS 2023, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Machine learning on on-chip systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) on a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest their own topics, but this is not required. The seminar can be held in English or German.

Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (eg, image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, eg, energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (eg, TPU) to improve its energy profile as well as performance.

Machine Learning methods for DNN compilation and mapping

Deep neural networks have achieved great success in challenging tasks such as image classification and object detection. There is a great demand for deploying these networks in different devices, ranging from cloud servers to embedded devices.

Mapping DNNs to these devices is a challenging task since each of these devices has different characteristics in terms of memory organization, compute units, etc. . There have been efforts to automate the process of mapping/compiling DNNs to hardware with different characteristics.

In this seminar, we will discuss the efforts that have been done in mapping/compiling DNNs over hardware using machine learning methods.

Organizational issues

Please register in ILIAS to participate.



Embedded Security and Architectures

2400148, SS 2023, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re)configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.

This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management

Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues

Please register in ILIAS to participate.



Advanced Methods of Information Fusion

24344, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
On-Site

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount of data. It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.



User-Adaptive Systems Seminar

2540553, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school "KD2School: Designing Adaptive Systems for Economic Decisions" (<https://kd2school.info/>)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

**Research Seminar: Human-Centered Systems**

2540557, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group "Information Systems I" (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

**Embedded Machine Learning Seminar**

2400137, WS 23/24, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Machine Learning on On-Chip Systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) to a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest own topics, but this is not required. The seminar can be held in English or German.

DNN Pruning and Quantization

As DNNs become more computationally hungry, their hardware implementation becomes more challenging, since embedded devices have limited resources. DNN compression techniques, such as pruning and quantization, can be applied for efficient utilization of computational resources. While pruning involves removing unimportant elements of a DNN structure (connections, filters, channels etc), quantization decreases the precision for representing DNN-related tensors (weights and activations). Both promise to trade-off some of the application's accuracy for limited energy consumption and reduced memory footprint. Students will review state-of-the-art research works on hardware-aware DNN pruning and quantization. The findings will be summarized in a seminar report and presented to the other members of the course.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

**Embedded Security and Architectures**2400148, WS 23/24, SWS, Language: German/English, [Open in study portal](#)**Seminar (S)**
Blended (On-Site/Online)**Content**

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re) configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.

This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management

Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues

Please register in ILIAS to participate.

**Advanced Methods of Information Fusion**24344, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)**Seminar (S)**
On-Site**Content**

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount data .It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

**6.347 Course: Seminar Informatics Master [T-INFO-111205]****Organisation:** KIT Department of Informatics**Part of:** M-INFO-102822 - Seminar Module Informatics

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	1

Events					
ST 2023	2400035	Seminar Image Analysis and Fusion	2 SWS	Seminar / ●	Beyerer
ST 2023	2400039	Research Focus Class: Blockchain & Payment Channel Networks Seminar	2 SWS	Seminar / ●	Droll, Hartenstein, Grundmann, Stengele
ST 2023	2400044	Seminar Cryptanalysis	2 SWS	Seminar / ●	Geiselmann, Müller-Quade, Tiepelt
ST 2023	2400084	Seminar: Robot Reinforcement Learning	2 SWS	Seminar / ☼	Neumann
ST 2023	2400085	Quantum Information Theory	2 SWS	Seminar / ☼	Müller-Quade, Tiepelt, Schwerdt, Ottenhues, Fruböse
ST 2023	2400089	Decentralized Systems: Fundamentals, Modeling, and Applications	4 SWS	Lecture / Practice / ●	Stengele, Hartenstein
ST 2023	2400136	Seminar: Interactive Learning	2 SWS	Seminar / ●	Lioutikov
ST 2023	2400137	Embedded Machine Learning		Seminar / ☼	Sikal, Pfeiffer, Balaskas, Khdr, Henkel
ST 2023	2400148	Embedded Security and Architectures		Seminar / ☼	Hussain, Nassar, Bauer, Khdr, Gonzalez, Henkel, Sikal
ST 2023	2400178	Maschinelles Lernen in den Klima- und Umweltwissenschaften	2 SWS	Seminar / ●	Nowack
ST 2023	2400181	Interpretability and Causality in Machine Learning	2 SWS	Seminar / ●	Stühmer
ST 2023	2400285	Seminar: Critical topics of Artificial Intelligence	2 SWS	Seminar / ●	Friederich, Nierling, Bareis
ST 2023	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / ●	Hanebeck, Reith-Braun
ST 2023	2500125	Engineering Seminar: Human-Centered Systems	3 SWS	Seminar / ☼	Mädche
ST 2023	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar / ☼	Mädche, Beigl
ST 2023	2540557	Research Seminar: Human-Centered Systems	3 SWS	Seminar / ☼	Mädche
WT 23/24	2400013	Seminar: Energy Informatics	2 SWS	Seminar / ●	Wagner, Hagenmeyer, Fichtner, Heidrich, Ueckerdt, Bläsius, Göttlicher, Yi
WT 23/24	2400047	Seminar Algorithmentchnik	2 SWS	Seminar / ●	Ueckerdt, Wilhelm, Feilhauer, Katzmann, Bläsius, Jungeblut, Merker, Sauer, Weyand, Göttlicher, Yi, von der Heydt, Zündorf, Goetze
WT 23/24	2400108	Continuous Software Engineering	2 SWS	Seminar	Koziolk

WT 23/24	2400126	Post-Quantum Cryptography	2 SWS	Seminar /	Ottenhues, Tiepelt, Müller-Quade, Coijanovic, Fruböse, Gröll, Beskorovajnov, Benz
WT 23/24	2400129	Seminar Digital Accessibility and Assisitive Technologies	2 SWS	Seminar /	Stiefelhagen, Schwarz
WT 23/24	2400137	Embedded Machine Learning Seminar		Seminar /	Sikal, Balaskas, Ahmed, Khdr, Demirdag, Henkel
WT 23/24	2400148	Embedded Security and Architectures		Seminar /	Hussain, Nassar, Bauer, Khdr, Gonzalez, Sikal, Henkel
WT 23/24	2400210	Seminar: Critical topics in AI		Seminar /	Friederich, Zhou, Reiser, Torresi, Neubert, Eberhard, Schlöder
WT 23/24	24344	Advanced Methods of Information Fusion	2 SWS	Seminar /	Hanebeck, Reith-Braun
WT 23/24	2500125	Engineering Seminar: Human-Centered Systems	2 SWS	Seminar /	Mädche
Exams					
ST 2023	7500013	Advanced Methods of Information Fusion			Hanebeck
ST 2023	7500108	Seminar: Advanced Algorithms in Computer Graphics			Dachsbacher
ST 2023	7500284	Decentralized Systems: Fundamentals, Modeling, and Applications			Hartenstein
ST 2023	7500285	Seminar: Critical topics of Artificial Intelligence			Friederich
ST 2023	7500302	Research Focus Class: Blockchain & Payment Channel Networks - Seminar			Hartenstein
ST 2023	7500319	Seminar: Interpretability and Causality in Machine Learning			Stühmer
ST 2023	7500335	CES - Seminar: Machine Learning			Henkel
WT 23/24	7500021	Advanced Methods of Information Fusion			Hanebeck

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

Seminar Image Analysis and Fusion 2400035, SS 2023, 2 SWS, Language: German, Open in study portal	Seminar (S) On-Site
---	--------------------------------------

Organizational issues

Termin und Ort der Einführungsveranstaltung werden vor Semesterbeginn auf der Webseite bekannt gegeben.

Findet - sofern Präsenz-Veranstaltung erlaubt - im Fraunhofer IOSB statt.

Decentralized Systems: Fundamentals, Modeling, and Applications 2400089, SS 2023, 4 SWS, Language: English, Open in study portal	Lecture / Practice (VÜ) On-Site
--	--

Content

Decentralized Systems (like blockchain-based systems) represent distributed systems that are controlled by multiple parties who make their own independent decisions. In this course, we cover fundamental theoretical aspects as well as up-to-date decentralized systems and connect theory with current practice. We thereby address fault tolerance, security & trust, as well as performance aspects at the example of applications like Bitcoin, Ethereum Smart Contracts, and Matrix.

The lecture covers the following topics:

- Fundamentals
 - Peer-to-Peer Overlay Networks, Sybil and Eclipse Attacks
 - Formalization of decentralized systems, including models for their computation, communication, faults, and timing.
 - Leader election and mutual exclusion in decentralized systems based on different models for node identities and timing.
 - Byzantine consensus in synchronous and asynchronous settings, including Bracha's fundamental algorithm for reliable broadcast, Practical Byzantine Fault Tolerant consensus, and the fundamental limits.
 - Consistency models and protocols, up to and including Conflict-Free Replicated Data Types.
- Applications
 - Matrix
 - Distributed Ledgers, Blockchain, and Bitcoin
 - Payment Channel Networks
 - Ethereum as a smart contract platform
 - Decentralized storage systems

Competency**Goals:**

1. Fundamentals & Modeling
 1. The student is able to recognize and distinguish distributed, federated, and decentralized systems.
 2. The student understands consensus, consistency and coordination within the context of networked and decentralized systems.
 3. The student understands the concept of Sybil attacks.
 4. The student is familiar with decentralized algorithms for leader election and mutual exclusion for execution contexts with various guarantees.
 5. The student understands the formally proven limits of fault tolerance and their underlying assumptions. This includes an understanding of synchronous and asynchronous network models which underpin the respective proofs. The student also understands several models for fault tolerance, notably silent and noisy crash as well as byzantine fault tolerance within the context of decentralized and distributed systems.
 6. The student has a basic understanding of state machine replication.
 7. The student knows various models for and levels of consistency.
2. Applications
 1. The student understands conflict-free replicated data types and their use in decentralized systems like Matrix.
 2. The student has a fundamental understanding of blockchain-based cryptocurrencies (e.g. Bitcoin/Ethereum), Payment Channels, and decentralized communication systems like Matrix.
 3. The student understands trust relations in distributed and decentralized systems and applications.
 4. The student is able to understand how the previously introduced theoretical foundations relate to networked and decentralized systems in practice.
 5. The student understands concepts of decentralized storage systems.

**Seminar: Interactive Learning**

2400136, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content

Arbeitsaufwand = 90 h = 3 ECTS

- Präsenzzeit: 15hr
- Selbststudium: 45h
- Scientific Report schreiben: 20h

Präsentation vorbereiten: 10h

Each student will select several related papers in the field of Interactive Learning. The organizers will suggest several papers but the students will be encouraged to identify and research additional relevant papers during the semester. The students will then prepare a presentation and a basic scientific research paper.

It is highly recommended to take this seminar in combination with the “Interactive Learning” Research Project (Forschungspraktikum), where the students get the chance to deepen their understanding, implement and evaluate their presented work.

We highly recommend to take this seminar in combination with the “Interactive Learning” research project (Forschungspraktikum).

It is highly recommended to attend the “Explainable Artificial Intelligence” lecture in parallel or prior to this seminar.

- Experience in Machine Learning is recommended, e.g. through prior coursework.
- The Computer Science Department offers several great lectures e.g., “Maschinelles Lernen - Grundlagen und Algorithmen” and “Deep Learning”
- A good mathematical background will be beneficial
- Python experience is recommended
- We might use the PyTorch deep learning library in the exercises. Some prior knowledge in this is helpful but not necessary.

Vortrag zum gewählten Thema am Ende des Semesters und schriftliche Ausarbeitung.

Ein Rücktritt ist innerhalb von zwei Wochen nach Vergabe des Themas möglich.

It is only possible to resign within two weeks after assignment of the topic

Organizational issues

[KIT-Fakultät für Informatik/1. Informatik Lehrveranstaltungen/1.7 Seminare](#)

**Embedded Machine Learning**

2400137, SS 2023, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Machine learning on on-chip systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) on a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest their own topics, but this is not required. The seminar can be held in English or German.

Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (eg, image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, eg, energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (eg, TPU) to improve its energy profile as well as performance.

Machine Learning methods for DNN compilation and mapping

Deep neural networks have achieved great success in challenging tasks such as image classification and object detection. There is a great demand for deploying these networks in different devices, ranging from cloud servers to embedded devices.

Mapping DNNs to these devices is a challenging task since each of these devices has different characteristics in terms of memory organization, compute units, etc. . There have been efforts to automate the process of mapping/compiling DNNs to hardware with different characteristics.

In this seminar, we will discuss the efforts that have been done in mapping/compiling DNNs over hardware using machine learning methods.

Organizational issues

Please register in ILIAS to participate.



Embedded Security and Architectures

2400148, SS 2023, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re)configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.

This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management

Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues

Please register in ILIAS to participate.



Advanced Methods of Information Fusion

24344, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
On-Site

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount of data. It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.



User-Adaptive Systems Seminar

2540553, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). It is offered as part of the DFG-funded graduate school "KD2School: Designing Adaptive Systems for Economic Decisions" (<https://kd2school.info/>)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

**Research Seminar: Human-Centered Systems**

2540557, SS 2023, 3 SWS, Language: English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group "Information Systems I" (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

**Continuous Software Engineering**

2400108, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)

Seminar (S)

Content

Modern software engineering happens in short cycles, which allow fast feedback. Technologies like build servers and containerization support fast, frequent and automated deployment of software to production systems and fast feedback to development (devops).

The term "continuous software engineering" combines different aspects of this intertwinement of different software engineering activities.

In this seminars, students will work on a topic in the context of continuous software engineering. Some of the addressed topics will be concerned with challenges when engineering systems with machine-learning components.

Literature

Fitzgerald, Brian, and Klaas-Jan Stol. "Continuous software engineering: A roadmap and agenda." Journal of Systems and Software 123 (2017): 176-189.

**Embedded Machine Learning Seminar**

2400137, WS 23/24, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Machine Learning on On-Chip Systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) to a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest own topics, but this is not required. The seminar can be held in English or German.

DNN Pruning and Quantization

As DNNs become more computationally hungry, their hardware implementation becomes more challenging, since embedded devices have limited resources. DNN compression techniques, such as pruning and quantization, can be applied for efficient utilization of computational resources. While pruning involves removing unimportant elements of a DNN structure (connections, filters, channels etc), quantization decreases the precision for representing DNN-related tensors (weights and activations). Both promise to trade-off some of the application's accuracy for limited energy consumption and reduced memory footprint. Students will review state-of-the-art research works on hardware-aware DNN pruning and quantization. The findings will be summarized in a seminar report and presented to the other members of the course.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

**Embedded Security and Architectures**

2400148, WS 23/24, SWS, Language: German/English, [Open in study portal](#)

Seminar (S)
Blended (On-Site/Online)

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re) configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.

This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management

Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues

Please register in ILIAS to participate.



Advanced Methods of Information Fusion

24344, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount of data. It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

T

6.348 Course: Seminar Laboratory: Machine Learning and Intelligent Systems [T-INFO-112105]


Responsible: Michael Fennel





Prof. Dr.-Ing. Uwe Hanebeck

Organisation: KIT Department of Informatics

Part of: [M-INFO-105959 - Seminar Laboratory: Machine Learning and Intelligent Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	24004	Seminar Laboratory Machine Learning and Intelligent Systems	2 SWS	Seminar / 	Hanebeck, Fennel
Exams					
ST 2023	7500049	Seminar Laboratory Machine Learning and Intelligent Systems			Hanebeck
WT 23/24	7500135	Seminar Laboratory Machine Learning and Intelligent Systems			Hanebeck

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.349 Course: Seminar: Commercial and Corporate Law in the IT Industry [T-INFO-111405]





Responsible: Dr. Georg Nolte

Organisation: KIT Department of Informatics

Part of: [M-INFO-101216 - Private Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	2400165	Seminar Commercial and Corporate Law in Information Technology	2 SWS	Seminar / 	Nolte
Exams					
WT 23/24	7500182	Seminar: Legal Studies II			Boehm, Raabe
WT 23/24	7500310	Seminar: Commercial and Corporate Law in the IT Industry			Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.350 Course: Seminar: IT- Security Law [T-INFO-111404]

Responsible: Martin Schallbruch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101217 - Public Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 23/24	24389	Seminar "IT-Sicherheitsrecht"	2 SWS	Seminar	Schallbruch
Exams					
WT 23/24	7500249	Seminar: IT- Security Law			Zufall

**6.351 Course: Seminar: Legal Studies I [T-INFO-101997]**

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: [M-INFO-101218 - Seminar Module Law](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2023	2400005	Governance, Risk & Compliance	2 SWS	Seminar /	Herzig, Siddiq
ST 2023	2400061	Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung	2 SWS	Seminar /	Bless, Boehm, Hartenstein, Madche, Volkamer, Zitterbart
ST 2023	2400078	Intelligente Chatbots und Recht	2 SWS	Seminar /	Raabe
ST 2023	2400149	„Vom Original zur Kopie und vom Analogen zum Digitalen“	2 SWS	Seminar /	Dreier
ST 2023	24820	Current Issues in Patent Law	2 SWS	Seminar /	Melullis
WT 23/24	2400060	Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection	2 SWS	Seminar /	Reussner, Raabe, Werner, Muller-Quade
WT 23/24	2400184	EU Digital Regulatory Framework	2 SWS	Seminar /	Zufall
WT 23/24	2400203	(Smart) City in and as a Network	2 SWS	Seminar /	Kasper
WT 23/24	2513214	Seminar Information security and Data protection (Bachelor)	2 SWS	Seminar /	Oberweis, Volkamer, Raabe, Schiefer, Hennig, Sterz, Veit, Ballreich, Mossano
Exams					
ST 2023	7500106	Title not available			Bless, Hartenstein, Madche, Zitterbart, Boehm, Sunyaev
ST 2023	7500140	Seminar: Legal Studies I			Dreier, Melullis, Matz
WT 23/24	7500035	Seminar: Legal Studies II			Zufall
WT 23/24	7500182	Seminar: Legal Studies II			Boehm, Raabe
WT 23/24	7500232	Seminar Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection			Reussner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung**

2400061, SS 2023, 2 SWS, [Open in study portal](#)

Seminar (S)
On-Site

Content

- Registration via <https://portal.wiwi.kit.edu/ys/5877>

Organizational issues
nach Vereinbarung

**EU Digital Regulatory Framework**

2400184, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content

This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act (proposal), the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact with each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a one-page report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 60 %, one-page report: 20 %, discussion: 20 %).

Organizational issues**WS 2023/24**

T

6.352 Course: Service Design Thinking [T-WIWI-102849]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101503 - Service Design Thinking](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	12	Grade to a third	Irregular	4

Events					
ST 2023	2595600	Service Design Thinking	2 SWS	Lecture / 🗣️	Satzger, Feldmann
WT 23/24	2595600	Service Design Thinking	2 SWS	Lecture / 🗣️	Satzger, Feldmann
Exams					
ST 2023	7900293	Service Design Thinking			Satzger
ST 2023	7900301	Practical Seminar Service Innovation			Satzger

Legend: 📺 Online, 🔄 Blended (On-Site/Online), 🗣️ On-Site, ✕ Cancelled

Competence Certificate

Alternative exam assessment.

Prerequisites

None

Recommendation

This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

Annotation

Due to practical project work as a component of the program, access is limited.

The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.

For more information on the application process and the program itself are provided in the module component description and the program's website (<http://sdt-karlsruhe.de>).

Furthermore, the KSRI conducts an information event for applicants every year in May.

This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.

Below you will find excerpts from events related to this course:

V

Service Design Thinking

2595600, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The Service Design Thinking course is more than a usual lecture. You will learn what it really takes to be an innovator. You will receive education in the human-centric innovation approach Design Thinking, work in small but interdisciplinary and international teams on real business challenges over the course of nine months (September to June). You will collaborate directly with mentors from a partner company as well as with fellow students from renowned universities from the SUGAR network, e.g. the University of St. Gallen, the Trinity College Dublin or the University of Science and Technology of China (USTC). Along the way, you will visit international destinations known for being innovation hotspots and will be on stage at innovation events that draw an audience of several hundred participants.

What students will learn:

- Deep knowledge of the innovation method "Design Thinking", as introduced and promoted by Stanford University.
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users.
- Know-how to use prototyping and experimentation to visualize one's ideas, to test and iteratively develop them, and to converge on a solution.
- Learn to apply the method to real innovation projects issued by industry partners.
- Communicate, work and present in an interdisciplinary and international project setting.

Course phases (roughly 4 weeks each):

- **Paper Bike:**
Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (internally known as Design Thinking network).
- **Design Space Exploration:**
Exploring the problem space through customer and user observation as well as desk research.
- **Critical Function Prototype:**
Identification of critical features from the customer's perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- **Dark Horse Prototype:**
Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are the focus of this phase.
- **Funky Prototype:**
Integration of the individually tested and successful functions to a complete solution, which is further tested and developed.
- **Functional Prototype:**
Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is laid out in detail and tested with users.
- **Final Prototype:**
Implementing the functional prototype and presenting it to the customer as well as the SUGAR network.

Literature

- Design Thinking: Das Handbuch; Falk Uebernickel, Walter Brenner, Therese Naef, Britta Pukall, Bernhard Schindlholzer
- The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems; Michael Lewrick, Patrick Link, Larry Leifer
- The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods; Michael Lewrick, Patrick Link, Larry Leifer
- Frame Innovation: Create New Thinking by Design (Design Thinking, Design Theory); Kees Dorst



Service Design Thinking

2595600, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The Service Design Thinking course is more than a usual lecture. You will learn what it really takes to be an innovator. You will receive education in the human-centric innovation approach Design Thinking, work in small but interdisciplinary and international teams on real business challenges over the course of nine months (September to June). You will collaborate directly with mentors from a partner company as well as with fellow students from renowned universities from the SUGAR network, e.g. the University of St. Gallen, the Trinity College Dublin or the University of Science and Technology of China (USTC). Along the way, you will visit international destinations known for being innovation hotspots and will be on stage at innovation events that draw an audience of several hundred participants.

What students will learn:

- Deep knowledge of the innovation method "Design Thinking", as introduced and promoted by Stanford University.
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users.
- Know-how to use prototyping and experimentation to visualize one's ideas, to test and iteratively develop them, and to converge on a solution.
- Learn to apply the method to real innovation projects issued by industry partners.
- Communicate, work and present in an interdisciplinary and international project setting.

Course phases (roughly 4 weeks each):

- **Paper Bike:**
Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (internally known as Design Thinking network).
- **Design Space Exploration:**
Exploring the problem space through customer and user observation as well as desk research.
- **Critical Function Prototype:**
Identification of critical features from the customer's perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- **Dark Horse Prototype:**
Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are the focus of this phase.
- **Funky Prototype:**
Integration of the individually tested and successful functions to a complete solution, which is further tested and developed.
- **Functional Prototype:**
Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is laid out in detail and tested with users.
- **Final Prototype:**
Implementing the functional prototype and presenting it to the customer as well as the SUGAR network.

Organizational issues

Bei der Vorlesung handelt es sich um eine zweisemestrige Veranstaltung, die jährlich im September startet.

Literature


- Design Thinking: Das Handbuch; Falk Uebernickel, Walter Brenner, Therese Naef, Britta Pukall, Bernhard Schindlholzer
- The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems; Michael Lewrick, Patrick Link, Larry Leifer
- The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods; Michael Lewrick, Patrick Link, Larry Leifer
- Frame Innovation: Create New Thinking by Design (Design Thinking, Design Theory); Kees Dorst

T

6.353 Course: Service Innovation [T-WIWI-102641]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-102808 - Digital Service Systems in Industry](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2595468	Digital Services: Innovation & Business Models	1.5 SWS	Lecture / 	Satzger, Benz, Schüritz
Exams					
ST 2023	7900113	Digital Services: Innovation & Business Models			Satzger
ST 2023	7900249	Service Innovation - oral exam			Satzger

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Note: From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

The assessment consists of a written exam (60 min.). A bonus can be acquired through successful participation in the exercise. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by one grade (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

None

Annotation

Starting with the summer semester 2023, the course Service Innovation will be called "Digital Services: Innovation & Business Models".

Below you will find excerpts from events related to this course:

V

Digital Services: Innovation & Business Models

2595468, SS 2023, 1.5 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Leveraging data and digital technologies for business success is a key challenge for organizations as they need to

- get aware of the newly arising potential
- develop suitable digital services that are user-centric and individualized
- "servitize" their offering portfolio and business model
- transform their organizations

This course will equip students with concepts and methods to tackle this challenge along two dimensions: First, we will cover innovation as a concept as well as apply contemporary innovation methods (like Design Thinking, Open Innovation) to the services space. Second, we deal with leveraging innovation to develop new business models (including multi-partner concepts in platforms or ecosystems), to servitize existing business models (e.g., via product-service-systems), and to accordingly transform the organization.

The course links innovation and business model theories with practical examples and exercises. Students are asked to actively engage in the discussion.

Organizational issues

The course will be offered in the form of a flipped classroom concept starting in summer semester 2023. The lecture will be recorded in advance and made available online. During the "in presence" sessions, the contents of the lecture will be applied and expanded on.

Literature


- Böhmman, T./ Leimeister, J.M./ Möslin, K. (2014), Service Systems Engineering, Business & Information Systems Engineering, Vol. 6, No.2, 73-79.
- Cardoso, J., Fromm, H., Nickel, S., Satzger, G., Studer, R., & Weinhardt, C. (Eds.) (2015). Fundamentals of service systems (Vol. 12). Heidelberg: Springer.
- Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. John Wiley & Sons.
- Rogers, S. (2003). Diffusion of Innovations. 5. ed. New York: Free Press.
- Satzger, G., Benz, C., Böhmman, T., Roth, A. (2022). Servitization and Digitalization as Siamese Twins – Concepts and Research Agenda. Edvardsson/Tronvoll (eds.): The Palgrave Handbook of Service Management, 967-989.
- Uebersnickel, F., Brenner, W., Pukall, B., Naef, T., & Schindlholzer, B. (2015). Design Thinking: Das Handbuch. Frankfurt am Main: Frankfurter Allgemeine Buch.
- Vargo, S.L., Lusch, R.F. (2017). Service-dominant logic 2025. Int. J. Res. Mark. 34, 46–67.
- Weill, P.; Woerner, S.L. (2018): "What's your Digital Business Model? – Six Questions to Help you Build the Next-Generation Enterprise". Boston, Massachusetts: Harvard Business Review Press.

T

6.354 Course: Signals and Codes [T-INFO-101360]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [M-INFO-100823 - Signals and Codes](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

Events					
WT 23/24	24137	Signals and Codes	2 SWS	Lecture / 	Geiselman, Müller-Quade
Exams					
ST 2023	7500179	Signals and Codes			Geiselman, Müller-Quade

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Signals and Codes

24137, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In this lecture, bounds for codes (Hamming, Gilbert-Varshamov, Singleton) are presented. Coding and decoding for classical algebraic codes (linear, cyclic, Reed Solomon-, Goppa- und Reed Muller-codes) will be presented as well as concatenated codes.

Literature

Shu Lin, Daniel Costello, 'Error Control Coding', 2nd Ed., Pearson Prentice Hall, 2004

Todd Moon, 'Error Correction Coding', Wiley, 2005

Weitere Literatur wird in der Vorlesung bekannt gegeben.

Weiterführende Literatur


Wird in der Vorlesung bekannt gegeben.





T

6.355 Course: Simulation Game in Energy Economics [T-WIWI-108016]

Responsible: Dr. Massimo Genoese
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101451 - Energy Economics and Energy Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3,5	Grade to a third	Each summer term	2

Events					
ST 2023	2581025	Simulation Game in Energy Economics	3 SWS	Lecture / Practice / 	Genoese, Zimmermann
Exams					
ST 2023	7981025	Simulation Game in Energy Economics			Fichtner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Examination as written assignment and oral presentation (§4 (2), 1 SPO).

Prerequisites

None

Recommendation

Visiting the course "Introduction to Energy Economics"

Annotation

The number of participants is limited.

There is a registration procedure via CAS followed by a selection of the participants.

Below you will find excerpts from events related to this course:

V

Simulation Game in Energy Economics

2581025, SS 2023, 3 SWS, Language: German, [Open in study portal](#)

Lecture / Practice (VÜ)
On-Site

Content

- Introduction
- Agents and market places in the electricity industry
- Selected planning tasks of energy service companies
- Methods of modelling in the energy sector
- Agent-based simulation: The PowerACE model
- Simulation game: Simulation in energy economics (electricity and emission trading, investment decisions)

The lecture is structured in a theoretical and a practical part. In the theoretical part, the students are taught the basics to carry out simulations themselves in the practical part which comprises amongst others the simulation of the power exchange. The participants of the simulation game take a role as a power trader in the power market. Based on various sources of information (e.g. prognosis of power prices, available power plants, fuel prices), they can launch bids in the power exchange.

Assessment: presentation and written summary

Prerequisites: Basics in Energy economics ad markets are advantageous.

Organizational issues

CIP-Pool West, Raum 102, Geb. 06.41 - siehe Institutsaushang

Literature

Weiterführende Literatur:

Möst, D. und Genoese, M. (2009): Market power in the German wholesale electricity market. The Journal of Energy Markets (47–74). Volume 2/Number 2, Summer 2009

**6.356 Course: Smart Energy Infrastructure [T-WIWI-107464]**

Responsible: Dr. Armin Ardone
Dr. Dr. Andrej Marko Pustisek

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101452 - Energy Economics and Technology](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	2

Events					
WT 23/24	2581023	(Smart) Energy Infrastructure	4 SWS	Lecture /	Ardone, Pustisek
Exams					
ST 2023	7981023	Smart Energy Infrastructure			Fichtner
WT 23/24	7900178	Smart Energy Infrastructure NEW			Fichtner
WT 23/24	7981023	Smart Energy Infrastructure			Fichtner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Below you will find excerpts from events related to this course:

**(Smart) Energy Infrastructure**

2581023, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture provides a techno-economic overview of different infrastructures of the energy system and their importance regarding the future energy system ("Energiewende") – in particular

- for electricity:
 - the supply side (e.g. power plants)
 - the demand side (e.g. load structures of appliances, flexibilities) as well as
 - transport infrastructures (electricity grids)
- for fuel transportation:
 - pipeline infrastructures (focus on natural gas)
 - shipping of LNG
 - crude oil and oil product transportation
 - hydrogen transportation
 - comparison of potential energy carriers for global trade of renewable energy (e.g., hydrogen and its derivatives, e-fuels, reactive metals)
- storage systems (e.g. batteries)

Additionally, the lecture provides a toolbox for energy system analysis such as an overview and classification of energy systems modelling approaches as well as the usage of scenario techniques for energy systems analysis.

The lecture also provides practical examples for the relevant methods presented.

Organizational issues

Blockveranstaltung

16.11., 17.11., 30.11., 01.12., 07.12., 08.12., 14.12., 15.12.

T

6.357 Course: Smart Grid Applications [T-WIWI-107504]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101446 - Market Engineering](#)
[M-WIWI-103720 - eEnergy: Markets, Services and Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	2

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites

None

Recommendation

None

Annotation

The lecture will no longer be offered from the coming winter semester 2023/24. It is only possible to take part in the main exam (first-time writer) and follow-up exam (repeater).

**6.358 Course: Social Choice Theory [T-WIWI-102859]**

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101500 - Microeconomic Theory](#)
[M-WIWI-101504 - Collective Decision Making](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2520537	Social Choice Theory	2 SWS	Lecture /	Puppe
ST 2023	2520539	Übung zu Social Choice Theory	1 SWS	Practice /	Müller, Puppe
Exams					
ST 2023	7900039	Social Choice Theory			Puppe
ST 2023	7900045	Social Choice Theory			Puppe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of an alternative exam assessment (open book exam). The exam takes place in every summer semester.

Prerequisites

None

Below you will find excerpts from events related to this course:

**Social Choice Theory**

2520537, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

How should (political) candidates be elected? What are good ways of merging individual judgments into collective judgments? Social Choice Theory is the systematic study and comparison of how groups and societies can come to collective decisions.

The course offers a rigorous and comprehensive treatment of judgment and preference aggregation as well as voting theory. It is divided into two parts. The first part deals with (general binary) aggregation theory and builds towards a general impossibility result that has the famous Arrow theorem as a corollary. The second part treats voting theory. Among other things, it includes proving the Gibbard-Satterthwaite theorem.

Literature

Main texts:

- Hervé Moulin: Axioms of Cooperative Decision Making, Cambridge University Press, 1988
- Christian List and Clemens Puppe: Judgement Aggregation. A survey, in: Handbook of rational & social choice, P.Anand,P.Pattanaik, C.Puppe (Eds.), Oxford University Press 2009.

Secondary texts:

- Amartya Sen: Collective Choice and Social Welfare, Holden-Day, 1970
- Wulf Gaertner: A Primer in Social Choice Theory, revised edition, Oxford University Press, 2009
- Wulf Gaertner: Domain Conditions in Social Choice Theory, Oxford University Press, 2001

T

6.359 Course: Sociotechnical Information Systems Development [T-WIWI-109249]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
ST 2023	2512400	Advanced Lab Development of Sociotechnical Information Systems (Bachelor)	3 SWS	Practical course /	Sunyaev, Pandl, Goram, Leiser
ST 2023	2512401	Advanced Lab Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course /	Sunyaev, Pandl, Goram, Leiser
Exams					
ST 2023	7900173	Advanced Lab Development of Sociotechnical Information Systems (Master)			Sunyaev

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The alternative exam assessment consists of an implementation and a final thesis documenting the development and use of the application.

Prerequisites

None.

Below you will find excerpts from events related to this course:

V

Advanced Lab Development of Sociotechnical Information Systems (Bachelor) Practical course (P)
 2512400, SS 2023, 3 SWS, Language: German/English, [Open in study portal](#) Online

Content

The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

V

Advanced Lab Development of Sociotechnical Information Systems (Master) Practical course (P)
 2512401, SS 2023, 3 SWS, Language: German/English, [Open in study portal](#) Online

Content


The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.





Registration information will be announced on the course page.

T

6.360 Course: Software Architecture and Quality [T-INFO-101381]

Responsible: Prof. Dr. Ralf Reussner**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100844 - Software Architecture and Quality](#)[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)**Type**
Oral examination**Credits**
3**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	24667	Software Architecture and Quality	2 SWS	Lecture / 	Reussner
Exams					
ST 2023	7500021	Software Architecture and Quality			Reussner
WT 23/24	7500032	Software Architecture and Quality			Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T


6.361 Course: Software Engineering II [T-INFO-101370]





Responsible: Prof. Dr.-Ing. Anne Koziolk
Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: [M-INFO-100833 - Software Engineering II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 23/24	24076	Software Engineering II	4 SWS	Lecture / 	Reussner
Exams					
ST 2023	7500207	Software Engineering II			Reussner
WT 23/24	7500054	Software Engineering II			Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Below you will find excerpts from events related to this course:

V

Software Engineering II

24076, WS 23/24, 4 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Literature

Craig Larman, Applying UML and Patterns, 3rd edition, Prentice Hall, 2004. Weitere Literaturhinweise werden in der Vorlesung gegeben.

T

6.362 Course: Software Lab Parallel Numerics [T-INFO-105988]

Responsible: Prof. Dr. Wolfgang Karl
Organisation: KIT Department of Informatics
Part of: [M-INFO-102998 - Software Lab Parallel Numerics](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	2

T

6.363 Course: Software Product Line Engineering [T-INFO-111017]

Responsible: Prof. Dr.-Ing. Ina Schaefer
Organisation: KIT Department of Informatics
Part of: [M-INFO-105471 - Software Product Line Engineering](#)

Type
Oral examination

Credits
3

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Exams			
ST 2023	7500280	Software Product Line Engineering	Reussner, Kühn
ST 2023	7500349	Software Product Line Engineering	Schaefer

**6.364 Course: Software Quality Management [T-WIWI-102895]**

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101477 - Development of Business Information Systems](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2023	2511208	Software Quality Management	2 SWS	Lecture /	Alpers
ST 2023	2511209	Übungen zu Software-Qualitätsmanagement	1 SWS	Practice /	Frister, Forell
Exams					
ST 2023	79AIFB_STQM_A5	Software Quality Management (Registration until 17 July 2023)			Oberweis
WT 23/24	79AIFB_STQM_C1	Software Quality Management			Oberweis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Prerequisites

None

Below you will find excerpts from events related to this course:

**Software Quality Management**

2511208, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Learning objectives:

Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the main models of software certification, compare and evaluate these models,
- write scientific theses in the area of software quality management and find own solutions for given problems.

Recommendations:

Programming knowledge in Java and basic knowledge of computer science are expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- Helmut Balzert: Lehrbuch der Software-Technik. Spektrum-Verlag 2008
- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002
- Mauro Pezzè, Michal Young: Software testen und analysieren. Oldenbourg Verlag 2009

Weitere Literatur wird in der Vorlesung bekanntgegeben.

T


6.365 Course: Software Security Engineering [T-INFO-112862]

Responsible: Dr. Christopher Gerking
Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: [M-INFO-106344 - Software Security Engineering](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	2400059	Software Security Engineering	2 SWS	Lecture / 	Gerking
Exams					
ST 2023	7500357	Software Security Engineering			Gerking
WT 23/24	7500093	Software Security Engineering			Gerking


Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled





T

6.366 Course: Software-Evolution [T-INFO-101256]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: [M-INFO-100719 - Software-Evolution](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 23/24	24164	Software Evolution	2 SWS	Lecture / 	Heinrich
Exams					
ST 2023	7500023	Software-Evolution			Reussner

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.367 Course: Spatial Economics [T-WIWI-103107]**Responsible:** Prof. Dr. Ingrid Ott**Organisation:** KIT Department of Economics and Management**Part of:** [M-WIWI-101485 - Transport Infrastructure Policy and Regional Development](#)
[M-WIWI-101496 - Growth and Agglomeration](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2561260	Spatial Economics	2 SWS	Lecture / 🗎	Ott
WT 23/24	2561261	Exercise for Spatial Economics	1 SWS	Practice / 🗎	Ott, Mirzoyan
Exams					
ST 2023	7900103	Spatial Economics			Ott
WT 23/24	7900075	Spatial Economics			Ott
WT 23/24	7900276	Spatial Economics			Ott

Legend: 🗎 Online, 🗎 Blended (On-Site/Online), 🗎 On-Site, ✕ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as an open-book examination, or as a 60-minute written examination.

Prerequisites

None

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses "Economics I" [2600012], and "Economics II" [2600014]. In addition, an interest in quantitative-mathematical modeling is required. The attendance of the course "Introduction to economic policy" [2560280] is recommended.

Annotation

Due to the research semester of Prof. Dr. Ingrid Ott, the course will not be offered in the winter semester 2021/22. The exam will take place. Preparation materials can be found in ILIAS.

Below you will find excerpts from events related to this course:

V

Spatial Economics2561260, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)Lecture (V)
On-Site

Content

The course covers the following topics:

- Geography, trade and development
- Geography and economic theory
- Core models of economic geography and empirical evidence
- Agglomeration, home market effect, and spatial wages
- Applications and extensions

Learning objectives:

The student

- analyses how spatial distribution of economic activity is determined.
- uses quantitative methods within the context of economic models.
- has basic knowledge of formal-analytic methods.
- understands the link between economic theory and its empirical applications.
- understands to what extent concentration processes result from agglomeration and dispersion forces.
- is able to determine theory based policy recommendations.

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. An interest in mathematical modeling is advantageous.

Workload:

The total workload for this course is approximately 135 hours.

- Classes: ca. 30 h
- Self-study: ca. 45 h
- Exam and exam preparation: ca. 60 h

Assessment:

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Literature

Steven Brakman, Harry Garretsen, Charles van Marrewijk (2009): The New Introduction to Geographical Economics, 2nd ed, Cambridge University Press.

Weitere Literatur wird in der Vorlesung bekanntgegeben.
(Further literature will be announced in the lecture.)

T

6.368 Course: Special Topics in Information Systems [T-WIWI-109940]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101410 - Business & Service Engineering](#)
[M-WIWI-101506 - Service Analytics](#)
[M-WIWI-103720 - eEnergy: Markets, Services and Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Exams			
ST 2023	00019	Implementation of a classification of Digital Involvement Projects (DIP) in a web-based application	Weinhardt
ST 2023	00032	Practical Seminar: Visualizing AI Predictions Using Metaverse Technology	Weinhardt
ST 2023	7900326	Special Topics in Information Systems	Weinhardt

Competence Certificate

The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

Prerequisites

see below

Recommendation

None

Annotation

All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in "Information Systems" so far. With this course students majoring in "Industrial Engineering and Management" and "Economics Engineering" also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T

6.369 Course: Startup Experience [T-WIWI-111561]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101488 - Entrepreneurship \(EnTechnon\)](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
ST 2023	2545004	Startup Experience	4 SWS	Seminar /	Finner, Manthey, Weimar, Terzidis
WT 23/24	2545004	Startup Experience	4 SWS	Seminar /	Weimar, Martjan, Terzidis
Exams					
ST 2023	7900186	Startup Experience			Terzidis
WT 23/24	7900186	Startup Experience			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative exam assessment. Details on the design of the examination performance of other types will be announced in the course. The grade is composed of a presentation and a written paper (plus any specified documentation, e.g. work results, experience diary, reflection).

Recommendation

Lecture Entrepreneurship already completed

Annotation

The language in the seminar is English. The seminar contents will be published on the chair homepage.

Below you will find excerpts from events related to this course:

V

Startup Experience

2545004, SS 2023, 4 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content**Content**

In the Startup Experience course, you develop entrepreneurial competences that enable you to develop a new venture. In an entrepreneurial project, you have three main goals:

1. Identify and develop an opportunity. Who is your target customer and what problem or task does he or she have? How attractive and how big is this market?
2. How will you provide value for them? How can you use specific resources, including technology to develop a solution?
3. How can you conceive and set up a viable organization? Which business model do you suggest to create, deliver, and capture value?

After the teams are formed, a teambuilding session follows so that the team members get to know each other better and establish the cornerstones for working together. In this way, they create a basis for their joint project.

The focus of the seminar is on technology-based venturing. In this context, we will use the TAS (Technology-Application-Selection) approach developed at the EnTechnon. By default, we start from KIT patents (but you can also 'bring with you' other new technologies). We analyze the technology and use creativity techniques to find potential applications. Among other approaches, we will systematically explore applications around the UN sustainable development goals. Prototyping, business model development, and pitching are part of the seminar.

Learning Objectives

You will be able to explore deep technology venturing opportunities and create new products and services. The pedagogical approach is that of action learning. In a team, you will experience typical challenges and processes related to setting up a new business and develop the corresponding entrepreneurial competences.

After completing this course, the course participants will be able to:

- Characterize the core process of Deep Tech Venturing,
- Work effectively in a cohesive team,
- Use a technology characterization canvas to extract the core characteristics of a technology,
- Apply creativity techniques to ideate potential applications,
- Use utility analysis approaches to select a promising technology application,
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method,
- Use approaches of technology impact assessment to implement responsible innovation processes,
- Apply advanced business modeling methods to develop a sound business concept,
- Develop and deliver a concise presentation ("pitch") to communicate you project.

Additional information:

Alternative exam assessment. The grade consists of the presentation and the written elaboration. Potentially, a 'project diary' of the seminar progress may be part of the deliverables (depends on tutor and will be communicated at the kick-off).

For a successful course completion, we expect you to submit a Business Plan with the following features:

- Scope: 9000 words,
- Sound and clear structure,
- Expression and spelling are correct
- Complete and correct references, quotations, etc.
- Visual elements are chosen appropriately
- Documentation and traceability of data acquisition, analysis and evaluation,
- Content is developed according to the course instructions.

Furthermore, we expect you to deliver a team Pitch.

- Duration: will be communicated (typically 5-10 minutes)
- Content: Introduction/Purpose; Problem; Solution; Business Model; Prototype; Competition; Management Team; Current Status and next steps,
- Layout and form: appropriate choice,
- Appearance: appropriate amount of visual elements,
- Data: well researched and organized visually
- Story Line: is sound; clear and convincing.

Organizational issues

Registration is via the Wiwi-Portal.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

**Startup Experience**

2545004, WS 23/24, 4 SWS, Language: English, [Open in study portal](#)

Seminar (S)
On-Site

Content**Content**

In the Startup Experience seminar you will develop entrepreneurial competences that will enable you to build a new business. In an entrepreneurial project, you have three main objectives:

1. Identify and develop an opportunity. Who is your target customer and what problem or task does he or she have? How attractive and how big is this market?
2. How will you add value to it? How can you use specific resources, including technology, to develop a solution?
3. How can you design and set up a viable organisation? What business model do you propose to create, deliver and capture value?

Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. After gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

Learning Objectives

After completing this course, the course participants will be able to:

- Work effectively in a cohesive team
- Understand the role of digital entrepreneurship in healthcare
- Apply creativity techniques to ideate
- Use utility analysis approaches to select promising solutions
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method
- Apply advanced business modeling methods to develop a sound business concept
- Develop and deliver a concise presentation ("pitch") to communicate your project
- Gain basic knowledge of healthcare regulations and reimbursement ways

Additional information:

Alternative exam assessment. The grade consists of the presentation and the written elaboration. Potentially, a 'project diary' of the seminar progress may be part of the deliverables (depends on tutor and will be communicated at the kick-off).

For a successful course completion, we expect you to submit a Business Plan with the following features:

- Scope: 9000 words,
- Sound and clear structure,
- Expression and spelling are correct
- Complete and correct references, quotations, etc.
- Visual elements are chosen appropriately
- Documentation and traceability of data acquisition, analysis and evaluation,
- Content is developed according to the course instructions.

Furthermore, we expect you to deliver a team Pitch.

- Duration: will be communicated (typically 5-10 minutes)
- Content: Introduction/Purpose; Problem; Solution; Business Model; Prototype; Competition; Management Team; Current Status and next steps,
- Layout and form: appropriate choice,
- Appearance: appropriate amount of visual elements,
- Data: well researched and organized visually
- Story Line: is sound; clear and convincing.

Organizational issues

Registration is via the Wiwi portal.

In the seminar you will work on a project in teams of max. 5 persons. The groups are formed in the seminar.

T

6.370 Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101638 - Econometrics and Statistics I](#)
[M-WIWI-101639 - Econometrics and Statistics II](#)
[M-WIWI-105414 - Statistics and Econometrics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2521350	Statistical Modeling of Generalized Regression Models	2 SWS	Lecture	Heller
Exams					
ST 2023	7900146 (SS23)	Statistical Modeling of generalized regression models			Heller
WT 23/24	7900146 (WS23/24)	Statistical Modeling of generalized regression models			Heller

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

Prerequisites

None

Recommendation

Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Below you will find excerpts from events related to this course:

V

Statistical Modeling of Generalized Regression Models

2521350, WS 23/24, 2 SWS, [Open in study portal](#)

Lecture (V)

Content

Learning objectives:

The student has profound knowledge of generalized regression models.

Requirements:

Knowledge of the contents covered by the course *Economics III: Introduction in Econometrics* [2520016].

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

**6.371 Course: Stochastic Calculus and Finance [T-WIWI-103129]**

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101639 - Econometrics and Statistics II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2521331	Stochastic Calculus and Finance	2 SWS	Lecture	Safarian
WT 23/24	2521332	Übungen zu Stochastic Calculus and Finance	2 SWS	Practice	Safarian
Exams					
WT 23/24	7900225	Stochastic Calculus and Finance			Safarian

Competence Certificate

The assessment of this course consists of a written examination (\$4(2), 1 SPOs, 180 min.).

Prerequisites

None

Annotation

For more information see <http://statistik.econ.kit.edu/>

Below you will find excerpts from events related to this course:

**Stochastic Calculus and Finance**

2521331, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)

Content**Learning objectives:**

After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis will be put on both finance and the theory behind it.

Content:

The course will provide rigorous yet focused training in stochastic calculus and mathematical finance. Topics to be covered:

1. Stochastic Calculus: Stochastic Processes, Brownian Motion and Martingales, Entropy, Stopping Times, Local martingales, Doob-Meyer Decomposition, Quadratic Variation, Stochastic Integration, Ito Formula, Girsanov Theorem, Jump-diffusion Processes, Stable and Levy processes.
2. Mathematical Finance: Pricing Models, The Black-Scholes Model, State prices and Equivalent Martingale Measure, Complete Markets and Redundant Security Prices, Arbitrage Pricing with Dividends, Term-Structure Models (One Factor Models, Cox-Ingersoll-Ross Model, Affine Models), Term-Structure Derivatives and Hedging, Mortgage-Backed Securities, Derivative Assets (Forward Prices, Future Contracts, American Options, Look-back Options), Incomplete Markets, Markets with Transaction Costs, Optimal Portfolio and Consumption Choice (Stochastic Control and Merton continuous time optimization problem, CAPM), Equilibrium models, Numerical Methods.

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Organizational issues

Blockveranstaltung, Termine werden über Ilias bekannt gegeben

Literature

- Dynamic Asset Pricing Theory, Third Edition by D. Duffie, Princeton University Press, 1996
- Stochastic Calculus for Finance II: Continuous-Time Models by S. E. Shreve, Springer, 2003
- Stochastic Finance: An Introduction in Discrete Time by H. Föllmer, A. Schied, de Gruyter, 2011
- Methods of Mathematical Finance by I. Karatzas, S. E. Shreve, Springer, 1998
- Markets with Transaction Costs by Yu. Kabanov, M. Safarian, Springer, 2010
- Introduction to Stochastic Calculus Applied to Finance by D. Lamberton, B. Lapeyre, Chapman&Hall, 1996

**6.372 Course: Stochastic Information Processing [T-INFO-101366]**

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: [M-INFO-100829 - Stochastic Information Processing](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Events					
WT 23/24	24113	Stochastic Information Processing	3 SWS	Lecture /	Hanebeck, Frisch
Exams					
ST 2023	7500010	Stochastic Information Processing			Hanebeck
WT 23/24	7500031	Stochastic Information Processing			Hanebeck

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Stochastic Information Processing**

24113, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)

Lecture (V)
On-Site

Content

In order to handle complex dynamic systems (e.g., in robotics), an in-step estimation of the system's internal state (e.g., position and orientation of the actuator) is required. Such an estimation is ideally based on the system model (e.g., a discretized differential equation describing the system dynamics) and the measurement model (e.g., a nonlinear function that maps the state space to a measurement subspace). Both system and measurement model are uncertain (e.g., include additive or multiplicative noise).

For continuous state spaces, an exact calculation of the probability densities is only possible in a few special cases. In practice, general nonlinear systems are often traced back to these special cases by simplifying assumptions. One extreme is linearization with subsequent application of linear estimation theory. However, this often leads to unsatisfactory results and requires additional heuristic measures. At the other extreme are numerical approximation methods, which only evaluate the desired distribution densities at discrete points in the state space. Although the working principle of these procedures is usually quite simple, a practical implementation often turns out to be difficult and especially for higher-dimensional systems it is computationally complex.

As a middle ground, analytical nonlinear estimation methods would therefore often be desirable. In this lecture the main difficulties in the development of such estimation methods are presented and corresponding solution modules are presented. Based on these building blocks, some analytical estimation methods are discussed in detail as examples, which are very suitable for practical implementation and offer a good compromise between computing effort and performance. Useful applications of these estimation methods are also discussed. Both known methods and the results of current research are presented.

Organizational issues

Der Prüfungstermin ist per E-Mail (gambichler@kit.edu) zu vereinbaren.

Literature**Weiterführende Literatur**

Skript zur Vorlesung

T

6.373 Course: Strategic Finance and Technology Change [T-WIWI-110511]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101483 - Finance 2](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each summer term	1

Exams			
ST 2023	7900268	Strategic Finance and Technoloy Change	Ruckes
WT 23/24	7900219	Strategic Finance and Technology Change	Ruckes

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

Prerequisites

None

Recommendation

Attending the lecture "Financial Management" is strongly recommended.

T

6.374 Course: Strategic Management of Information Technology [T-WIWI-102669]

Responsible: Prof. Dr. Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101477 - Development of Business Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Competence Certificate

Please note that the exam for first writers will be offered for the last time in winter semester 2019/2020. A last examination possibility exists in the summer semester 2020 (only for repeaters).

The assessment of this course is a written (60 min.) or (if necessary) oral examination according (30 min.) to §4(2) of the examination regulation.

Prerequisites


None

T

6.375 Course: Strategy and Management Theory: Developments and "Classics" [T-WIWI-106190]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-103119 - Advanced Topics in Strategy and Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar / 	Lindstädt
Exams					
ST 2023	7900278	Strategy and Management Theory: Developments and "Classics"			Lindstädt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a conclusion meeting. Details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Annotation

This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

Below you will find excerpts from events related to this course:

V

Strategy and Management Theory: Developments and "Classics" (Master)

2577921, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

This course covers highly topical issues of great relevance to the management of organizations. Students will be enabled to take strategic management positions. By applying appropriate models from the fields of strategy and management - or models developed in-house - participants will learn to evaluate the strategic starting position of an organization and derive precise and well-founded recommendations for action based on this.

This course offers students the opportunity to explore current management issues and sharpen their skills in strategic analysis and evaluation. Through intensive collaboration and practical application of the knowledge learned, students are optimally prepared for the demands and challenges of modern business management.

Structure

The course begins with an overarching theme, based on which students are divided into groups of two. The core of the course consists of the preparation of a written paper as well as the presentation and discussion of the results.

Learning Objectives

Upon completion of the course, students will be able to,

- analyze complex business situations, think strategically and derive sound management decisions.
- compose clear and convincing written papers that accurately present the analyses and recommendations developed.
- present results in an engaging manner and actively participate in substantive discussions.

Recommendations:

Prior attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

Total effort approx. 90 hours

Attendance time: 15 hours

Preparation and follow-up: 75 hours

Examination and preparation: not applicable

Verification:

The success control according to § 4(2), 3 SPO is done by writing a scientific paper and a presentation of the results of the paper in the context of a final event. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

Organizational issues

siehe Homepage

T

6.376 Course: Subdivision Algorithms [T-INFO-103551]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: [M-INFO-101863 - Subdivision Algorithms](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Prerequisites


None.





T

6.377 Course: Successful Transformation Through Innovation [T-WIWI-111823]

Responsible: Malte Busch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	2500018	Successful transformation through innovation	2 SWS	Seminar / 	Busch
Exams					
ST 2023	7900025	Successful Transformation Through Innovation			Busch

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessments. The grade consists of an presentation of the results (50%) and a seminar paper (50%).

Recommendation

Prior attendance of the course Innovation Management [2545015] is recommended.

Below you will find excerpts from events related to this course:

V

Successful transformation through innovation

2500018, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

This seminar uses strategic innovation management theory and concepts such as organisational ambidexterity, boundary spanning and stakeholder approaches how companies can increase their innovative capacity through innovation. The students will use a core paper to illustrate the steps towards becoming an innovative organisation. The aim is to understand how -with the help of the concepts mentioned above - medium-sized companies, in the context of organisational inertia and path dependency, may become innovation-driven organisations. The seminar will analyse the role of different stakeholders, which role the different stakeholders play and how companies may become part of an innovation ecosystems. Based on the core paper, the students will apply the concepts they have learned to selected companies and present the results in class. In addition to a presentation, the students will submit the results in seminar papers.

Organizational issues

Weblink: https://itm.entechnon.kit.edu/192_1281.php

T

6.378 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101477 - Development of Business Information Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate

The assessment of this course is a written or (if necessary) oral examination.

Prerequisites

None

Annotation

This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but is not equivalent to another course of this topic.

**6.379 Course: Supply Chain Management in the Automotive Industry [T-WIWI-102828]**

Responsible: Tilman Heupel
Hendrik Lang

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2023	2581957	Supply Chain Management in the automotive industry	2 SWS	Lecture /	Heupel, Lang
Exams					
ST 2023	7981957	Supply Chain Management in the Automotive Industry	Schultmann		

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Annotation

The lecture will be offered for the next time in the summer semester 2023.

Below you will find excerpts from events related to this course:

**Supply Chain Management in the automotive industry**

2581957, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)
Online

Content

- Automotive industry significance
- The automotive supply chain
- Adding value structures of the automotive supply chain and mastering of the production systems as factors of success in the SCM
- Strategic procurement logistics
- Risk management
- Quality engineering and management in the automotive supply chain
- Cost engineering and management in the automotive supply chain
- Purchasing (Supplier selection, contract management)
- Performance measurement of the supply chain
- Organization

Organizational issues

Blockveranstaltung, siehe Homepage

Literature

Wird in der Veranstaltung bekannt gegeben.

T


6.380 Course: Supply Chain Management with Advanced Planning Systems [T-WIWI-102763]

Responsible: Claus J. Bosch
Dr. Mathias Göbelt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101412 - Industrial Production III](#)
[M-WIWI-101471 - Industrial Production II](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2023	2581961	Supply Chain Management with Advanced Planning Systems	2 SWS	Lecture / 	Göbelt, Bosch
Exams					
ST 2023	7981961	Supply Chain Management with Advanced Planning Systems			Schultmann

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Supply Chain Management with Advanced Planning Systems

2581961, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site

Content

This lecture deals with supply chain management from a practitioner's perspective with a special emphasis Advanced Planning Systems (APS) and the planning domain. The software solution SAP SCM, one of the most widely used Advanced Planning Systems, is used as an example to show functionality and application of an APS in practice.

First, the term supply chain management is defined and its scope is determined. Methods to analyze supply chains as well as indicators to measure supply chains are derived. Second, the structure of an APS (advanced planning system) is discussed in a generic way. Later in the lecture, the software solution SAP SCM is mapped to this generic structure. The individual planning tasks and software modules (demand planning, supply network planning / sales & operations planning, production planning / detailed scheduling, deployment, transportation planning, global available-to-promise) are presented by discussing the relevant business processes, providing academic background, describing typical planning processes and showing the user interface and user-related processes in the software solution. At the end of the lecture, implementation methodologies and project management approaches for SAP SCM are covered.

Contents**1. Introduction to Supply Chain Management**

- 1.1. Supply Chain Management Fundamentals
- 1.2. Supply Chain Management Analytics

2. Structure of Advanced Planning Systems**3. SAP SCM**

- 3.1. Introduction / SCM Solution Map
- 3.2. Demand Planning
- 3.3. Supply Network Planning / Sales & Operations Planning
- 3.4. Production Planning and Detailed Scheduling
- 3.5. Deployment
- 3.6. Transportation Planning / Global Available to Promise
- 3.7. Cloud-based Supply Chain Planning

4. SAP SCM in Practice

- 4.1. Project Management and Implementation
- 4.2. SAP Implementation Methodology

Literature

will be announced in the course

T

6.381 Course: Symmetric Encryption [T-INFO-101390]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: [M-INFO-100853 - Symmetric Encryption](#)


Type
Oral examination





Credits
3

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	24629	Symmetric encryption	2 SWS	Lecture / 	Müller-Quade, Geiselmann
Exams					
ST 2023	7500070	Symmetric Encryption			Geiselmann, Müller-Quade

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Es wird empfohlen, das Modul Sicherheit zu belegen.

Below you will find excerpts from events related to this course:

V

Symmetric encryption

24629, SS 2023, 2 SWS, Language: German, [Open in study portal](#)


Lecture (V)
On-Site

T

6.382 Course: Tax Law [T-INFO-111437]

Responsible: Detlef Dietrich
Organisation: KIT Department of Informatics
Part of: [M-INFO-101216 - Private Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	24646	Tax Law	2 SWS	Lecture / 	Dietrich
Exams					
ST 2023	7500120	Tax Law			Dreier, Matz
WT 23/24	7500062	Tax Law			Matz

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.383 Course: Technologies for Innovation Management [T-WIWI-102854]

Responsible: Dr. Daniel Jeffrey Koch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	2

Competence Certificate

Presentation and individual paper (ca. 15 pages) as alternative exam assessment.

Prerequisites

None

Recommendation


Prior attendance of the course Innovationsmanagement: Konzepte, Strategien und Methoden is recommended.





T

6.384 Course: Technology Assessment [T-WIWI-102858]

Responsible: Dr. Daniel Jeffrey Koch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101507 - Innovation Management](#)
[M-WIWI-101507 - Innovation Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	see Annotations	1

Events					
ST 2023	2545101	Technology Assessment	2 SWS	Seminar / 	Koch
Exams					
ST 2023	7900238	Technology Assessment			Weissenberger-Eibl

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment.

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management is recommended.

Annotation

See German version.

Below you will find excerpts from events related to this course:

V

Technology Assessment

2545101, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

Technology assessment can play a role at different points in the innovation process and can be considered as a decision support for or against certain technological options. The seminar Technology Assessment will focus on the early phase "fuzzy front end" in innovation management. Here, technology assessment takes place under a high degree of uncertainty regarding future technological developments. The evaluation of technologies can be carried out using methods such as technology readiness, technology lifecycle analysis, portfolio analysis, etc. The early evaluation of technologies is of particular importance before the "fuzzy front end" in innovation management. The early evaluation of technologies is of great importance, especially against the background of limited resources in companies and uncertainty about future developments.

Translated with www.DeepL.com/Translator (free version)

Organizational issues



Weblink: https://itm.entechnon.kit.edu/192_1284.php



T

6.385 Course: Telecommunications and Internet – Economics and Policy [T-WIWI-113147]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101406 - Network Economics](#)
[M-WIWI-101409 - Electronic Markets](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2561232	Telecommunication and Internet - Economics and Policy	2 SWS	Lecture / 	Mitusch
WT 23/24	2561233	Excercises to Telecommunication and Internet - Economics and Policy	1 SWS	Practice / 	Mitusch, Wisotzky, Corbo
Exams					
ST 2023	7900276	Telecommunication and Internet Economics			Mitusch

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Students' understanding and knowledge will be assessed through either an oral or a written exam. The actual method used will be announced during the course. The course takes place every winter term, and exams are offered two times a year, in March and in September.

Modeled Conditions

The following conditions have to be fulfilled:

1. The course [T-WIWI-102713 - Telecommunication and Internet Economics](#) must not have been started.

Recommendation

Basic knowledge of microeconomics is a precondition. Further knowledge of industrial economics or networks economics is useful, but not necessary. No prior knowledge of telecommunications or internet technologies is required.

Annotation

Disclaimer:

German wording is sometimes provided in parallel. Some German original literature is used (especially official and legislative texts) where we will try to provide English translations in parallel.

Below you will find excerpts from events related to this course:

V

Telecommunication and Internet - Economics and Policy

2561232, WS 23/24, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

ContentDescription:

The course provides students with a comprehensive understanding of the economic principles, dynamics, and policies that govern the telecommunication and internet industries and markets. It focuses on the infrastructure of the internet, both physical and logical.

Course Objectives:

Understand the telecommunication and internet landscape: Students will be introduced to the historical development, evolution, and current state of the telecommunication and internet industries. This includes technology, industrial organization, regulation, and other policies. Students will explore the emergence of modern telecommunication networks, the birth of the internet, and key milestones that have shaped the global communication landscape.

Examine network economics: Students will explore the unique economic characteristics of telecommunications networks, including network effects, economies of scale, the implications for investment decisions and market entry barriers, and regulatory responses.

Analyse market structures and competition policies: Students will dive into the various market structures that exist within the telecommunication and internet industries, including: access to the internet by users, access to the infrastructure by firms, economic interactions between the autonomous systems (i.e. sub-networks) and other players (like internet exchange points) of the internet, implications for quality of services and network neutrality. Emphasis will be placed on competitiveness of markets, resp. market power, on the role of regulation, and how they impact market dynamics.

Investigate infrastructure investment and policy: The course will address the significant role of infrastructure investment in the telecommunication and internet sectors. Students will analyse the economic drivers behind infrastructure construction, government policies, and regulatory frameworks that influence investment decisions.

Address emerging trends: The course will address the latest trends and technologies in telecommunication and the internet, such as 5G, Internet of Things (IoT), and cloud computing, content delivery networks, and their economic implications.

Assess platform economics: The role of digital platforms in the telecommunication and internet industries will be addressed. Students will understand platform business models and the economics of multisided markets. In this context, the "hypergiants" of the internet get into the focus as well as the challenges and opportunities they present.


Teaching Methodology:

The course will adopt a combination of lectures, case studies, and guest lectures from (industry) experts. Real-world examples will be used to illustrate economic principles in action within the telecommunication and internet sectors. A few economic models will be analysed, but most of the issues will be addressed verbally.

T

6.386 Course: Telecommunications Law [T-INFO-101309]**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-101217 - Public Business Law](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2023	24632	Telekommunikationsrecht	2 SWS	Lecture / 	Döveling
Exams					
ST 2023	7500085	Telecommunications Law			Dreier
WT 23/24	7500049	Telecommunications Law			Zufall

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.387 Course: Telematics [T-INFO-101338]**

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: [M-INFO-100801 - Telematics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 23/24	24128	Telematics	3 SWS	Lecture /	Kopmann, Seehofer, Zitterbart
Exams					
ST 2023	7500115	Telematics			Zitterbart

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

**Telematics**

24128, WS 23/24, 3 SWS, Language: German, [Open in study portal](#)

**Lecture (V)
On-Site**

Content

The lecture covers (i.a.) protocols, architectures, as well as methods and algorithms, for routing and establishing reliable end-to-end connections in the Internet. In addition to various methods for media access control in local area networks, the lecture also covers other communication systems, e.g. circuit-switched systems such as ISDN. Participants should also have understood the possibilities for managing and administering networks.

Familiarity with the contents of the lecture *Einführung in Rechnernetze* or comparable lectures is assumed.

Learning Objectives

After attending this lecture, the students will

- have a profound understanding of protocols, architectures, as well as procedures and algorithms used for routing and for establishing reliable end-to-end connections in the Internet
- have a profound understanding of different media access control procedures in local networks and other communication systems like circuit-switched ISDN
- have a profound understanding of the problems that arise in large scale dynamic communication systems and are familiar with mechanism to deal with these problems
- be familiar with current developments such as SDN and data center networking
- be familiar with different aspects and possibilities for network management and administration

Students have a profound understanding of the basic protocol mechanisms that are necessary to establish reliable end-to-end communication. Students have detailed knowledge about the congestion and flow control mechanisms used in TCP and can discuss fairness issue in the context of multiple parallel transport streams. Students can analytically determine the performance of transport protocols and know techniques for dealing with specific constraints in the context of TCP, e.g., high data rates and low latencies. Students are familiar with current topics such as the problem of middle boxes on the Internet, the usage of TCP in data centers or multipath TCP. Students are also familiar with practical aspects of modern transport protocols and know practical ways to overcome heterogeneity in the development of distributed applications.

Students know the functions of (Internet) routing and routers and can explain and apply common routing algorithms. Students are familiar with routing architectures and different alternatives for buffer placement as well as their advantages and disadvantages. Students understand the classification into interior and exterior gateway protocols and have in-depth knowledge of the functionality and features of common protocols such as RIP, OSPF, and BGP. Students are also familiar with current topics such as label switching, IPv6 and SDN.

Students know the function of media access control and are able to classify and analytically evaluate different media access control mechanisms. Students have an in-depth knowledge of Ethernet and various Ethernet variants and characteristics, which especially includes current developments such as real-time Ethernet and data center Ethernet. Students can explain and apply the Spanning Tree Protocol.

Students know the architecture of ISDN and can reproduce the peculiarities of setting up the ISDN subscriber line. Students are familiar with the technical features of DSL.

Literature

S. Keshav. An Engineering Approach to Computer Networking. Addison-Wesley, 1997
J.F. Kurose, K.W. Ross. Computer Networking: A Top-Down Approach Featuring the Internet. 4th Edition, Addison-Wesley, 2007
W. Stallings. Data and Computer Communications. 8th Edition, Prentice Hall, 2006
Weiterführende Literatur •D. Bertsekas, R. Gallager. Data Networks. 2nd Edition, Prentice-Hall, 1991
•F. Halsall. Data Communications, Computer Networks and Open Systems. 4th Edition, Addison-Wesley Publishing Company, 1996
•W. Haaß. Handbuch der Kommunikationsnetze. Springer, 1997
•A.S. Tanenbaum. Computer-Networks. 4th Edition, Prentice-Hall, 2004
•Internet-Standards
•Artikel in Fachzeitschriften

T

6.388 Course: Testing Digital Systems I [T-INFO-101388]

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: [M-INFO-100851 - Testing Digital Systems I](#)

Type
Oral examination

Credits
3

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Exams			
ST 2023	7500008	Testing Digital Systems I	Tahoori
WT 23/24	7500039	Testing Digital Systems I	Tahoori

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Prerequisites

None.

Recommendation

Knowledge of Digital Design and Computer Architecture is helpful.

**6.389 Course: Testing Digital Systems II [T-INFO-105936]**

Responsible: Prof. Dr. Mehdi Baradaran Tahoori
Organisation: KIT Department of Informatics
Part of: [M-INFO-102962 - Testing Digital Systems II](#)

Type
Oral examination

Credits
3

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events					
ST 2023	2400014	Testing Digital Systems II (findet im SS 2023 nicht statt)	2 SWS	Lecture /	Tahoori
Exams					
ST 2023	7500069	Testing Digital Systems II			Tahoori

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out as an oral examination (§ 4 Abs. 2 Nr. 2 SPO) lasting 20 minutes.

Prerequisites

None.

Recommendation

Knowledge of Digital Design and Computer Architecture is helpful.

Below you will find excerpts from events related to this course:

**Testing Digital Systems II (findet im SS 2023 nicht statt)**

2400014, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Online

Content

Testing of digital circuits plays a critical role during the design and manufacturing cycles. It also ensures the quality of parts shipped to the customers. Test generation and design for testability are integral parts of automated design flow of all electronic products. The objective of this course is to provide more advanced topics on testing of digital systems and complement the foundation covered in Testing Digital Systems I.


Topics include Functional and Structural Testing (design verification vectors, exhaustive test, pseudo-exhaustive test, pseudo-random testing), Essentials of Test Generation for Sequential Circuits (state-machine initialization, time-frame expansion method), Built-in Self Test (test economics of BIST, test pattern generation, output response analysis, BIST architectures), Boundry Scan (Boundry scan architectures, BS test methodology), Delay Testing (path delay test, hazard-free, robust, and non-robust delay tests), transition faults, delay test schemes), Current-Based Testing (motivation, test vectores for IDDQ, variations of IDDQ), Memory Test (memory test algorithm, memory BIST, memory repair), and DFT for System-on-Chip.




The objective of this course is to provide more advanced topics on testing of digital systems and complement the foundation covered in Testing Digital Systems I.

T

6.390 Course: Theoretical Foundations of Cryptography [T-INFO-111199]

Responsible: Prof. Dr. Jörn Müller-Quade**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-105584 - Theoretical Foundations of Cryptography](#)**Type**
Written examination**Credits**
6**Grading scale**
Grade to a third**Recurrence**
Each winter term**Version**
1

Events					
WT 23/24	2400237	Theoretische Grundlagen der Kryptographie	4 SWS	Lecture / 	Müller-Quade, Berger
Exams					
WT 23/24	7500274	Theoretical Foundations of Cryptography			Müller-Quade

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.391 Course: Topics in Experimental Economics [T-WIWI-102863]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101505 - Experimental Economics](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Prerequisites

None

Recommendation

Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Annotation



The course is offered in summer 2020 for the next time, not in summer 2018.





T

6.392 Course: Topics in Stochastic Optimization [T-WIWI-112109]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101473 - Mathematical Programming](#)
[M-WIWI-101637 - Analytics and Statistics](#)
[M-WIWI-102832 - Operations Research in Supply Chain Management](#)
[M-WIWI-103289 - Stochastic Optimization](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
ST 2023	2500024	Übungen zu Topics in Stochastic Optimization	1 SWS	Practice / 	Rebennack, Gabl
ST 2023	2500026	Topics in Stochastic Optimization	2 SWS	Lecture / 	Rebennack, Gabl
Exams					
ST 2023	7900341	Topics in Stochastic Optimization			Rebennack

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Students will be given problem sets on which they work in groups. The problem sets will involve the implementation of the models presented in the course, and exploring features of these models. The groups will present their findings in front of the class. The grading will be based on the presentation.

Recommendation

A solid understanding of Stochastic Optimization and/or Optimization under Uncertainty as well as optimization in general is highly recommended, since we will heavily build upon basics of these areas.

Below you will find excerpts from events related to this course:

V

Topics in Stochastic Optimization

2500026, SS 2023, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
Blended (On-Site/Online)

Content

Content:

While Stochastic Optimization is a long established, powerful paradigm for dealing with optimization problems under uncertainty, it is also a field that is continuously evolving, in an effort to expand the applicability of the respective techniques, but also to challenge frontiers to other paradigms such as robust optimization. In this course we will closely examine more recent developments in the field, and introduce, and train the usage of the computational techniques, that act as a workhorse for solution strategies.

Prerequisites:

None.



T

6.393 Course: Trademark and Unfair Competition Law [T-INFO-101313]

Responsible: Dr. Yvonne Matz

Organisation: KIT Department of Informatics

Part of: [M-INFO-101215 - Intellectual Property Law](#)Type
Written examinationCredits
3Grading scale
Grade to a thirdRecurrence
Each termVersion
1

Events					
ST 2023	24609	Trademark and Unfair Competition Law	2 SWS	Lecture / 	Matz
WT 23/24	24136	Trademark and Unfair Competition Law	2 SWS	Lecture / 	Matz
Exams					
ST 2023	7500051	Trademark and Unfair Competition Law	Dreier, Matz		
WT 23/24	7500061	Trademark and Unfair Competition Law	Matz		

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.394 Course: Transport Economics [T-WIWI-100007]**

Responsible: Prof. Dr. Kay Mitusch
Dr. Eckhard Szimba

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-101406 - Network Economics](#)
[M-WIWI-101468 - Environmental Economics](#)
[M-WIWI-101485 - Transport Infrastructure Policy and Regional Development](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2023	2560230	Transport Economics	2 SWS	Lecture	Mitusch, Szimba
ST 2023	2560231	Übung zu Transportökonomie	1 SWS	Practice	Mitusch, Szimba, Wisotzky
Exams					
ST 2023	7900275	Transport Economics			Mitusch

Competence Certificate

The assessment is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Below you will find excerpts from events related to this course:

**Transport Economics**

2560230, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)

Content

The course shall provide an overview of transport economics. It will be demonstrated, using new microeconomic models, which impacts regulation and pricing in transport have on the economic actions of individuals and logisticians and which benefits and costs apply. The following topics will be discussed:

- demand and supply in transport
- empirical analysis of transport demand
- assessment of transport infrastructure projects
- external effects in transport
- transport policy
- cost structures of transport infrastructure
- Project evaluation from the perspective of the public sector

Literature**Literatur:**

Aberle, G: Transportwirtschaft: einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen München; Wien: Oldenbourg, 2003.

Blauwens, G., De Baere, P. and Van der Voorde, E. (2006): Transport Economics.

Frerich, J; Müller, G: Europäische Verkehrspolitik, Landverkehrspolitik München; Wien: Oldenbourg, 2004.

Dasgupta, A, Pearce, D (1972): Cost-Benefit Analysis, MacMillan, London.

Europäische Kommission (2008): Guide to Cost Benefit Analysis of Investment Projects, online unter http://ec.europa.eu/regional_policy/sources/Ben-Akiva, M., Meerseman, H., and Van de Voorde, E. (2008): Recent developments in transport modelling: Lessons for the freight sector.


Ortúzar, J. d. D. and Willumsen, L. (1990): Modelling Transport.





T

6.395 Course: Trustworthy Emerging Technologies [T-WIWI-113026]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-104403 - Critical Digital Infrastructures](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
WT 23/24	2511404	Trustworthy Emerging Technologies		Lecture / 	Sunyaev, Lins

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Modeled Conditions

The following conditions have to be fulfilled:

1. The course [T-WIWI-109251 - Selected Issues in Critical Information Infrastructures](#) must not have been started.

T

6.396 Course: Ubiquitous Computing [T-INFO-101326]**Responsible:** Prof. Dr.-Ing. Michael Beigl**Organisation:** KIT Department of Informatics

Part of: [M-INFO-100789 - Ubiquitous Computing](#)
[M-WIWI-101458 - Ubiquitous Computing](#)
[M-WIWI-104814 - Information Systems: Analytical and Interactive Systems](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 23/24	24146	Ubiquitäre Informationstechnologien	2+1 SWS	Lecture / Practice	Beigl
Exams					
ST 2023	7500342_03.07.23	Ubiquitous Computing			Beigl
WT 23/24	7500351_27.11.2023	Ubiquitous Computing			Beigl

T

6.397 Course: Valuation [T-WIWI-102621]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)
[M-WIWI-101482 - Finance 1](#)
[M-WIWI-101483 - Finance 2](#)
[M-WIWI-101510 - Cross-Functional Management Accounting](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 23/24	2530212	Valuation	2 SWS	Lecture /	Ruckes
WT 23/24	2530213	Übungen zu Valuation	1 SWS	Practice /	Ruckes, Luedecke
Exams					
ST 2023	7900072	Valuation			Ruckes
WT 23/24	7900057	Valuation			Ruckes

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

See German version.

Prerequisites

None

Recommendation

None

Below you will find excerpts from events related to this course:

V

Valuation

2530212, WS 23/24, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)
On-Site


Literature**Weiterführende Literatur**

Titman/Martin (2013): *Valuation - The Art and Science of Corporate Investment Decisions*, 2nd. ed. Pearson International.

T

6.398 Course: Visualization [T-INFO-101275]

Responsible: Prof. Dr.-Ing. Carsten Dachsbacher**Organisation:** KIT Department of Informatics**Part of:** [M-INFO-100738 - Visualization](#)**Type**
Oral examination**Credits**
5**Grading scale**
Grade to a third**Recurrence**
Each summer term**Version**
1

Events					
ST 2023	2400175	Visualisierung	2 SWS	Lecture / 	Dachsbacher
Exams					
ST 2023	7500193	Visualization			Dachsbacher
WT 23/24	7500563	Visualization			Dachsbacher

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

**6.399 Course: Wearable Robotic Technologies [T-INFO-106557]**

Responsible: Prof. Dr.-Ing. Tamim Asfour
Prof. Dr.-Ing. Michael Beigl

Organisation: KIT Department of Informatics

Part of: [M-INFO-103294 - Wearable Robotic Technologies](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	4

Events					
ST 2023	2400062	Wearable Robotic Technologies	2 SWS	Lecture /	Asfour, Beigl
Exams					
ST 2023	7500219	Wearable Robotic Technologies			Asfour
WT 23/24	7500073	Wearable Robotic Technologies			Asfour

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites

Attending the lecture Mechano-Informatics and Robotics is recommended.

Recommendation

Attending the lecture Mechano-Informatics and Robotics is recommended.

Below you will find excerpts from events related to this course:

**Wearable Robotic Technologies**

2400062, SS 2023, 2 SWS, Language: German/English, [Open in study portal](#)

Lecture (V)
On-Site

Content

The lecture starts with an overview of wearable robot technologies (exoskeletons, prostheses and orthoses) and its potentials, followed by the basics of wearable robotics. In addition to different approaches to the design of wearable robots and their related actuator and sensor technology, the lecture focuses on modeling the neuromusculoskeletal system of the human body and the physical and cognitive human-robot interaction for tightly coupled hybrid human-robot systems. Examples of current research and various applications of lower, upper and full body exoskeletons as well as prostheses are presented.

Learning Objectives:

The students have received fundamental knowledge about wearable robotic technologies and understand the requirements for the design, the interface to the human body and the control of wearable robots. They are able to describe methods for modelling the human neuromusculoskeletal system, the mechatronic design, fabrication and composition of interfaces to the human body. The students understand the symbiotic human-machine interaction as a core topic of Anthropomatics and has knowledge of state-of-the-art examples of exoskeletons, orthoses and prostheses.

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik, Sportwissenschaften

Empfehlungen: Der Besuch der Vorlesung *Mechano-Informatik in der Robotik* wird empfohlen.

Arbeitsaufwand: 120h

Literature

Vorlesungsfolien und ausgewählte aktuelle Literaturangaben werden in der Vorlesung bekannt gegeben und als pdf unter <http://www.humanoids.kit.edu> verfügbar gemacht.

T

6.400 Course: Web App Programming for Finance [T-WIWI-110933]

Responsible: TT-Prof. Dr. Julian Thimme
Organisation: KIT Department of Economics and Management
Part of: [M-WIWI-101480 - Finance 3](#)

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Once	1

Competence Certificate

Non exam assessment according to § 4 paragraph 3 of the examination regulation. (Anmerkung: gilt nur für SPO 2015). The grade is made up as follows: 50% result of the project (R-code), 50% presentation of the project.

Prerequisites

None

Recommendation

The content of the bachelor course Investments is assumed to be known and necessary to follow the course.

T


6.401 Course: Web Applications and Service-Oriented Architectures (II) [T-INFO-101271]



Responsible: Prof. Dr. Sebastian Abeck

Organisation: KIT Department of Informatics

Part of: [M-INFO-100734 - Web Applications and Service-Oriented Architectures \(II\)](#)
[M-WIWI-104812 - Information Systems: Engineering and Transformation](#)

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	24677	Web Applications and Service oriented Architectures (II)	2 SWS	Lecture / 	Abeck, Schneider, Sanger, Throner
Exams					
ST 2023	7500138	Web Applications and Service-oriented Architectures (II)			Abeck

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

T

6.402 Course: Workshop Business Wargaming – Analyzing Strategic Interactions [T-WIWI-106189]

Responsible: Prof. Dr. Hagen Lindstädt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-103119 - Advanced Topics in Strategy and Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2023	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar / 	Lindstädt
WT 23/24	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar / 	Lindstädt
Exams					
ST 2023	7900071	Workshop Business Wargaming – Analyzing Strategic Interactions			Lindstädt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Annotation

This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

The course is planned to be held for the first time in the summer term 2018.

Below you will find excerpts from events related to this course:

V

Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)

2577922, SS 2023, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

This course enables the simulation of strategic conflicts in which the participants assume the roles of selected actors. With the help of specially programmed wargaming software, strategic conflicts are simulated interactively and then reflected upon and discussed.

The course focuses on the simulation and analysis of real conflict situations with strategic interaction. Students gain a better understanding of the structural characteristics of strategic conflicts in the fields of economics and politics as well as the ability to derive their own strategies for action.

Through a combination of group work, simulation, and reflection, the seminar provides a learning experience that both strengthens team skills and develops analytical skills in strategic conflict. Join this seminar to gain sound insights into conflict dynamics and develop effective action strategies for complex situations.

Learning Objectives

Upon completion of the course, students will be able to,

- learn the basic methodologies, characteristics and benefits of business wargaming
- improve their understanding of conflict dynamics by reflecting on strategic conflicts
- Strengthen analytical skills by processing a variety of courses of action and deriving strategies for action

Recommendations:

Previous attendance of the bachelor module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

- Total workload: approx. 90 hours
- Attendance time: 15 hours
- Preparation and follow-up: 75 hours
- Examination and preparation: not applicable

Evidence:

In this course, real conflict situations are simulated and analyzed with the help of various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

**Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)**

2577922, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

This course enables the simulation of strategic conflicts in which the participants assume the roles of selected actors. With the help of specially programmed wargaming software, strategic conflicts are simulated interactively and then reflected upon and discussed.

The course focuses on the simulation and analysis of real conflict situations with strategic interaction. Students gain a better understanding of the structural characteristics of strategic conflicts in the fields of economics and politics as well as the ability to derive their own strategies for action.

Through a combination of group work, simulation, and reflection, the seminar provides a learning experience that both strengthens team skills and develops analytical skills in strategic conflict. Join this seminar to gain sound insights into conflict dynamics and develop effective action strategies for complex situations.

Learning Objectives

Upon completion of the course, students will be able to,

- learn the basic methodologies, features and benefits of business wargaming
- improve their understanding of conflict dynamics by reflecting on strategic conflicts
- Strengthen analytical skills by processing a variety of courses of action and deriving strategies for action

Recommendations:

Prior attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

- Total workload: approx. 90 hours
- Attendance time: 15 hours
- Preparation and follow-up: 75 hours
- Examination and preparation: not applicable

Evidence:

In this course, real conflict situations are simulated and analyzed with the help of various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

T


6.403 Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]





Responsible: Prof. Dr. Hagen Lindstädt

Organisation: KIT Department of Economics and Management

Part of: [M-WIWI-103119 - Advanced Topics in Strategy and Management](#)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 23/24	2577923	Workshop aktuelle Themen Strategie und Management (Master)	2 SWS	Seminar / 	Lindstädt

Legend:  Online,  Blended (On-Site/Online),  On-Site,  Cancelled

Competence Certificate

The evaluation of the performance takes place through the active participation in the discussion rounds; an appropriate preparation is expressed here and a clear understanding of the topic and framework becomes recognizable. Further details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Annotation

This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

Below you will find excerpts from events related to this course:

V

Workshop aktuelle Themen Strategie und Management (Master)

2577923, WS 23/24, 2 SWS, Language: German, [Open in study portal](#)

Seminar (S)
On-Site

Content

Aspects of strategic management can be found in a variety of daily events. In this course, current strategic and industrial policy issues are discussed and the exchange of ideas on current management topics is promoted.

For this purpose, practice-relevant case studies and dedicated questions are communicated to the students in advance so that they can prepare themselves individually for the discussion. The chair team actively moderates the discussion and creates typical discussion situations such as pro/con discussions and conflicting interests of different groups in order to bring opposing opinions into an exchange and to promote the power of argumentation. In this way, the discussion not only imparts knowledge about the content, but also strengthens the participants' skills by simulating real discussion situations in a management team.

In addition, company representatives and managers participate in individual case studies to strengthen the context of the content and experience the daily dynamics of discussion in strategic business areas.

Learning Objectives:

Students will

- are able to evaluate strategic decisions using appropriate models of strategic business management,
- are able to present and critically evaluate theoretical approaches and models in the field of strategic business management and illustrate them using practical examples, and
- have the ability to present their position convincingly through a reasoned argumentation in structured discussions.

Recommendations:

Previous attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

Total effort approx. 90 hours

Attendance time: 15 hours

Preparation and follow-up: 75 hours

Examination and preparation: not applicable

Evidence:

Performance will be assessed through active discussion participation in the discussion rounds; here, adequate preparation will be expressed and a clear understanding of the topic and framework will be evident. Further details on the design of the performance assessment will be announced during the lecture.

Annotation:

This course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics"[M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester so that the entire module can be completed in two semesters.