Karlsruher Institut für Technologie

Module Handbook
Economathematics M.Sc.

SPO 2016

Summer term 2020

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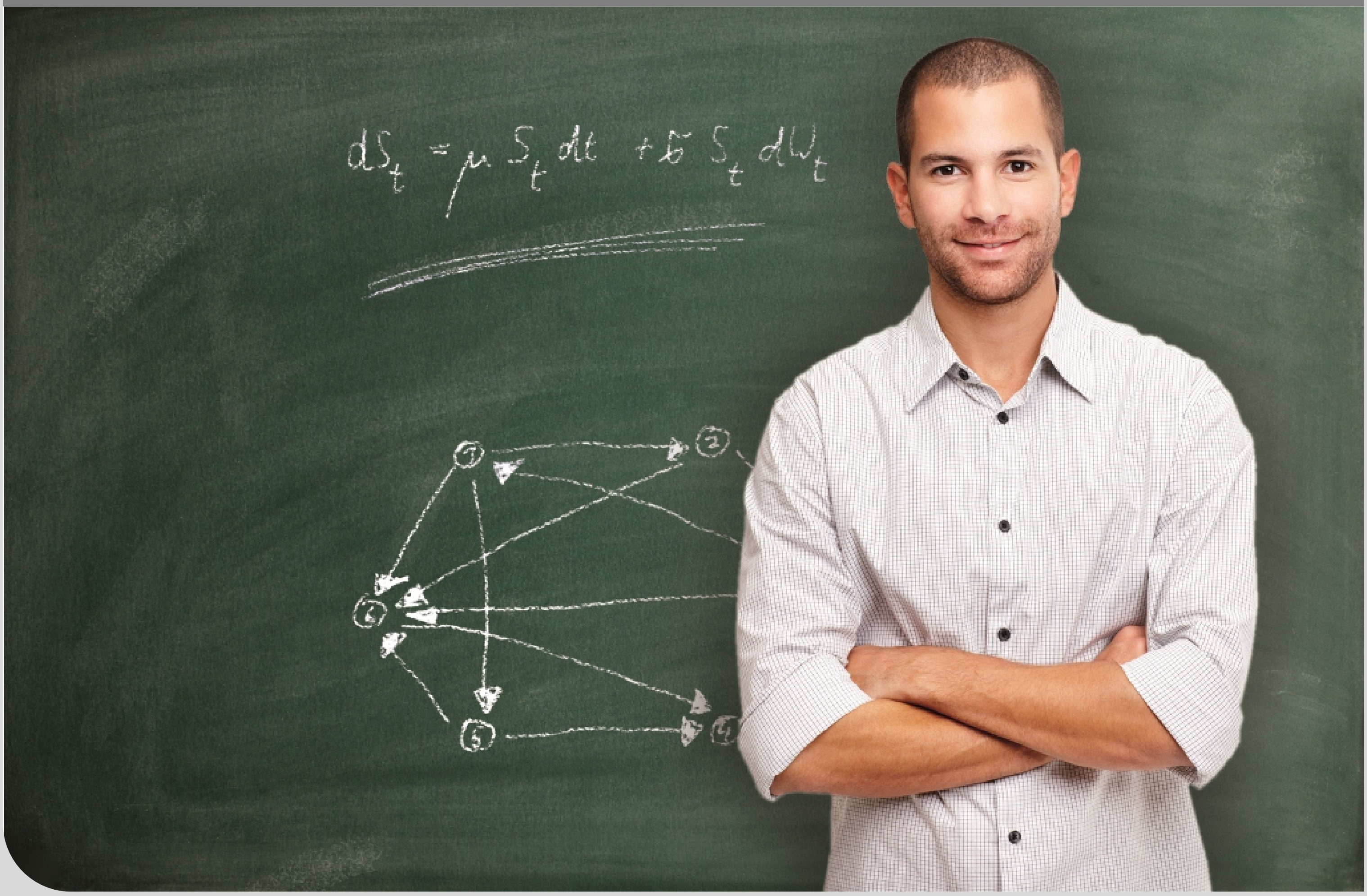
KIT DEPARTMENT OF ECONOMICS AND MANAGEMENT / KIT DEPARTMENT OF MATHEMATICS



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1 Welcome to the new module handbook of your study programme

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!

The following contact persons are at your disposal for questions and problems at any time.

Study Guidance

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2 About this handbook

2.1 Notes and rules

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).

2.1.1 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.

2.1.2 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.

2.1.3 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 examamination. 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, https://studium.kit.edu/Seiten/FAQ.aspx.

2.1.4 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.

2.1.5 Repeating exams

Principally, a failed written exam, oral exam or alternative exam assessment can 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 loosing the examination claim. A counseling interview is mandatory.

For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

2.1.6 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.

2.1.7 Allocation of places for courses with a limited number of participants

The allocation of places in courses with a limited number of participants will be based on preferences and suitability for the topics. Among other things, professional and practical experience in the subject area as well as foreign language skills, if applicable, play a role. Students with the highest academic progress will be given preferential admission. Places are usually allocated via the WIWI portal at https://portal.wiwi.kit.edu/.

2.1.8 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.

2.1.9 Further information

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).

3 Field of study structure

Mandatory	
Master Thesis	30 CR
Mathematical Methods	36 CR
Finance - Risk Management - Managerial Economics	18 CR
Operations Management - Data Analysis - Informatics	18 CR
Seminar in Economics and Management	3 CR
Mathematical Seminar	3 CR
Elective Field	12 CR

3.1 Master Thesis

Credits
30

Mandatory		
M-MATH-102917	Master Thesis	30 CR

3.2 Mathematical Methods

Credits
36

Election block: Stochastics (at least 8 credits)		
M-MATH-102860	Continuous Time Finance	8 CR
M-MATH-102865	Stochastic Geometry	8 CR
M-MATH-102902	Asymptotic Stochastics	8 CR
M-MATH-102903	Spatial Stochastics	8 CR
M-MATH-102904	Brownian Motion	4 CR
M-MATH-102905	Percolation	6 CR
M-MATH-102906	Generalized Regression Models	4 CR
M-MATH-102907	Markov Decision Processes	5 CR
M-MATH-102908	Stochastic Control	4 CR
M-MATH-102909	Mathematical Statistics	4 CR
M-MATH-102910	Nonparametric Statistics	4 CR
M-MATH-102911	Time Series Analysis	4 CR
M-MATH-102919	Discrete Time Finance	8 CR
M-MATH-102922	Poisson Processes	5 CR
M-MATH-102939	Extreme Value Theory	4 CR
M-MATH-102942	Stochastic Evolution Equations	8 CR
M-MATH-102946	Stein's Method	5 CR
M-MATH-102947	Probability Theory and Combinatorial Optimization	8 CR
M-MATH-102951	Random Graphs	6 CR
M-MATH-102956	Forecasting: Theory and Practice	8 CR
M-MATH-104055	Ruin Theory	4 CR
M-MATH-105101	Introduction to Homogeneous Dynamics	6 CR
Election block: Analysis or Applied and Numerical Mathematics, Optimization (at least 8 credits)		
M-MATH-101320	Functional Analysis	8 CR
M-MATH-101335	Special Functions and Applications in Potential Theory	5 CR
M-MATH-101768	Spectral Theory	8 CR
M-MATH-102870	Classical Methods for Partial Differential Equations	8 CR
M-MATH-102871	Boundary and Eigenvalue Problems	8 CR
M-MATH-102872	Evolution Equations	8 CR
M-MATH-102873	Fourier Analysis	8 CR
M-MATH-102874	Integral Equations	8 CR
M-MATH-102878	Complex Analysis	8 CR
M-MATH-102879	Potential Theory	8 CR
M-MATH-102881	Stochastic Differential Equations	8 CR
M-MATH-102883	Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems	8 CR
M-MATH-102885	Maxwell's Equations	8 CR
M-MATH-102890	Inverse Problems	8 CR
M-MATH-102924	Optimization in Banach Spaces	8 CR
M-MATH-102926	Sobolev Spaces	5 CR
M-MATH-102927	Traveling Waves	6 CR
M-MATH-102941	Control Theory	6 CR
M-MATH-102942	Stochastic Evolution Equations	8 CR
M-MATH-102952	L2-Invariants	5 CR
M-MATH-103080	Dynamical Systems	8 CR
M-MATH-103257	Nonlinear Maxwell Equations	3 CR
M-MATH-103259	Bifurcation Theory	5 CR

M-MATH-103539	Nonlinear Analysis	8 CR
M-MATH-103545	Harmonic Analysis for Dispersive Equations	8 CR
M-MATH-102884	Scattering Theory	8 CR
M-MATH-104059	Mathematical Topics in Kinetic Theory	4 CR
M-MATH-104425	Dispersive Equations	6 CR
M-MATH-104435	Selected Topics in Harmonic Analysis	3 CR
M-MATH-101338	Parallel Computing	5 CR
M-MATH-102888	Numerical Methods for Differential Equations	8 CR
M-MATH-102889	Introduction to Scientific Computing	8 CR
M-MATH-102891	Finite Element Methods	8 CR
M-MATH-102892	Numerical Optimisation Methods	8 CR
M-MATH-102894	Numerical Methods in Computational Electrodynamics	6 CR
M-MATH-102895	Wavelets	8 CR
M-MATH-102896	Medical Imaging	8 CR
M-MATH-102897	Mathematical Methods in Signal and Image Processing	8 CR
M-MATH-102899	Optimisation and Optimal Control for Differential Equations	4 CR
M-MATH-102900	Adaptive Finite Elemente Methods	6 CR
M-MATH-102901	Numerical Methods in Mathematical Finance	8 CR
M-MATH-102914	Numerical Methods in Mathematical Finance II	8 CR
M-MATH-102915	Numerical Methods for Hyperbolic Equations	6 CR
M-MATH-102920	Special Topics of Numerical Linear Algebra	8 CR
M-MATH-102921	Geometric Numerical Integration	6 CR
M-MATH-102928	Numerical Methods for Time-Dependent Partial Differential Equations	8 CR
M-MATH-102929	Mathematical Modelling and Simulation in Practise	4 CR
M-MATH-102930	Numerical Methods for Integral Equations	8 CR
M-MATH-102931	Numerical Methods for Maxwell's Equations	6 CR
M-MATH-102932	Numerical Methods in Fluid Mechanics	4 CR
M-MATH-102935	Compressive Sensing	5 CR
M-MATH-102936	Functions of Operators	6 CR
M-MATH-102937	Functions of Matrices	8 CR
M-MATH-102938	Project Centered Software-Lab	4 CR
M-MATH-102943	Introduction into Particulate Flows	3 CR
M-MATH-102944	Numerical Continuation Methods	5 CR
M-MATH-102945	Introduction to Matlab and Numerical Algorithms	5 CR
M-MATH-102955	Advanced Inverse Problems: Nonlinearity and Banach Spaces	5 CR
M-MATH-103260	Mathematical Methods of Imaging	5 CR
M-MATH-103527	Foundations of Continuum Mechanics	3 CR
M-MATH-103700	Exponential Integrators	6 CR
M-MATH-103709	Numerical Linear Algebra for Scientific High Performance Computing	3 CR
M-MATH-103919	Introduction to Kinetic Theory	4 CR
M-MATH-104054	Uncertainty Quantification	4 CR
M-MATH-104058	Numerical Linear Algebra in Image Processing	6 CR
M-MATH-104426	Comparison of Numerical Integrators for Nonlinear Dispersive Equations	4 CR
M-MATH-104827	Fourier Analysis and its Applications to PDEs	3 CR
M-MATH-103540	Boundary Element Methods	8 CR
M-MATH-102887	Monotonicity Methods in Analysis	3 CR
M-MATH-105066	Nonlinear Maxwell Equations	8 CR
M-MATH-105101	Introduction to Homogeneous Dynamics	6 CR
M-MATH-105093	Variational Methods	8 CR
M-MATH-105324	Harmonic Analysis neu	8 CR
M-MATH-105325	Splitting Methods for Evolution Equations neu	6 CR

M-MATH-105326	Nonlinear Wave Equations neu	4 CR
M-MATH-105327	Numerical Simulation in Molecular Dynamics neu	8 CR
Election block: Algebra and Geometry (at most 20 credits)		
M-MATH-101315	Algebra	8 CR
M-MATH-101317	Differential Geometry	8 CR
M-MATH-101336	Graph Theory	8 CR
M-MATH-101724	Algebraic Geometry	8 CR
M-MATH-101725	Algebraic Number Theory	8 CR
M-MATH-102864	Convex Geometry	8 CR
M-MATH-102867	Geometric Group Theory	8 CR
M-MATH-102948	Algebraic Topology	8 CR
M-MATH-102949	Introduction to Geometric Measure Theory	6 CR
M-MATH-102950	Combinatorics	8 CR
M-MATH-102952	L2-Invariants	5 CR
M-MATH-102957	Extremal Graph Theory	8 CR
M-MATH-102958	Spin Manifolds, Alpha Invariant and Positive Scalar Curvature	5 CR
M-MATH-102959	Homotopy Theory	8 CR
M-MATH-102960	The Riemann Zeta Function	4 CR
M-MATH-102865	Stochastic Geometry	8 CR
M-MATH-102866	Geometry of Schemes	8 CR
M-MATH-102912	Global Differential Geometry	8 CR
M-MATH-102940	Comparison Geometry	5 CR
M-MATH-102953	Algebraic Topology II	8 CR
M-MATH-102954	Group Actions in Riemannian Geometry	5 CR
M-MATH-103258	Finite Group Schemes	4 CR
M-MATH-104053	Commutative Algebra	8 CR
M-MATH-104057	Key Moments in Geometry	5 CR
M-MATH-104261	Lie Groups and Lie Algebras	8 CR
M-MATH-104349	Bott Periodicity	5 CR
M-MATH-105101	Introduction to Homogeneous Dynamics	6 CR
M-MATH-105323	Topological Groups neu	5 CR
M-MATH-105331	Introduction to Aperiodic Order neu	3 CR

3.3 Finance - Risk Management - Managerial Economics

Credits
18

Election block: Finance - Risk Management - Managerial Economics (at least 18 credits)		
M-WIWI-101478	Innovation and Growth	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101496	Growth and Agglomeration	9 CR
M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-101505	Experimental Economics	9 CR
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-102970	Decision and Game Theory	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-105032	Data Science for Finance	9 CR
M-WIWI-105036	FinTech Innovations	9 CR

3.4 Operations Management - Data Analysis - Informatics

Credits
18

Election block: Operations Management - Data Analysis - Informatics (at least 18 credits)		
M-WIWI-101413	Applications of Operations Research	9 CR
M-WIWI-101414	Methodical Foundations of OR	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101472	Informatics	9 CR
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
M-WIWI-105312	Marketing and Sales Management neu	9 CR

3.5 Seminar in Economics and Management

Credits
3

Election block: Seminar in Economics and Management (at least 3 credits)		
M-WIWI-102971	Seminar	3 CR
M-WIWI-102973	Seminar	3 CR

3.6 Mathematical Seminar

Credits
3

Mandatory		
M-MATH-102730	Seminar	3 CR

3.7 Elective Field

Credits 12

Election block: Elective Field (at least 12 credits)		
M-MATH-102864	Convex Geometry	8 CR
M-MATH-102866	Geometry of Schemes	8 CR
M-MATH-102872	Evolution Equations	8 CR
M-MATH-102879	Potential Theory	8 CR
M-MATH-102883	Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems	8 CR
M-MATH-102888	Numerical Methods for Differential Equations	8 CR
M-MATH-102890	Inverse Problems	8 CR
M-MATH-102891	Finite Element Methods	8 CR
M-MATH-102894	Numerical Methods in Computational Electrodynamics	6 CR
M-MATH-102904	Brownian Motion	4 CR
M-MATH-102906	Generalized Regression Models	4 CR
M-MATH-102909	Mathematical Statistics	4 CR
M-MATH-102910	Nonparametric Statistics	4 CR
M-MATH-102924	Optimization in Banach Spaces	8 CR
M-MATH-102927	Traveling Waves	6 CR
M-MATH-102931	Numerical Methods for Maxwell's Equations	6 CR
M-MATH-102936	Functions of Operators	6 CR
M-MATH-101315	Algebra	8 CR
M-MATH-101724	Algebraic Geometry	8 CR
M-MATH-101725	Algebraic Number Theory	8 CR
M-MATH-101768	Spectral Theory	8 CR
M-MATH-102867	Geometric Group Theory	8 CR
M-MATH-102874	Integral Equations	8 CR
M-MATH-102899	Optimisation and Optimal Control for Differential Equations	4 CR
M-MATH-102905	Percolation	6 CR
M-MATH-102915	Numerical Methods for Hyperbolic Equations	6 CR
M-MATH-102947	Probability Theory and Combinatorial Optimization	8 CR
M-MATH-102951	Random Graphs	6 CR
M-MATH-102956	Forecasting: Theory and Practice	8 CR
M-MATH-101317	Differential Geometry	8 CR
M-MATH-101320	Functional Analysis	8 CR
M-MATH-101335	Special Functions and Applications in Potential Theory	5 CR
M-MATH-101336	Graph Theory	8 CR
M-MATH-101338	Parallel Computing	5 CR
M-MATH-102860	Continuous Time Finance	8 CR
M-MATH-102873	Fourier Analysis	8 CR
M-MATH-102878	Complex Analysis	8 CR
M-MATH-102885	Maxwell's Equations	8 CR
M-MATH-102889	Introduction to Scientific Computing	8 CR
M-MATH-102892	Numerical Optimisation Methods	8 CR
M-MATH-102930	Numerical Methods for Integral Equations	8 CR
M-MATH-102940	Comparison Geometry	5 CR
M-MATH-102941	Control Theory	6 CR
M-MATH-102942	Stochastic Evolution Equations	8 CR
M-MATH-102944	Numerical Continuation Methods	5 CR
M-MATH-102952	L2-Invariants	5 CR

M-MATH-102958	Spin Manifolds, Alpha Invariant and Positive Scalar Curvature	5 CR
M-MATH-102895	Wavelets	8 CR
M-MATH-102896	Medical Imaging	8 CR
M-MATH-102897	Mathematical Methods in Signal and Image Processing	8 CR
M-MATH-102901	Numerical Methods in Mathematical Finance	8 CR
M-MATH-102902	Asymptotic Stochastics	8 CR
M-MATH-102907	Markov Decision Processes	5 CR
M-MATH-102908	Stochastic Control	4 CR
M-MATH-102911	Time Series Analysis	4 CR
M-MATH-102912	Global Differential Geometry	8 CR
M-MATH-102914	Numerical Methods in Mathematical Finance II	8 CR
M-MATH-102919	Discrete Time Finance	8 CR
M-MATH-102920	Special Topics of Numerical Linear Algebra	8 CR
M-MATH-102922	Poisson Processes	5 CR
M-MATH-102926	Sobolev Spaces	5 CR
M-MATH-102928	Numerical Methods for Time-Dependent Partial Differential Equations	8 CR
M-MATH-102929	Mathematical Modelling and Simulation in Practise	4 CR
M-MATH-102932	Numerical Methods in Fluid Mechanics	4 CR
M-MATH-102935	Compressive Sensing	5 CR
M-MATH-102937	Functions of Matrices	8 CR
M-MATH-102939	Extreme Value Theory	4 CR
M-MATH-102943	Introduction into Particulate Flows	3 CR
M-MATH-102946	Stein's Method	5 CR
M-MATH-102948	Algebraic Topology	8 CR
M-MATH-102949	Introduction to Geometric Measure Theory	6 CR
M-MATH-102954	Group Actions in Riemannian Geometry	5 CR
M-MATH-102959	Homotopy Theory	8 CR
M-MATH-102960	The Riemann Zeta Function	4 CR
M-MATH-102865	Stochastic Geometry	8 CR
M-MATH-102870	Classical Methods for Partial Differential Equations	8 CR
M-MATH-102871	Boundary and Eigenvalue Problems	8 CR
M-MATH-102881	Stochastic Differential Equations	8 CR
M-MATH-102900	Adaptive Finite Elemente Methods	6 CR
M-MATH-102903	Spatial Stochastics	8 CR
M-MATH-102921	Geometric Numerical Integration	6 CR
M-MATH-102938	Project Centered Software-Lab	4 CR
M-MATH-102945	Introduction to Matlab and Numerical Algorithms	5 CR
M-MATH-102950	Combinatorics	8 CR
M-MATH-102953	Algebraic Topology II	8 CR
M-MATH-102955	Advanced Inverse Problems: Nonlinearity and Banach Spaces	5 CR
M-MATH-102957	Extremal Graph Theory	8 CR
M-WIWI-101413	Applications of Operations Research	9 CR
M-WIWI-101414	Methodical Foundations of OR	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101472	Informatics	9 CR
M-WIWI-101473	Mathematical Programming	9 CR
M-WIWI-101478	Innovation and Growth	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101496	Growth and Agglomeration	9 CR

M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-101505	Experimental Economics	9 CR
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-102832	Operations Research in Supply Chain Management	9 CR
M-WIWI-102970	Decision and Game Theory	9 CR
M-WIWI-102971	Seminar	3 CR
M-WIWI-102972	Seminar	3 CR
M-WIWI-102973	Seminar	3 CR
M-WIWI-102974	Seminar	3 CR
M-MATH-103080	Dynamical Systems	8 CR
M-MATH-103257	Nonlinear Maxwell Equations	3 CR
M-MATH-103259	Bifurcation Theory	5 CR
M-MATH-103260	Mathematical Methods of Imaging	5 CR
M-MATH-103258	Finite Group Schemes	4 CR
M-WIWI-103289	Stochastic Optimization	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-MATH-103527	Foundations of Continuum Mechanics	3 CR
M-MATH-103539	Nonlinear Analysis	8 CR
M-MATH-103545	Harmonic Analysis for Dispersive Equations	8 CR
M-MATH-103700	Exponential Integrators	6 CR
M-MATH-103709	Numerical Linear Algebra for Scientific High Performance Computing	3 CR
M-MATH-103919	Introduction to Kinetic Theory	4 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-MATH-104053	Commutative Algebra	8 CR
M-MATH-104054	Uncertainty Quantification	4 CR
M-MATH-104055	Ruin Theory	4 CR
M-MATH-104057	Key Moments in Geometry	5 CR
M-MATH-104058	Numerical Linear Algebra in Image Processing	6 CR
M-MATH-104059	Mathematical Topics in Kinetic Theory	4 CR
M-MATH-102884	Scattering Theory	8 CR
M-MATH-104261	Lie Groups and Lie Algebras	8 CR
M-MATH-104349	Bott Periodicity	5 CR
M-MATH-104425	Dispersive Equations	6 CR
M-MATH-104426	Comparison of Numerical Integrators for Nonlinear Dispersive Equations	4 CR
M-MATH-104435	Selected Topics in Harmonic Analysis	3 CR
M-MATH-104827	Fourier Analysis and its Applications to PDEs	3 CR
M-MATH-103540	Boundary Element Methods	8 CR
M-MATH-102887	Monotonicity Methods in Analysis	3 CR
M-MATH-105066	Nonlinear Maxwell Equations	8 CR
M-MATH-105101	Introduction to Homogeneous Dynamics	6 CR
M-MATH-105093	Variational Methods	8 CR
M-WIWI-105312	Marketing and Sales Management neu	9 CR
M-MATH-105323	Topological Groups neu	5 CR
M-MATH-105324	Harmonic Analysis neu	8 CR
M-MATH-105325	Splitting Methods for Evolution Equations neu	6 CR
M-MATH-105326	Nonlinear Wave Equations neu	4 CR

M-MATH-105327	Numerical Simulation in Molecular Dynamics neu	8 CR
M-MATH-105331	Introduction to Aperiodic Order neu	3 CR

4 Modules

M 4.1 Module: Adaptive Finite Elemente Methods [M-MATH-102900]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-105898	Adaptive Finite Element Methods	6 CR	Dörfler

Prerequisites
none

M 4.2 Module: Advanced Inverse Problems: Nonlinearity and Banach Spaces [M-MATH-102955]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	5	1

Mandatory			
T-MATH-105927	Advanced Inverse Problems: Nonlinearity and Banach Spaces	5 CR	Rieder

Prerequisites
none

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

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	1

Election block: Compulsory Elective Courses (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.

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

Prerequisites
None

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.

Recommendation
None

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.

M 4.4 Module: Algebra [M-MATH-101315]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-102253	Algebra	8 CR	Herrlich, Kühnlein

Prerequisites
None

M 4.5 Module: Algebraic Geometry [M-MATH-101724]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-103340	Algebraic Geometry	8 CR	Herrlich, Kühnlein

M 4.6 Module: Algebraic Number Theory [M-MATH-101725]

Responsible: Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-103346	Algebraic Number Theory	8 CR	Kühnlein

M 4.7 Module: Algebraic Topology [M-MATH-102948]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	4	1

Mandatory			
T-MATH-105915	Algebraic Topology	8 CR	Kammeyer, Sauer

Prerequisites
none

M 4.8 Module: Algebraic Topology II [M-MATH-102953]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	5	1

Mandatory			
T-MATH-105926	Algebraic Topology II	8 CR	Sauer

Prerequisites
none

M 4.9 Module: Analytics and Statistics [M-WIWI-101637]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	2

Mandatory			
T-WIWI-103123	Advanced Statistics	4,5 CR	Grothe
Election block: Supplementary Courses (between 4,5 and 5 credits)			
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe

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 seperately.
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.

Prerequisites
The course "*Advanced Statistics*" is compulsory.

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 4.10 Module: Applications of Operations Research [M-WIWI-101413]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German	4	9

Election block: Compulsory Elective Courses (between 1 and 2 items)			
T-WIWI-102704	Facility Location and Strategic Supply Chain Management	4,5 CR	Nickel
T-WIWI-102714	Tactical and Operational Supply Chain Management	4,5 CR	Nickel
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102726	Global Optimization I	4,5 CR	Stein
T-WIWI-106199	Modeling and OR-Software: Introduction	4,5 CR	Nickel
T-WIWI-106545	Optimization under Uncertainty	4,5 CR	Rebennack

Competence Certificate
Due to a research semester of Professor Nickel in WS 19/20, the events 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.ior.kit.edu/Lehrveranstaltungen.php for further details.

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 seperately.

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 student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of Supply Chain Management and their respective optimization problems,
- is acquainted with classical location problem models (in the plane, on 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.

Prerequisites
At least one of the courses *Facility Location and strategic Supply Chain Management* and *Tactical and operational Supply Chain Management* has to be taken.

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 Supply Chain Management. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities like 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 Suppy 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.

Recommendation
The courses Introduction to Operations Research I and II are helpful.

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

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.

4.11 Module: Asymptotic Stochastics [M-MATH-102902]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105866	Asymptotic Stochastics	8 CR	Fasen-Hartmann, Henze, Klar

Prerequisites
none

M 4.12 Module: Bifurcation Theory [M-MATH-103259]

Responsible: Dr. Rainer Mandel
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Level	Version
5	Irregular	4	1

Mandatory			
T-MATH-106487	Bifurcation Theory	5 CR	Mandel

Prerequisites
None

Annotation
Course is held in English

M 4.13 Module: Bott Periodicity [M-MATH-104349]

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 semester	4	1

Mandatory			
T-MATH-108905	Bott Periodicity	5 CR	Tuschmann

Prerequisites
None

M 4.14 Module: Boundary and Eigenvalue Problems [M-MATH-102871]

Responsible: Prof. Dr. Wolfgang Reichel
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each summer term	1 semester	4	1

Mandatory			
T-MATH-105833	Boundary and Eigenvalue Problems	8 CR	Frey, Hundertmark, Lamm, Plum, Reichel, Schnaubelt

M 4.15 Module: Boundary Element Methods [M-MATH-103540]

Responsible: PD Dr. Tilo Arens
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-109851	Boundary Element Methods	8 CR	Arens

Prerequisites
None

M 4.16 Module: Brownian Motion [M-MATH-102904]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-105868	Brownian Motion	4 CR	Bäuerle, Fasen-Hartmann, Last

Prerequisites
none

M 4.17 Module: Classical Methods for Partial Differential Equations [M-MATH-102870]

Responsible: Prof. Dr. Michael Plum
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105832	Classical Methods for Partial Differential Equations	8 CR	Frey, Hundertmark, Lamm, Plum, Reichel, Schnaubelt

M 4.18 Module: Collective Decision Making [M-WIWI-101504]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	2 semester	English	4	4

Election block: Compulsory Elective Courses ()			
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 seperately.

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.

Competence Goal
Students

- are able to model practical problems of the public sector and to analyze them with respect to positive and normative questions,
- 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.

Prerequisites
None

Content
The focus of the module is on mechanisms of public decisions 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.

4.19 Module: Combinatorics [M-MATH-102950]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	4	1

Mandatory			
T-MATH-105916	Combinatorics	8 CR	Aksenovich

Competence Certificate
The final grade is given based on the written final exam (3h).

By successfully working on the problem sets, a bonus can be obtained. If the grade in the final written exam is between 4,0 and 1,3, then the bonus improves the grade by one step (0,3 or 0,4).

Competence Goal
The students understand, describe, and use fundamental notions and techniques in combinatorics. They can analyze, structure, and formally describe typical combinatorial questions. The students can use the results and methods such as inclusion-exclusion, generating functions, Young tableaux, as well as the developed proof ideas, in solving combinatorial problems. In particular, they can analyze the existence and the number of ordered and unordered arrangements of a given size. The students understand and critically use the combinatorial methods. Moreover, the students can communicate using English technical terminology.

Prerequisites
none

Content
The course is an introduction into combinatorics. Starting with counting problems and bijections, classical methods such as inclusion-exclusion principle and generating functions are discussed. Further topics include Catalan families, permutations, Young tableaux, partial orders, and combinatorial designs.

Annotation

- Regular cycle: every 2nd year, summer semester
- Course is held in English

M 4.20 Module: Commutative Algebra [M-MATH-104053]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-108398	Commutative Algebra	8 CR	Herrlich

Prerequisites
None

M 4.21 Module: Comparison Geometry [M-MATH-102940]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 semester	5	1

Mandatory			
T-MATH-105917	Comparison Geometry	5 CR	Tuschmann

Prerequisites
none

M 4.22 Module: Comparison of Numerical Integrators for Nonlinear Dispersive Equations [M-MATH-104426]

Responsible: Prof. Dr Katharina Schratz
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-109040	Comparison of Numerical Integrators for Nonlinear Dispersive Equations	4 CR	Schratz

Prerequisites
None

Content
We will compare numerical integrators (e.g., splitting methods, exponential integrators) for nonlinear dispersive equations such as the nonlinear Schrödinger equation and Kortweg-de Vries equation. We will analyze their convergence properties with regard to the regularity assumptions on the solution.

M 4.23 Module: Complex Analysis [M-MATH-102878]

Responsible: Dr. Christoph Schmoeger
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	5	1

Mandatory			
T-MATH-105849	Complex Analysis	8 CR	Herzog, Plum, Reichel, Schmoeger, Schnaubelt

Content

- infinite products
- Mittag-Leffler theorem
- Montel's theorem
- Riemann mapping theorem
- conformal mappings
- univalent (schlicht) functions
- automorphisms of some domains
- harmonic functions
- Schwarz reflection principle
- regular and singular points of power series

M 4.24 Module: Compressive Sensing [M-MATH-102935]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	4	1

Mandatory			
T-MATH-105894	Compressive Sensing	5 CR	Rieder

M 4.25 Module: Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems [M-MATH-102883]

Responsible: Prof. Dr. Michael Plum
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105854	Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems	8 CR	Plum

M 4.26 Module: Continuous Time Finance [M-MATH-102860]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each summer term	1 semester	4	1

Mandatory			
T-MATH-105930	Continuous Time Finance	8 CR	Bäuerle, Fasen-Hartmann

M 4.27 Module: Control Theory [M-MATH-102941]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105909	Control Theory	6 CR	Schnaubelt

Prerequisites
none

M 4.28 Module: Convex Geometry [M-MATH-102864]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105831	Convex Geometry	8 CR	Hug

Competence Goal
The students

- know fundamental combinatorial, geometric and analytic properties of convex sets and convex functions and apply these to related problems,
- are familiar with fundamental geometric and analytic inequalities for functionals of convex sets and their applications to geometric extremal problems and can present central ideas and techniques of proofs,
- know selected integral formulas for convex sets and the required results on invariant measures.
- know how to work self-organized and self-reflexive.

Content
1. Convex Sets
1.1. Combinatorial Properties
1.2. Support and Separation Properties
1.3. Extremal Representations
2. Convex Functions
2.1. Basic Properties
2.2. Regularity
2.3. Support Function
3. Brunn-Minkowski Theory
3.1. Hausdorff Metric
3.2. Volume and Surface Area
3.3. Mixed Volumes
3.4. Geometric Inequalities
3.5. Surface Area Measures
3.6. Projection Functions
4. Integralgeometric Formulas
4.1. Invariant Measures
4.2. Projection and Section Formulas

M 4.29 Module: Data Science for Finance [M-WIWI-105032]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics

Credits	Recurrence	Language	Level	Version
9	Each winter term	English	4	1

Mandatory			
T-WIWI-102878	Computational Risk and Asset Management	6 CR	Ulrich
T-WIWI-110213	Python for Computational Risk and Asset Management	3 CR	Ulrich

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module.
The assessment of "Computational Risk and Asset Management" is carried out in form of a written exam (90 minutes), the assessment of "Python for Computational Risk and Asset Management" is carried out in form of twelve weekly Python programming tasks and offered each winter term.
The overall grade of the module is the grade of the written exam weighted with factor 0.75 and the grade for the Python programming tasks weighted with factor 0.25. The resulting grade is truncated after the first decimal.

Competence Goal
Students learn how to implement solutions for advanced and real-world challenges in portfolio management. The focus of this module is on the realization of statistical concepts in Python and enable students to solve a broad range of problems along the investment process on their own.

Content
The module covers several topics, among them:

- Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization
- Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation
- Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor
- Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

Recommendation
Good knowledge of statistics and first programming experience with Python is recommended.

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module. 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 4.30 Module: Decision and Game Theory [M-WIWI-102970]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Language	Level	Version
9	German	4	1

Election block: Wahlpflichtangebot (9 credits)			
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß

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 seperately.

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 student learns the basics of individual and strategic decisions on an advanced and formal level.

He learns to analyze economic problems through abstract and method-based thinking and to design solution strategies. In the tutorials, the concepts and results of the lecture will be applied in case studies.

Prerequisites
None

Content
See German version.

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

M 4.31 Module: Differential Geometry [M-MATH-101317]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each summer term	1 semester	4	1

Mandatory			
T-MATH-102275	Differential Geometry	8 CR	Grensing, Leuzinger, Tuschmann

Prerequisites
None

M 4.32 Module: Discrete Time Finance [M-MATH-102919]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105839	Discrete Time Finance	8 CR	Bäuerle, Fasen-Hartmann

Prerequisites
none

M 4.33 Module: Dispersive Equations [M-MATH-104425]

Responsible: Prof. Dr. Wolfgang Reichel
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-109001	Dispersive Equations	6 CR	Reichel

Prerequisites
None

M 4.34 Module: Dynamical Systems [M-MATH-103080]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	German	4	1

Mandatory			
T-MATH-106114	Dynamical Systems	8 CR	Rottmann-Matthes

Prerequisites
none

M 4.35 Module: Econometrics and Statistics I [M-WIWI-101638]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	4

Mandatory			
T-WIWI-103125	Applied Econometrics	4,5 CR	Schienle
Election block: Supplementary Courses (between 4,5 and 5 credits)			
T-WIWI-103066	Data Mining and Applications	4,5 CR	Nakhaeizadeh
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-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller

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 seperately.

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 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.

Prerequisites
The course "*Advanced Statistics*" [2520020] is compulsory and must be examined.

The course Financial Econometrics [2520022] can only be passed if the course Time Series Analysis in the module Time Series Analysis and the course Generalized Regression Models in the module Generalized Regression Models have not be passed.

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

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	3

Election block: Compulsory Elective Courses (between 9 and 10 credits)			
T-WIWI-103066	Data Mining and Applications	4,5 CR	Nakhaeizadeh
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-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-103129	Stochastic Calculus and Finance	4,5 CR	Safarian

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 seperately.

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 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.

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

The course Financial Econometrics [2520022] can only be passed if the course Time Series Analysis in the module Time Series Analysis and the course Generalized Regression Models in the module Generalized Regression Models have not be passed.

Content
This modula 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 4.37 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: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German/English	4	4

Election block: Compulsory Elective Courses (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
Election block: Supplementary Courses (1 item)			
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.

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

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

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

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	1

Election block: Compulsory Elective Courses (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

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.

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 aproaches,
- can evaluate business models of electricity grids according to the regulation regime
- is prepared for scientific contributions in the field of energy system analysis.

Prerequisites
None.

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

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	4

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-102793	Efficient Energy Systems and Electric Mobility	3,5 CR	Jochem, McKenna
T-WIWI-102650	Energy and Environment	4,5 CR	Karl
T-WIWI-102830	Energy Systems Analysis	3 CR	Ardone, Fichtner
T-WIWI-107464	Smart Energy Infrastructure	3 CR	Ardone, Pustisek
T-WIWI-102695	Heat Economy	3 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 seperately.

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 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.

Prerequisites
To integrate the module “Energy Economics and Technology” in the degree programme “Wirtschaftsmathematik” it is compulsory to choose the course „Energy Systems Analysis“.

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 4.40 Module: Evolution Equations [M-MATH-102872]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105844	Evolution Equations	8 CR	Frey, Kunstmann, Schnaubelt

M 4.41 Module: Experimental Economics [M-WIWI-101505]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	5

Election block: Compulsory Elective Courses (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.

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.

Prerequisites
None.

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.

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

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.

M 4.42 Module: Exponential Integrators [M-MATH-103700]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-107475	Exponential Integrators	6 CR	Hochbruck

Competence Certificate
Oral exam of approximately 20 minutes

Prerequisites
None

Content
In this class we consider the construction, analysis, implementation and application of exponential integrators. The focus will be on two types of stiff problems.

The first one is characterized by a Jacobian that possesses eigenvalues with large negative real parts. Parabolic partial differential equations and their spatial discretization are typical examples. The second class consists of highly oscillatory problems with purely imaginary eigenvalues of large modulus.

Apart from motivating the construction of exponential integrators for various classes of problems, our main intention in this class is to present the mathematics behind these methods. We will derive error bounds that are independent of stiffness or highest frequencies in the system.

Since the implementation of exponential integrators requires the evaluation of the product of a matrix function with a vector, we will briefly discuss some possible approaches as well.

M 4.43 Module: Extremal Graph Theory [M-MATH-102957]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	English	4	1

Mandatory			
T-MATH-105931	Extremal Graph Theory	8 CR	Aksenovich

Competence Certificate
The final grade is given based on an oral exam (approx. 30 min.).

Competence Goal
The students understand, describe, and use fundamental notions and techniques in extremal graph theory. They can analyze, structure, and formally describe typical combinatorial questions. The students understand and use Szemeredi’s regularity lemma and Szemeredi’s theorem, can use probabilistic techniques, such as dependent random choice and multistep random colorings, know the best bounds for the extremal numbers of complete graphs, cycles, complete bipartite graphs, and bipartite graphs with bounded maximum degree. They understand and can use the Ramsey theorem for graphs and hypergraphs, as well as stepping-up techniques for bounding Ramsey numbers. Moreover, the students know and understand the behavior of Ramsey numbers for graphs with bounded maximum degree. The students can communicate using English technical terminology.

Content
The course is concerned with advanced topics in graph theory. It focuses on the areas of extremal functions, regularity, and Ramsey theory for graphs and hypergraphs. Further topics include Turán's theorem, Erdös-Stone theorem, Szemerédi’s lemma, graph colorings and probabilistic techniques.

Recommendation
Basic knowledge of linear algebra, analysis and graph theory is recommended.

Annotation
Course is held in English

M 4.44 Module: Extreme Value Theory [M-MATH-102939]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 term	4	2

Mandatory			
T-MATH-105908	Extreme Value Theory	4 CR	Fasen-Hartmann, Henze

Prerequisites
None

M 4.45 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: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	1

Election block: Compulsory Elective Courses (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 seperately.

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 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

Prerequisites
None

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 4.46 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: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	6

Election block: Compulsory Elective Courses (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-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-102644	Fixed Income Securities	4,5 CR	Uhrig-Homburg
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-102645	Credit Risk	4,5 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technoloy 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 seperately.

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

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.

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 4.47 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: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	6

Election block: Compulsory Elective Courses (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-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-102644	Fixed Income Securities	4,5 CR	Uhrig-Homburg
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-102645	Credit Risk	4,5 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technoloy 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 seperately.

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

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.

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 4.48 Module: Finite Element Methods [M-MATH-102891]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105857	Finite Element Methods	8 CR	Dörfler, Hochbruck, Jahnke, Rieder, Wieners

M 4.49 Module: Finite Group Schemes [M-MATH-103258]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
4	Once	German	4	1

Mandatory			
T-MATH-106486	Finite Group Schemes	4 CR	Januszewski

M 4.50 Module: FinTech Innovations [M-WIWI-105036]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics

Credits	Recurrence	Language	Level	Version
9	Each term	English	4	1

Mandatory			
T-WIWI-106193	Engineering FinTech Solutions	9 CR	Ulrich

Competence Certificate
The assessment is carried out in form of a written thesis based on the course "Engineering FinTech Solutions".

Competence Goal
Students with a strong technological background and/or a strong interest for software development and investments will learn how to build a prototype that automates essential steps for a fully automated investment and risk management process. Students also learn to organize themselves efficiently in teams of several developers in order to complete a prototype in a limited amount of time. Moreover, students deepen their understanding of finance and technology and learn how to combine both in an effective way. Students will hence be well prepared to become leaders and pioneers for upcoming FinTech innovations (and beyond) to help society to better invest for the future and to better protect from adverse risks.

Prerequisites
see T-WIWI-106193 "Engineering FinTech Solutions"

Content
The module is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

Recommendation
None

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

M 4.51 Module: Forecasting: Theory and Practice [M-MATH-102956]

Responsible: Prof. Dr. Tilmann Gneiting
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
8	Irregular	1 term	English	4	2

Mandatory			
T-MATH-105928	Forecasting: Theory and Practice	8 CR	Gneiting

Prerequisites
None

Annotation

- Regular cycle: every 2nd year, starting winter semester 16/17
- Course is held in English

M 4.52 Module: Foundations of Continuum Mechanics [M-MATH-103527]

Responsible: Prof. Dr. Christian Wieners
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Once	2 term	4	1

Mandatory			
T-MATH-107044	Foundations of Continuum Mechanics	3 CR	Wieners

Prerequisites
none

4.53 Module: Fourier Analysis [M-MATH-102873]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105845	Fourier Analysis	8 CR	Schnaubelt

Content

- Fourier series
- Fourier transform on L1 and L2
- Tempered distributions and their Fourier transform
- Explizit solutions of the Heat-, Schrödinger- and Wave equation in Rn
- the Hilbert transform
- the interpolation theorem of Marcinkiewicz
- Singular integral operators
- the Fourier multiplier theorem of Mihlin

M 4.54 Module: Fourier Analysis and its Applications to PDEs [M-MATH-104827]

Responsible: Jun.-Prof. Dr. Xian Liao
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Irregular	1 semester	4	2

Mandatory			
T-MATH-109850	Fourier Analysis and its Applications to PDEs	3 CR	Liao

Prerequisites
None

M 4.55 Module: Functional Analysis [M-MATH-101320]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-102255	Functional Analysis	8 CR	Frey, Herzog, Hundertmark, Lamm, Plum, Reichel, Schmoeger, Schnaubelt

Prerequisites
None

M 4.56 Module: Functions of Matrices [M-MATH-102937]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	4	1

Mandatory			
T-MATH-105906	Functions of Matrices	8 CR	Grimm

Prerequisites
none

M 4.57 Module: Functions of Operators [M-MATH-102936]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105905	Functions of Operators	6 CR	

M 4.58 Module: Generalized Regression Models [M-MATH-102906]

Responsible: Dr. Bernhard Klar
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Each summer term	1 semester	4	2

Mandatory			
T-MATH-105870	Generalized Regression Models	4 CR	Henze, Klar

Prerequisites
None

M 4.59 Module: Geometric Group Theory [M-MATH-102867]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105842	Geometric Group Theory	8 CR	Herrlich, Leuzinger, Link, Sauer, Tuschmann

4.60 Module: Geometric Numerical Integration [M-MATH-102921]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105919	Geometric Numerical Integration	6 CR	Hochbruck, Jahnke

Prerequisites
none

M 4.61 Module: Geometry of Schemes [M-MATH-102866]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	5	1

Mandatory			
T-MATH-105841	Geometry of Schemes	8 CR	Herrlich, Kühnlein

M 4.62 Module: Global Differential Geometry [M-MATH-102912]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	5	1

Mandatory			
T-MATH-105885	Global Differential Geometry	8 CR	Grensing, Tuschmann

Prerequisites
none

M 4.63 Module: Graph Theory [M-MATH-101336]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
8	Irregular	1 semester	English	4	1

Mandatory			
T-MATH-102273	Graph Theory	8 CR	Aksenovich

Competence Certificate
The final grade is given based on the written final exam (3h).
By successfully working on the problem sets, a bonus can be obtained. If the grade in the final written exam is between 4,0 and 1,3, then the bonus improves the grade by one step (0,3 or 0,4).

Competence Goal
The students understand, describe and use fundamental notions and techniques in graph theory. They can represent the appropriate mathematical questions in terms of graphs and use the results such as Menger's theorem, Kuratowski's theorem, Turan's theorem, as well as the developed proof ideas, to solve these problems. The students can analyze graphs in terms of their characteristics such as connectivity, planarity, and chromatic number. They are well positioned to understand graph theoretic methods and use them critically. Moreover, the students can communicate using English technical terminology.

Prerequisites
None

Content
The course Graph Theory treats the fundamental properties of graphs, starting with basic ones introduced by Euler and including the modern results obtained in the last decade. The following topics are covered: structure of trees, paths, cycles and walks in graphs, minors, unavoidable subgraphs in dense graphs, planar graphs, graph coloring, Ramsey theory, and regularity in graphs.

Annotation

- Regular cycle: every 2nd year, winter semester
- Course is held in English

4.64 Module: Group Actions in Riemannian Geometry [M-MATH-102954]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	5	1

Mandatory			
T-MATH-105925	Group Actions in Riemannian Geometry	5 CR	Tuschmann

Prerequisites
none

M 4.65 Module: Growth and Agglomeration [M-WIWI-101496]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	3

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-102785	Theory of Endogenous Growth	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.

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

Prerequisites
None

Content
The module includes the contents of the lectures *Endogenous Growth Theory* [2561503], *Spatial Economics* [2561260] and *International Economic Policy* [2560254]. While the first two lectures have a more formal-analytic focus, the third lecture approaches fundamental ideas and problems from the field of international economic policy from a more verbal perspective.

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

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.

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

4.66 Module: Harmonic Analysis [M-MATH-105324]

Responsible: Prof. Dr. Dorothee Frey
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-110804	Harmonic Analysis	8 CR	Frey, Kunstmann, Schnaubelt

Content

- Fourier series
- Fourier transform on L1 and L2
- Tempered distributions and their Fourier transform
- Explizit solutions of the Heat-, Schrödinger- and Wave equation in Rn
- the Hilbert transform
- the interpolation theorem of Marcinkiewicz
- Singular integral operators
- the Fourier multiplier theorem of Mihlin

M 4.67 Module: Harmonic Analysis for Dispersive Equations [M-MATH-103545]

Responsible: Dr. Peer Kunstmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-107071	Harmonic Analysis for Dispersive Equations	8 CR	Kunstmann

Prerequisites
None

Content
Fourier transform, Fourier multipliers, interpolation, singular integral operators, Mihlin's Theorem, Littlewood-Paley decomposition, oscillating integrals, dispersive estimates, Strichartz estimates, nonlinear equations.

M 4.68 Module: Homotopy Theory [M-MATH-102959]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	German	4	1

Mandatory			
T-MATH-105933	Homotopy Theory	8 CR	Sauer

M 4.69 Module: Informatics [M-WIWI-101472]

Responsible: Prof. Dr. Andreas Oberweis
Prof. Dr. Harald Sack
Prof. Dr. Ali Sunyaev
Prof. Dr. York Sure-Vetter
Prof. Dr. Melanie Volkamer
Prof. Dr.-Ing. Johann Marius Zöllner

Organisation: KIT Department of Economics and Management

Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Level	Version
9	Each term	1 semester	4	12

Election block: Compulsory Elective Area ()			
T-WIWI-110339	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services	4,5 CR	Sunyaev
T-WIWI-102680	Computational Economics	4,5 CR	Shukla
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-102668	Enterprise Architecture Management	4,5 CR	Wolf
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-110372	Supplement Software- and Systemsengineering	4,5 CR	Oberweis
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-110863	Introduction to Data Science	4,5 CR	Herbold
T-WIWI-102666	Knowledge Discovery	4,5 CR	Sure-Vetter
T-WIWI-102667	Management of IT-Projects	4,5 CR	Schätzle
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-102697	Business Process Modelling	4,5 CR	Oberweis
T-WIWI-102679	Nature-Inspired Optimization Methods	4,5 CR	Shukla
T-WIWI-109799	Process Mining	4,5 CR	Oberweis
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Sure-Vetter
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
T-WIWI-102669	Strategic Management of Information Technology	4,5 CR	Wolf
T-WIWI-103112	Web Science	4,5 CR	Sure-Vetter
Election block: Seminars and Advanced Labs (between 0 and 1 items)			
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-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Fachbereichs Informatik
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer
T-WIWI-109786	Advanced Lab Security	4,5 CR	Volkamer
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	4,5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	4,5 CR	Zöllner
T-WIWI-109251	Selected Issues in Critical Information Infrastructures	4,5 CR	Sunyaev

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.

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.

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.

Please note the following information about the module component exams of Prof. Dr. H. Schmeck:

The examinations in Algorithms for Internet Applications [T-WIWI-102658], Efficient Algorithms [T-WIWI-102655], Organic Computing [T-WIWI-102659] and Smart Energy Distribution [T-WIWI-102845] are offered latest until summer term 2017 (repeaters only).

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Prerequisites
It is only allowed to choose one lab.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Annotation
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

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

M 4.70 Module: Information Systems in Organizations [M-WIWI-104068]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	3

Election block: Compulsory Elective Courses (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, Morana
T-WIWI-106201	Digital Transformation of Organizations	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.

Competence Goal
The student

- has a comprehensive understanding of conceptual and theoretical foundations of informations 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

Prerequisites
None

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

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	3

Election block: Compulsory Elective Courses (between 9 and 10 credits)			
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-102785	Theory of Endogenous Growth	4,5 CR	Ott
T-WIWI-102840	Innovation Theory and Policy	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 offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately.

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.

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

Prerequisites
None

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.

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.

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.

M 4.72 Module: Integral Equations [M-MATH-102874]

Responsible: PD Dr. Frank Hettlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105834	Integral Equations	8 CR	Arens, Griesmaier, Hettlich

M 4.73 Module: Introduction into Particulate Flows [M-MATH-102943]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Once	2 term	4	1

Mandatory			
T-MATH-105911	Introduction into Particulate Flows	3 CR	Dörfler

Prerequisites
none

M 4.74 Module: Introduction to Aperiodic Order [M-MATH-105331]

Responsible: Prof. Dr. Tobias Hartnick
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Irregular	1 semester	4	1

Mandatory			
T-MATH-110811	Introduction to Aperiodic Order	3 CR	Hartnick

Prerequisites
None

M 4.75 Module: Introduction to Geometric Measure Theory [M-MATH-102949]

Responsible: PD Dr. Steffen Winter
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105918	Introduction to Geometric Measure Theory	6 CR	Winter

Prerequisites
none

M 4.76 Module: Introduction to Homogeneous Dynamics [M-MATH-105101]

Responsible: Prof. Dr. Tobias Hartnick
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-110323	Introduction to Homogeneous Dynamics	6 CR	Hartnick

Prerequisites
None

M 4.77 Module: Introduction to Kinetic Theory [M-MATH-103919]

Responsible: Prof. Dr. Martin Frank
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
4	Each winter term	1 semester	English	4	1

Mandatory			
T-MATH-108013	Introduction to Kinetic Theory	4 CR	Frank

Competence Goal
After successfully taking part in the module’s classes and exams, students have gained knowledge and abilities as described in the “Inhalt” section. Specifically, Students know common means of mesoscopic and macroscopic description of particle systems. Furthermore, students are able to describe the basics of multiscale methods, such as the asypmtotic analysis and the method of moments. Students are able to apply numerical methods to solve engineering problems related to particle systems. They can name the assumptions that are needed to be made in the process. Students can judge whether specific models are applicable to the specific problem and discuss their results with specialists and colleagues.

Prerequisites
None

Content

- From Newton's equations to Boltzmann's equation
- Rigorous derivation of the linear Boltzmann equation
- Properties of kinetic equations (existence & uniqueness, H theorem)
- The diffusion limit
- From Boltzmann to Euler & Navier-Stokes
- Method of Moments
- Closure techniques
- Selected numerical methods

Recommendation
Partial Differential Equations, Functional Analysis

M 4.78 Module: Introduction to Matlab and Numerical Algorithms [M-MATH-102945]

Responsible: Dr. Daniel Weiß
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	4	1

Mandatory			
T-MATH-105913	Introduction to Matlab and Numerical Algorithms	5 CR	Weiß, Wieners

Prerequisites
none

M 4.79 Module: Introduction to Scientific Computing [M-MATH-102889]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr Tobias Jahnke

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each summer term	1 semester	4	2

Mandatory			
T-MATH-105837	Introduction to Scientific Computing	8 CR	Dörfler, Hochbruck, Jahnke, Rieder, Wieners

Prerequisites
None

M 4.80 Module: Inverse Problems [M-MATH-102890]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105835	Inverse Problems	8 CR	Arens, Griesmaier, Hettlich, Rieder

M 4.81 Module: Key Moments in Geometry [M-MATH-104057]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 semester	4	1

Mandatory			
T-MATH-108401	Key Moments in Geometry	5 CR	Tuschmann

Prerequisites
None

M 4.82 Module: L2-Invariants [M-MATH-102952]

Responsible: Dr. Holger Kammeyer
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	4	1

Mandatory			
T-MATH-105924	L2-Invariants	5 CR	Kammeyer, Sauer

Prerequisites
none

M 4.83 Module: Lie Groups and Lie Algebras [M-MATH-104261]

Responsible: Prof. Dr. Enrico Leuzinger
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	German	4	1

Mandatory			
T-MATH-108799	Lie Groups and Lie Algebras	8 CR	Leuzinger

M 4.84 Module: Marketing and Sales Management [M-WIWI-105312]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each summer term	1 semester	German/English	4	1

Election block: Compulsory Elective Courses (at least 1 item)			
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102834	Case Studies in Sales and Pricing	1,5 CR	Klarmann
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Konhäuser
T-WIWI-102835	Marketing Strategy Business Game	1,5 CR	Klarmann
T-WIWI-102891	Price Negotiation and Sales Presentations	1,5 CR	Klarmann, Schröder
T-WIWI-110920	Real World Lab: Innovation Communication	1,5 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.

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

Prerequisites
The course "Market Research" is obligatory.

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

Annotation
Please note that only one of the listed 1,5-ECTS courses can be chosen in the module.

Workload
The total workload for this module is approximately 270 hours.

M 4.85 Module: Markov Decision Processes [M-MATH-102907]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 semester	4	1

Mandatory			
T-MATH-105921	Markov Decision Processes	5 CR	Bäuerle

Prerequisites
none

M 4.86 Module: Master Thesis [M-MATH-102917]

Responsible: Dr. Sebastian Grensing
Organisation: KIT Department of Mathematics
Part of: Master Thesis

Credits	Recurrence	Duration	Level	Version
30	Each term	1 term	4	1

Mandatory			
T-MATH-105878	Master Thesis	30 CR	Grensing

M 4.87 Module: Mathematical Methods in Signal and Image Processing [M-MATH-102897]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105862	Mathematical Methods in Signal and Image Processing	8 CR	Rieder

Prerequisites
none

M 4.88 Module: Mathematical Methods of Imaging [M-MATH-103260]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Level	Version
5	Irregular	4	1

Mandatory			
T-MATH-106488	Mathematical Methods of Imaging	5 CR	Rieder

Prerequisites
None

4.89 Module: Mathematical Modelling and Simulation in Practise [M-MATH-102929]

Responsible: PD Dr. Gudrun Thäter
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
4	Irregular	2 term	English	4	2

Mandatory			
T-MATH-105889	Mathematical Modelling and Simulation in Practise	4 CR	Thäter

Prerequisites
None

M 4.90 Module: Mathematical Programming [M-WIWI-101473]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	6

Election block: Compulsory Elective Courses (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-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
Election block: Supplementary Courses (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-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

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 seperately.

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 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 makes suggestions to adapt them to practical problems.

Prerequisites
At least one of the courses "Mixed Integer Programming I", "Parametric Optimization", "Convex Analysis", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

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. For further information see German version.

4.91 Module: Mathematical Statistics [M-MATH-102909]

Responsible: Dr. Bernhard Klar
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-105872	Mathematical Statistics	4 CR	Henze, Klar

Prerequisites
none

M 4.92 Module: Mathematical Topics in Kinetic Theory [M-MATH-104059]

Responsible: Prof. Dr. Dirk Hundertmark
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-108403	Mathematical Topics in Kinetic Theory	4 CR	Hundertmark

Competence Goal
The students are familiar with the basic questions in kinetic theory and methodical approaches to their solutions. With the acquired knowledge they are able to understand the required analytical methods and are able to apply them to the basic equations in kinetic theory.

Prerequisites
None

Content

- Boltzmann equation: Cauchy problem and properties of solutions
- entropy and H theorem
- equilibrium and convergence to equilibrium
- other models of kinetic theory

M 4.93 Module: Maxwell's Equations [M-MATH-102885]

Responsible: PD Dr. Frank Hettlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105856	Maxwell's Equations	8 CR	Arens, Griesmaier, Hettlich

M 4.94 Module: Medical Imaging [M-MATH-102896]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105861	Medical Imaging	8 CR	Rieder

Prerequisites
None

M 4.95 Module: Methodical Foundations of OR [M-WIWI-101414]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Level	Version
9	Each term	1 semester	4	9

Election block: Compulsory Elective Courses (at least 1 item as well as between 4,5 and 9 credits)			
T-WIWI-102726	Global Optimization I	4,5 CR	Stein
T-WIWI-103638	Global Optimization I and II	9 CR	Stein
T-WIWI-102724	Nonlinear Optimization I	4,5 CR	Stein
T-WIWI-103637	Nonlinear Optimization I and II	9 CR	Stein
Election block: Supplementary Courses ()			
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102727	Global Optimization II	4,5 CR	Stein
T-WIWI-102725	Nonlinear Optimization II	4,5 CR	Stein
T-WIWI-102704	Facility Location and Strategic Supply Chain Management	4,5 CR	Nickel

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 assessment procedures are described for each course of the module seperately.

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 student

- names and describes basic notions for optimization methods, in particular from nonlinear and from global optimization,
- 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.

Prerequisites
At least one of the courses *Nonlinear Optimization I* and *Global Optimization I* has to be examined.

Content
The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous decision variables. The lectures on nonlinear programming deal with local solution concepts, whereas the lectures on global optimization treat approaches for global solutions.

Recommendation
The courses Introduction to Operations Research I and II are helpful.

Annotation
The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu).

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

M 4.96 Module: Microeconomic Theory [M-WIWI-101500]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German/English	4	3

Election block: Compulsory Elective Courses (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-102859	Social Choice Theory	4,5 CR	Puppe
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
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 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 seperately.

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.

Competence Goal
Students

- are able to model practical microoeconomic problems mathematically and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs.

An example of a positive question is: which regulation policy results in which firm decistions under imperfect competition? An example of a normative question is: which voting rule has appealing properties?

Prerequisites
None

Content
The student should gain an understanding of advanced topics in economic theory, game theory and welfare economics. Core topics are, among others, strategic interactions in markets, cooperative and non-cooperative bargaining (Advanced Game Theory), allocation under asymmetric information and general equilibrium over time (Advanced Topics in Economic Theory), voting and the aggregation of preferences and judgements (Social Choice Theory).

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

M 4.97 Module: Monotonicity Methods in Analysis [M-MATH-102887]

Responsible: PD Dr. Gerd Herzog
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Irregular	2 term	4	1

Mandatory			
T-MATH-105877	Monotonicity Methods in Analysis	3 CR	Herzog

M 4.98 Module: Nonlinear Analysis [M-MATH-103539]

Responsible: Prof. Dr. Tobias Lamm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-107065	Nonlinear Analysis	8 CR	Lamm

Prerequisites
None

M 4.99 Module: Nonlinear Maxwell Equations [M-MATH-105066]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	German	4	1

Mandatory			
T-MATH-110283	Nonlinear Maxwell Equations	8 CR	Schnaubelt

Prerequisites
none

M 4.100 Module: Nonlinear Maxwell Equations [M-MATH-103257]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Irregular	1 semester	4	1

Mandatory			
T-MATH-106484	Nonlinear Maxwell Equations	3 CR	Schnaubelt

Prerequisites
none

Content

- Short introduction to nonlinear contraction semigroups in Hilbert spaces and to the spaces H(curl) and H(div).
- Semilinear case:
  Maxwell's equations with linear material laws and nonlinear conductivity. Wellposedness by means of maximal monotone operators. Long-term behavior.
- Quasilinear case:
  Maxwell's equations with nonlinear instantaneous material laws. Local wellposedness on the whole space via linearisation, apriori estimates and regularization. Blow-up examples. Outlook to results on domains.

M 4.101 Module: Nonlinear Wave Equations [M-MATH-105326]

Responsible: Dr. Birgit Schörkhuber
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-110806	Nonlinear Wave Equations	4 CR	Schörkhuber

Prerequisites
None

4.102 Module: Nonparametric Statistics [M-MATH-102910]

Responsible: Dr. Bernhard Klar
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	2

Mandatory			
T-MATH-105873	Nonparametric Statistics	4 CR	Henze, Klar

Prerequisites
None

M 4.103 Module: Numerical Continuation Methods [M-MATH-102944]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	2 term	4	1

Mandatory			
T-MATH-105912	Numerical Continuation Methods	5 CR	Rottmann-Matthes

Prerequisites
none

M 4.104 Module: Numerical Linear Algebra for Scientific High Performance Computing [M-MATH-103709]

Responsible: Dr. Hartwig Anzt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
3	Irregular	1 semester	English	4	1

Mandatory			
T-MATH-107497	Numerical Linear Algebra for Scientific High Performance Computing	3 CR	Anzt

Prerequisites
None

M 4.105 Module: Numerical Linear Algebra in Image Processing [M-MATH-104058]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-108402	Numerical Linear Algebra in Image Processing	6 CR	Grimm

Prerequisites
None

M 4.106 Module: Numerical Methods for Differential Equations [M-MATH-102888]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr Tobias Jahnke

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105836	Numerical Methods for Differential Equations	8 CR	Dörfler, Hochbruck, Jahnke, Rieder, Wieners

M 4.107 Module: Numerical Methods for Hyperbolic Equations [M-MATH-102915]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105900	Numerical Methods for Hyperbolic Equations	6 CR	Dörfler

Competence Goal
.

Prerequisites
none

M 4.108 Module: Numerical Methods for Integral Equations [M-MATH-102930]

Responsible: PD Dr. Tilo Arens
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	5	1

Mandatory			
T-MATH-105901	Numerical Methods for Integral Equations	8 CR	Arens, Hettlich

M 4.109 Module: Numerical Methods for Maxwell's Equations [M-MATH-102931]

Responsible: Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	2 term	4	1

Mandatory			
T-MATH-105920	Numerical Methods for Maxwell's Equations	6 CR	Hochbruck, Jahnke

4.110 Module: Numerical Methods for Time-Dependent Partial Differential Equations [M-MATH-102928]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	5	1

Mandatory			
T-MATH-105899	Numerical Methods for Time-Dependent Partial Differential Equations	8 CR	Hochbruck, Jahnke

M 4.111 Module: Numerical Methods in Computational Electrodynamics [M-MATH-102894]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-105860	Numerical Methods in Computational Electrodynamics	6 CR	Dörfler, Hochbruck, Jahnke, Rieder, Wieners

Prerequisites
none

M 4.112 Module: Numerical Methods in Fluid Mechanics [M-MATH-102932]

Responsible: Prof. Dr. Willy Dörfler
PD Dr. Gudrun Thäter

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	2 term	4	1

Mandatory			
T-MATH-105902	Numerical Methods in Fluid Mechanics	4 CR	Dörfler, Thäter

M 4.113 Module: Numerical Methods in Mathematical Finance [M-MATH-102901]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105865	Numerical Methods in Mathematical Finance	8 CR	Jahnke

Prerequisites
none

M 4.114 Module: Numerical Methods in Mathematical Finance II [M-MATH-102914]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	5	1

Mandatory			
T-MATH-105880	Numerical Methods in Mathematical Finance II	8 CR	Jahnke

Prerequisites
none

M 4.115 Module: Numerical Optimisation Methods [M-MATH-102892]

Responsible: Prof. Dr. Christian Wieners
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105858	Numerical Optimisation Methods	8 CR	Dörfler, Hochbruck, Jahnke, Rieder, Wieners

M 4.116 Module: Numerical Simulation in Molecular Dynamics [M-MATH-105327]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Irregular	German	4	1

Mandatory			
T-MATH-110807	Numerical Simulation in Molecular Dynamics	8 CR	Grimm

Prerequisites
None

4.117 Module: Operations Research in Supply Chain Management [M-WIWI-102832]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	7

Election block: Compulsory Elective Courses (at most 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
Election block: Supplementary Courses (at most 2 items)			
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	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-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx
T-WIWI-106549	Large-scale 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 seperately.

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 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.

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.

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 Suppy Chain Mangement, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

Recommendation
Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

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

M 4.118 Module: Optimisation and Optimal Control for Differential Equations [M-MATH-102899]

Responsible: Prof. Dr. Christian Wieners
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-105864	Optimisation and Optimal Control for Differential Equations	4 CR	

Prerequisites
none

M 4.119 Module: Optimization in Banach Spaces [M-MATH-102924]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105893	Optimization in Banach Spaces	8 CR	Griesmaier, Hettlich

Prerequisites
none

4.120 Module: Parallel Computing [M-MATH-101338]

Responsible: Dr. rer. nat. Mathias Krause
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Level	Version
5	Irregular	4	1

Mandatory			
T-MATH-102271	Parallel Computing	5 CR	Krause, Wieners

Prerequisites
None

4.121 Module: Percolation [M-MATH-102905]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-105869	Percolation	6 CR	Last

Competence Goal
The students

- are acquainted with basic models of discrete and continuum percolation,
- acquire the skills needed to use specific probabilistic and graph-theoretical methods for the analysis of these models,
- know how to work self-organised and self-reflexive.

Prerequisites
none

M 4.122 Module: Poisson Processes [M-MATH-102922]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 term	4	1

Mandatory			
T-MATH-105922	Poisson Processes	5 CR	Fasen-Hartmann, Hug, Last

Competence Certificate
oral exam

Competence Goal
The students know about important properties of the Poisson process. The focus is on probabilistic methods and results which are independent of the specific phase space. The students understand the central role of the Poisson process as a specific point process and as a random measure.

Module grade calculation
Marking: grade of exam

Prerequisites
none

Content

- Distributional properties of Poisson processes
- The Poisson process as a particular point process
- stationary Poisson and point processes
- Random measures and Cox processes
- Poisson cluster processes and compound Poisson processes
- The spatial Gale-Shapley algorithm

M 4.123 Module: Potential Theory [M-MATH-102879]

Responsible: Prof. Dr. Andreas Kirsch
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105850	Potential Theory	8 CR	Arens, Hettlich, Kirsch, Reichel

M 4.124 Module: Probability Theory and Combinatorial Optimization [M-MATH-102947]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 term	4	1

Mandatory			
T-MATH-105923	Probability Theory and Combinatorial Optimization	8 CR	Hug, Last

Prerequisites
none

M 4.125 Module: Project Centered Software-Lab [M-MATH-102938]

Responsible: PD Dr. Gudrun Thäter
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Each summer term	2 term	4	1

Mandatory			
T-MATH-105907	Project Centered Software-Lab	4 CR	Thäter

Prerequisites
none

M 4.126 Module: Random Graphs [M-MATH-102951]

Responsible: Dr. Matthias Schulte
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 term	4	1

Mandatory			
T-MATH-105929	Random Graphs	6 CR	Schulte

Prerequisites
none

M 4.127 Module: Ruin Theory [M-MATH-104055]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-108400	Ruin Theory	4 CR	Fasen-Hartmann

Prerequisites
None

4.128 Module: Scattering Theory [M-MATH-102884]

Responsible: PD Dr. Frank Hettlich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105855	Scattering Theory	8 CR	Arens, Griesmaier, Hettlich

M 4.129 Module: Selected Topics in Harmonic Analysis [M-MATH-104435]

Responsible: Prof. Dr. Dirk Hundertmark
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
3	Irregular	1 semester	4	1

Mandatory			
T-MATH-109065	Selected Topics in Harmonic Analysis	3 CR	Hundertmark

Competence Goal
The students are familiar with the concepts of singular integral operators and weighted estimates in Harmonic Analysis. They know the relations between the BMO space and the Muckenhoupt weights and also how to use dyadic analysis operators to obtain estimates for Calderon-Zygmund operators.

Prerequisites
None

Content
- Calderon-Zygmund and Singular Integral operators
- BMO space and Muckenhoupt weights
- Reverse Holder Inequality and Factorisation of Ap weights
- Extrapolation Theory and weighted norm inequalities for singular integral operators

M 4.130 Module: Seminar [M-MATH-102730]

Responsible: Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: Mathematical Seminar

Credits	Recurrence	Language	Level	Version
3	Each term	German	4	3

Election block: Elective Seminar (1 item)			
T-MATH-105686	Seminar Mathematics	3 CR	

M 4.131 Module: Seminar [M-WIWI-102971]

Responsible: Prof. Dr. Hagen Lindstädt
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: Seminar in Economics and Management
Elective Field

Credits	Language	Level	Version
3	German	4	1

Election block: Wahlpflichtangebot (3 credits)			
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-103483	Seminar in Statistics A (Master)	3 CR	Grothe, Schienle

Competence Certificate

The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characerization.
The final mark for the module is the mark of the seminar.

Competence Goal

The students are in a position to independently handle current, research-based tasks according to scientific criteria.

• They are able to research, analyze, abstract and critically review the information.

• They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.

• They can logically and systematically present the obtained 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.

Prerequisites

None.

Content

Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailled description o these qualifications is given in the section "Key Qualifications" of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Recommendation

None.

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.

M 4.132 Module: Seminar [M-WIWI-102973]

Responsible: Prof. Dr. Hagen Lindstädt
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: Seminar in Economics and Management
Elective Field

Credits	Language	Level	Version
3	German	4	1

Election block: Wahlpflichtangebot (3 credits)			
T-WIWI-103479	Seminar in Informatics A (Master)	3 CR	Professorenschaft des Fachbereichs Informatik
T-WIWI-103481	Seminar in Operations Research A (Master)	3 CR	Nickel, Rebennack, Stein

Competence Certificate
The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characerization.

The final mark for the module is the mark of the seminar.

Competence Goal
The students are in a position to independently handle current, research-based tasks according to scientific criteria.

• They are able to research, analyze, abstract and critically review the information.

• They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.

• They can logically and systematically present the obtained 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.

Prerequisites
None.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailled description o these qualifications is given in the section “Key Qualifications” of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Recommendation
None.

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.

M 4.133 Module: Seminar [M-WIWI-102972]

Responsible: Prof. Dr. Hagen Lindstädt
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: Elective Field

Credits	Recurrence	Language	Level	Version
3	Each term	German/English	4	1

Election block: Wahlplfichtangebot (1 item)			
T-WIWI-103476	Seminar in Business Administration B (Master)	3 CR	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
T-WIWI-103477	Seminar in Economics B (Master)	3 CR	Professorenschaft des Fachbereichs Volkswirtschaftslehre
T-WIWI-103484	Seminar in Statistics B (Master)	3 CR	Grothe, Schienle

Competence Certificate
The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characerization.

The final mark for the module is the mark of the seminar

Competence Goal

- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained 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.

Prerequisites
None.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well.

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.

Workload
he total workload for this module is approximately 90 hours.

M 4.134 Module: Seminar [M-WIWI-102974]

Responsible:	Prof. Dr. Hagen Lindstädt Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	Elective Field

Credits	Recurrence	Language	Level	Version
3	Each term	German/English	4	1

Election block: Wahlplfichtangebot (1 item)			
T-WIWI-103480	Seminar in Informatics B (Master)	3 CR	Professorenschaft des Fachbereichs Informatik
T-WIWI-103482	Seminar in Operations Research B (Master)	3 CR	Nickel, Rebennack, Stein

Competence Certificate
The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characerization.

The final mark for the module is the mark of the seminar

Competence Goal

- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained 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.

Prerequisites
None.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well.

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.

Workload
he total workload for this module is approximately 90 hours.

M 4.135 Module: Service Operations [M-WIWI-102805]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics

Credits	Recurrence	Language	Level	Version
9	Each term	German	4	6

Election block: Compulsory Elective Courses (at most 2 items)			
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Nickel
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
Election block: Supplementary Courses (at most 2 items)			
T-WIWI-102872	Challenges in Supply Chain Management	4,5 CR	Mohr

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.

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

Prerequisites
At least one of the fourcourses Operations Research in Supply Chain Management, Operations Research in Health Care Management, Practical seminar: Health Care Management orDiscrete-Event Simulation in Production and Logistics has to be assigned.

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.

Recommendation
The course Practical Seminar Health Care should be combined with the course OR in Health Care Management.

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.

M 4.136 Module: Sobolev Spaces [M-MATH-102926]

Responsible: Prof. Dr. Andreas Kirsch
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 term	4	1

Mandatory			
T-MATH-105896	Sobolev Spaces	5 CR	Kirsch

M 4.137 Module: Spatial Stochastics [M-MATH-102903]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each winter term	1 semester	4	1

Mandatory			
T-MATH-105867	Spatial Stochastics	8 CR	Hug, Last

Competence Goal
The students are familiar with some basic spatial stochastic processes. They do not only understand how to deal with general properties of distributions, but also know how to describe and apply specific models (Poisson process, Gaussian random fields). They know how to work self-organised and self-reflexive.

Prerequisites
none

Content

- Point processes
- Random measures
- Poisson processes
- Gibbs point processes
- Ralm distributions
- Spatial ergodic theorem
- Spectral Theory of random fields
- Gaussian fields

Recommendation
It is recommended to attend the following modules previously: Probability Theory

4.138 Module: Special Functions and Applications in Potential Theory [M-MATH-101335]

Responsible: Prof. Dr. Andreas Kirsch
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Level	Version
5	Irregular	4	1

Mandatory			
T-MATH-102274	Special Functions and Applications in Potential Theory	5 CR	Kirsch

Prerequisites
None

M 4.139 Module: Special Topics of Numerical Linear Algebra [M-MATH-102920]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	2 term	4	1

Mandatory			
T-MATH-105891	Special Topics of Numerical Linear Algebra	8 CR	Hochbruck

Prerequisites
none

M 4.140 Module: Spectral Theory [M-MATH-101768]

Responsible: Prof. Dr. Dorothee Frey
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Language	Level	Version
8	Each summer term	German	5	1

Mandatory			
T-MATH-103414	Spectral Theory - Exam	8 CR	Frey, Herzog, Kunstmann, Schmoeger, Schnaubelt

Recommendation
It is recommended to attend the module 'Functional Analysis' previously.

M 4.141 Module: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature [M-MATH-102958]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
5	Irregular	German	4	1

Mandatory			
T-MATH-105932	Spin Manifolds, Alpha Invariant and Positive Scalar Curvature	5 CR	Klaus, Tuschmann

M 4.142 Module: Splitting Methods for Evolution Equations [M-MATH-105325]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 semester	4	1

Mandatory			
T-MATH-110805	Splitting Methods for Evolution Equations	6 CR	Jahnke

Prerequisites
None

M 4.143 Module: Stein's Method [M-MATH-102946]

Responsible: Dr. Matthias Schulte
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 term	4	1

Mandatory			
T-MATH-105914	Stein's Method	5 CR	Schulte

Prerequisites
none

M 4.144 Module: Stochastic Control [M-MATH-102908]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Irregular	1 semester	4	1

Mandatory			
T-MATH-105871	Stochastic Control	4 CR	Bäuerle

Prerequisites
none

M 4.145 Module: Stochastic Differential Equations [M-MATH-102881]

Responsible: Prof. Dr. Dorothee Frey
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	5	1

Mandatory			
T-MATH-105852	Stochastic Differential Equations	8 CR	Frey, Schnaubelt

Content

- Brownian motion
- Martingales and Martingal inequalities
- Stochastic integrals and Ito's formula
- Existence and uniqueness of solutions for systems of stochastic differential equations
- Perturbation and stability results
- Application to equations in financial mathematics, physics and engineering
- Connection with diffusion equations and potential theory

M 4.146 Module: Stochastic Evolution Equations [M-MATH-102942]

Responsible: Prof. Dr. Lutz Weis
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 term	5	1

Mandatory			
T-MATH-105910	Stochastic Evolution Equations	8 CR	Weis

Prerequisites
none

M 4.147 Module: Stochastic Geometry [M-MATH-102865]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Each summer term	1 semester	5	1

Mandatory			
T-MATH-105840	Stochastic Geometry	8 CR	Hug, Last

Competence Goal
The students

- know the fundamental geometric models and characteristics in stochastic geometry,
- are familiar with properties of Poisson processes of geometric objects,
- know examples of applications of models of stochastic geometry,
- know how to work self-organised and self-reflexive.

Content

- Random Sets
- Geometric Point Processes
- Stationarity and Isotropy
- Germ Grain Models
- Boolean Models
- Foundations of Integral Geometry
- Geometric densities and characteristics
- Random Tessellations

Recommendation
It is recommended to attend the module 'Spatial Stochastics' previously.

M 4.148 Module: Stochastic Optimization [M-WIWI-103289]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics
Elective Field

Credits	Recurrence	Duration	Language	Level	Version
9	Each term	1 semester	German/English	4	8

Election block: Compulsory Elective Courses (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
Election block: Supplementary Courses (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-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

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 seperately.

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 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 makes suggestions to adapt them to practical problems.

Prerequisites
At least one of the courses "Advanced Stochastic Optimization" and"Large-scale Optimization" has to be taken.

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.

Recommendation
It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.

Annotation
The course "Introduction to Stochastic Optimization" will be offered until the summer semester 2019 as an additional option in the elective offer of the module. Thereafter, the course can only be selected in the supplementary offer.

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.

4.149 Module: The Riemann Zeta Function [M-MATH-102960]

Responsible: Dr. Fabian Januszewski
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Language	Level	Version
4	Irregular	German	4	1

Mandatory			
T-MATH-105934	The Riemann Zeta Function	4 CR	Januszewski

M 4.150 Module: Time Series Analysis [M-MATH-102911]

Responsible: Dr. Bernhard Klar
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Each summer term	1 semester	4	2

Mandatory			
T-MATH-105874	Time Series Analysis	4 CR	Henze, Klar

Prerequisites
None

M 4.151 Module: Topological Groups [M-MATH-105323]

Responsible: Dr. rer. nat. Rafael Dahmen
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits	Recurrence	Duration	Level	Version
5	Irregular	1 semester	4	1

Mandatory			
T-MATH-110802	Topological Groups	5 CR	Dahmen, Tuschmann

Prerequisites
None

M 4.152 Module: Traveling Waves [M-MATH-102927]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
6	Irregular	1 term	4	1

Mandatory			
T-MATH-105897	Traveling Waves	6 CR	Rottmann-Matthes

M 4.153 Module: Uncertainty Quantification [M-MATH-104054]

Responsible: Prof. Dr. Martin Frank
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
4	Each summer term	1 semester	4	1

Mandatory			
T-MATH-108399	Uncertainty Quantification	4 CR	Frank

Competence Goal
After successfully taking part in the module's classes and exams, students have gained knowledge and abilities as described in the "Inhalt" section.

Specifically, students know several parametrization methods for uncertainties. Furthermore, students are able to describe the basics of several solution methods (stochastic collocation, stochastic Galerkin, Monte-Carlo). Students can explain the so-called curse of dimensionality.

Students are able to apply numerical methods to solve engineering problems formulated as algebraic or differential equations with uncertainties. They can name the advantages and disadvantages of each method. Students can judge whether specific methods are applicable to the specific problem and discuss their results with specialists and colleagues. Finally, students are able to implement the above methods in computer codes.

Prerequisites
None

Content
In this class, we learn to propagate uncertain input parameters through differential equation models, a field called Uncertainty Quantification (UQ). Given uncertain input (parameter values, initial or boundary conditions), how uncertain is the output? The first part of the course ("how to do it") gives an overview on techniques that are used. Among these are:

- Sensitivity analysis
- Monte-Carlo methods
- Spectral expansions
- Stochastic Galerkin method
- Collocation methods, sparse grids

The second part of the course ("why to do it like this") deals with the theoretical foundations of these methods. The so-called "curse of dimensionality" leads us to questions from approximation theory. We look back at the very standard numerical algorithms of interpolation and quadrature, and ask how they perform in many dimensions.

Recommendation
Numerical methods for differential equations

M 4.154 Module: Variational Methods [M-MATH-105093]

Responsible: Prof. Dr. Wolfgang Reichel
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-110302	Variational Methods	8 CR	Reichel

M 4.155 Module: Wavelets [M-MATH-102895]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits	Recurrence	Duration	Level	Version
8	Irregular	1 semester	4	1

Mandatory			
T-MATH-105838	Wavelets	8 CR	Rieder

Prerequisites
none

5 Courses

T 5.1 Course: Adaptive Finite Element Methods [T-MATH-105898]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: M-MATH-102900 - Adaptive Finite Elemente Methods

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.2 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

Responsible: Jun.-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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530569	Advanced Empirical Asset Pricing	2 SWS	Lecture (V)	Thimme
WS 19/20	2530570	Übung zu Advanced Empirical Asset Pricing	1 SWS	Practice (Ü)	Thimme
Exams					
WS 19/20	7900319	Advanced Empirical Asset Pricing		Prüfung (PR)	Thimme

Competence Certificate
The success control takes place in form of a written examination (60 min) during the semester break (according to §4(2), 1 SPO). If the number of participants is low, an oral examination (according to §4 (2), 2 SPO) may also be offered. The examination is offered every semester and can be repeated at any regular examination date.
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 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

Lecture (V)

2530569, WS 19/20, 2 SWS, Language: English, Open in study portal

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 programing 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. Programing 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.

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 5.3 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-101500 - Microeconomic Theory
M-WIWI-101502 - Economic Theory and its Application in Finance
M-WIWI-102970 - Decision and Game Theory

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2521533	Advanced Game Theory	2 SWS	Lecture (V)	Reiß
WS 19/20	2521534	Übung zu Advanced Game Theory	1 SWS	Practice (Ü)	Reiß
Exams					
WS 19/20	7900279	Advanced Game Theory		Prüfung (PR)	Puppe
WS 19/20	7900317	Advanced Game Theory		Prüfung (PR)	Reiß

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

Lecture (V)

2521533, WS 19/20, 2 SWS, Language: English, Open in study portal

T 5.4 Course: Advanced Inverse Problems: Nonlinearity and Banach Spaces [T-MATH-105927]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-102955 - Advanced Inverse Problems: Nonlinearity and Banach Spaces

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.5 Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

Responsible: Professorenschaft des Fachbereichs Informatik
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each term	1

Events					
WS 19/20	2512301	Linked Data and the Semantic Web	3 SWS		Sure-Vetter, Acosta Deibe, Käfer, Heling
WS 19/20	2512501	Project lab Cognitive automobiles and robots	3 SWS	Practical course (P)	Zöllner
WS 19/20	2512600	Project lab Information Service Engineering	2 SWS	Practical course (P)	Sack
SS 2020	2512205	Lab Business Information Systems: Realisation of innovative services (Master)	3 SWS	Practical course (P)	Oberweis, Schiefer, Schüler, Toussaint
SS 2020	2512207	Lab Automation in Everyday Life (Master)	3 SWS	Practical course (P)	Oberweis, Forell, Frister
SS 2020	2512401	Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course (P)	Sunyaev, Sturm
SS 2020	2512403	Praktikum Blockchain und Distributed Ledger Technology (Master)	SWS	Practical course (P)	Sunyaev, Beyene, Kannengießer, Pandl
SS 2020	2512500	Project Lab Machine Learning	3 SWS	Practical course (P)	Zöllner
SS 2020	2512555	Practical lab Security, Usability and Society (Master)	3 SWS	Practical course (P)	Volkamer, Strufe, Mayer, Mossano

Exams				
WS 19/20	7900038	Linked Data and the Semantic Web	Prüfung (PR)	Sure-Vetter
WS 19/20	7900046	Sicherheit	Prüfung (PR)	Volkamer
WS 19/20	7900047	Praktikum Betriebliche Informationssysteme: Realisierung innovativer Dienste	Prüfung (PR)	Oberweis
WS 19/20	7900102	Advanced Lab Information Service Engineering	Prüfung (PR)	Sack
WS 19/20	7900107	Advanced Lab Cognitive Automobile and Robots	Prüfung (PR)	Zöllner
WS 19/20	7900115	Development of Sociotechnical Information Systems	Prüfung (PR)	Sunyaev
WS 19/20	7900116	Advanced Lab Security, Usability and Society	Prüfung (PR)	Volkamer
WS 19/20	7900187	Real-World Challenges in Data Science und Analytics	Prüfung (PR)	Sure-Vetter
SS 2020	7900020	Lab Automation in Everyday Life (Master)	Prüfung (PR)	Oberweis
SS 2020	7900086	Project Lab Machine Learning	Prüfung (PR)	Zöllner
SS 2020	7900147	Cognitive Automobiles and Robots	Prüfung (PR)	Zöllner
SS 2020	7900148	Advanced Lab in Information Systems: Realization of innovative services (Master)	Prüfung (PR)	Oberweis
SS 2020	7900172	Lab Blockchain and Distributed Ledger Technology (Master)	Prüfung (PR)	Sunyaev
SS 2020	7900173	Development of Sociotechnical Information Systems (Master)	Prüfung (PR)	Sunyaev
SS 2020	7900178	Practical lab Security, Usability and Society (Master)	Prüfung (PR)	Volkamer

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:

V **Linked Data and the Semantic Web**
2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V **Project lab Cognitive automobiles and robots** **Practical course (P)**
2512501, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V **Project lab Information Service Engineering** Practical course (P)
2512600, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
The ISE project course is based on the summer semester lecture "Information Service Engineering". Goal of the course is to work on a 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 ISEproject course can also be credited as a **seminar**.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

The project course will be restricted to 15 participants.

Participation in the lecture "Information Service Engineering" (summer semester) is required.

ISE Tutor Team:

- Dr. Mehwish Alam
- M. Sc. Rima Türker
- M. Sc. Russa Biswas
- M. Sc. Fabian Hoppe
- M. Sc. Genet Asefa Gesese
- B. Sc. Tabea Tietz

V **Lab Business Information Systems: Realisation of innovative services (Master)** Practical course (P)
2512205, SS 2020, 3 SWS, Language: German, Open in study portal

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.

V **Lab Automation in Everyday Life (Master)**
2512207, SS 2020, 3 SWS, Language: German, Open in study portal
Practical course (P)

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.

V **Development of Sociotechnical Information Systems (Master)**
2512401, SS 2020, 3 SWS, Language: German/English, Open in study portal
Practical course (P)

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 **Project Lab Machine Learning**
2512500, SS 2020, 3 SWS, Language: German/English, Open in study portal
Practical course (P)

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.

V **Practical lab Security, Usability and Society (Master)**
2512555, SS 2020, 3 SWS, Language: German/English, Open in study portal
Practical course (P)

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies.

Important dates:

Kick-off: April 24th, 2020, 14: 00-15: 30 Get. 5.20 Room 3A-11.1

Final submission: TBA

Presentation: TBA

Subjects:

Privacy-friendly apps

In this subject, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php . 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.

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.

Conducting Usable Security User studies (online studies only)

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.

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) .

As reported on the KIT informational page for the Corona outbreak (https://www.kit.edu/kit/25911.php), all teaching and in-person contact are forbid until new noticed. If the KIT restrictions are still in effect on the kick-off date, this will still take place at the date and time programmed, albeit in an online form.

In any case, we will inform you promptly as soon a more precise decision is reached.

T 5.6 Course: Advanced Lab Security [T-WIWI-109786]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	2

Events					
WS 19/20	2512100	Security	4 SWS	Practical course (P)	Baumgart, Volkamer, Mayer, Zarei
Exams					
WS 19/20	7900046	Sicherheit		Prüfung (PR)	Volkamer

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.

Below you will find excerpts from events related to this course:

V Security

2512100, WS 19/20, 4 SWS, Language: German, Open in study portal

Practical course (P)

Content
The lab deals with the IT security of everyday utensils. Implemented security mechanisms are first theoretically investigated and put to the test with practical attacks. Finally, countermeasures and suggestions for improvement are worked out. The lab is offered within the competence center for applied security technologies (KASTEL) and is supervised by several institutes.

The success control takes the form of a final presentation, a thesis and the handing over of the developed code.

More information on https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html

T 5.7 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-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
WS 19/20	2512551	Practical lab Security, Usability and Society	3 SWS	Practical course (P)	Volkamer, Landesberger von Antburg, Mayer
SS 2020	2512554	Practical lab Security, Usability and Society (Bachelor)	3 SWS	Practical course (P)	Volkamer, Strufe, Mayer, Mossano
Exams					
WS 19/20	7900116	Advanced Lab Security, Usability and Society		Prüfung (PR)	Volkamer
SS 2020	7900029	Practical lab Security, Usability and Society (Bachelor)		Prüfung (PR)	Volkamer

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 is expected to be offered from winter term 2018/2019.

Contents:

In the course of the programming lab, changing topics from the field of Human Factors in Security und Privacy will be worked on.

Learning goals:

The student

- can apply the basics of information security
- is able to implement appropriate measures to achieve different protection goals
- can structure a software project in the field of information security
- can use the Human Centred Security and Privacy by Design technique to develop user-friendly software
- can explain and present technical facts and the results of the programming lab in oral and written form

Below you will find excerpts from events related to this course:

V Practical lab Security, Usability and Society

Practical course (P)

2512551, WS 19/20, 3 SWS, Open in study portal

Content
Kick-off Meeting (compulsory attendance) on 18.10.2019 at 11:00 in room 3A-11.2

V

Practical lab Security, Usability and Society (Bachelor)

2512554, SS 2020, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies.

Important dates:

Kick-off: April 24th, 2020, 14: 00-15: 30 Get. 5.20 Room 3A-11.1

Final submission : TBA

Presentation : TBA

Subjects:

Privacy-friendly apps

In this subject, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php . 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.

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.

Conducting Usable Security User studies (online studies only)

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.

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) .

As reported on the KIT informational page for the Corona outbreak (https://www.kit.edu/kit/25911.php), all teaching and in-person contact are forbid until new noticed. If the KIT restrictions are still in effect on the kick-off date, this will still take place at the date and time programmed, albeit in an online form.

In any case, we will inform you promptly as soon a more precise decision is reached.

T 5.8 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	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2550552	Statistik für Fortgeschrittene	2 SWS	Lecture (V)	Grothe
WS 19/20	2550553	Übung zu Statistik für Fortgeschrittene	2 SWS	Practice (Ü)	Grothe, Kaplan
Exams					
WS 19/20	7900289	Advanced Statistics		Prüfung (PR)	Grothe

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4). The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites
None

Annotation
New course starting winter term 2015/2016

Below you will find excerpts from events related to this course:

V Statistik für Fortgeschrittene
2550552, WS 19/20, 2 SWS, Open in study portal

Lecture (V)

Literature
Skript zur Vorlesung

T 5.9 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	Recurrence	Version
Written examination	4,5	Irregular	1

Exams				
WS 19/20	7900245	Advanced Stochastic Optimization	Prüfung (PR)	Rebennack

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 5.10 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-101500 - Microeconomic Theory
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Recurrence	Version
Written examination	4,5	Irregular	1

Events					
SS 2020	2520527	Advanced Topics in Economic Theory	2 SWS	Lecture (V)	Mitusch, Scheffel
SS 2020	2520528	Übung zu Advanced Topics in Economic Theory	1 SWS	Practice (Ü)	Pegorari

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.

Below you will find excerpts from events related to this course:

V Advanced Topics in Economic Theory

Lecture (V)

2520527, SS 2020, 2 SWS, Language: English, Open in study portal

Literature
Die Veranstaltung wird in englischer Sprache angeboten:

The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.

T 5.11 Course: Algebra [T-MATH-102253]

Responsible: Prof. Dr. Frank Herrlich
Dr. Stefan Kühnlein

Organisation: KIT Department of Mathematics

Part of: M-MATH-101315 - Algebra

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0102200	Algebra	4 SWS	Lecture (V)	Herrlich
WS 19/20	0102210	Übungen zu 0102200 (Algebra)	2 SWS	Practice (Ü)	Herrlich
Exams					
WS 19/20	7700071	Algebra		Prüfung (PR)	Herrlich

T 5.12 Course: Algebraic Geometry [T-MATH-103340]

Responsible: Prof. Dr. Frank Herrlich
Dr. Stefan Kühnlein

Organisation: KIT Department of Mathematics

Part of: M-MATH-101724 - Algebraic Geometry

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0152000	Algebraische Geometrie	4 SWS	Lecture (V)	Herrlich
SS 2020	0152100	Übungen zu 0152000 (Algebraische Geometrie)	2 SWS	Practice (Ü)	Herrlich

T 5.13 Course: Algebraic Number Theory [T-MATH-103346]

Responsible: Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-101725 - Algebraic Number Theory

Type	Credits	Version
Oral examination	8	1

T 5.14 Course: Algebraic Topology [T-MATH-105915]

Responsible: Dr. Holger Kammeyer
Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: M-MATH-102948 - Algebraic Topology

Type	Credits	Recurrence	Version
Written examination	8	Irregular	1

Events					
SS 2020	0157400	Algebraic Topology	4 SWS	Lecture (V)	Sauer
SS 2020	0157410	Tutorial for 0157400 (Algebraic Topology)	2 SWS	Practice (Ü)	Sauer

Prerequisites
none

T 5.15 Course: Algebraic Topology II [T-MATH-105926]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: M-MATH-102953 - Algebraic Topology II

Type	Credits	Recurrence	Version
Written examination	8	Irregular	1

Events					
WS 19/20	0111500	Algebraic Topology II	4 SWS	Lecture (V)	Campagnolo
WS 19/20	0111510	Tutorial for 0111500 (Algebraic Topology II)	2 SWS	Practice (Ü)	Campagnolo
Exams					
WS 19/20	7700066	Algebraic Topology II		Prüfung (PR)	Campagnolo

Prerequisites
none

T 5.16 Course: Applied Econometrics [T-WIWI-103125]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I

Type	Credits	Recurrence	Version
Written examination	4,5	Irregular	1

Exams				
WS 19/20	7900251	Applied Econometrics	Prüfung (PR)	Krüger

Competence Certificate
The assessment of this course is a written examination (90 min) according to §4(2), 1 of the examination regulation.

Prerequisites
None

Annotation
The course is not offered regularly.

T 5.17 Course: Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services [T-WIWI-110339]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2511032	Applied Informatics - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services	2 SWS	Lecture (V)	Sunyaev
SS 2020	2511033	Übungen zu Angewandte Informatik - Internet Computing	1 SWS	Practice (Ü)	Sunyaev
Exams					
WS 19/20	7900004	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services		Prüfung (PR)	Sunyaev
SS 2020	7900025	Applied Informatics - Internet Computing (Registration until 13 July 2020)		Prüfung (PR)	Sunyaev

Competence Certificate
The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

By successful processing the exercises 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

Annotation
Replaces from winter semester 2019/2020 T-WIWI-109445 "Applied Informatics - Internet Computing".

Below you will find excerpts from events related to this course:

V Applied Informatics - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services

Lecture (V)

2511032, SS 2020, 2 SWS, Language: German, Open in study portal

Content
The lecture Applied Computer Science II provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).

In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:

- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence

Learning objectives:

The student learns about basic concepts and emerging technologies of distributed systems and internet computing. Practical topics will be deepened in lab classes.

Recommendations:

Knowledge of content of the module [WI1INFO].

Workload:

The total workload for this course is approximately 135-150 hours.

Literature
Wird in der Vorlesung bekannt gegeben

T 5.18 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	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2530555	Asset Pricing	2 SWS	Lecture (V)	Uhrig-Homburg, Thimme
SS 2020	2530556	Übung zu Asset Pricing	1 SWS	Practice (Ü)	Uhrig-Homburg, Reichenbacher
Exams					
WS 19/20	7900056	Asset Pricing		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
The success control takes place in form of a written examination (75 min) during the semester break (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date.
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 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:

V Asset Pricing

Lecture (V)

2530555, SS 2020, 2 SWS, Language: German, Open in study portal

Literature
Basisliteratur

- Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.

Zur Wiederholung/Vertiefung

- 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.

5.19 Course: Asymptotic Stochastics [T-MATH-105866]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Norbert Henze
Dr. Bernhard Klar

Organisation: KIT Department of Mathematics

Part of: M-MATH-102902 - Asymptotic Stochastics

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0118000	Asymptotische Stochastik	4 SWS	Lecture (V)	Henze
WS 19/20	0118100	Tutorial for 0118000 (asymptotic Stochastics)	2 SWS	Practice (Ü)	Henze
Exams					
WS 19/20	7700059	Asymptotic Stochastics		Prüfung (PR)	Henze

Prerequisites
none

T 5.20 Course: Auction Theory [T-WIWI-102613]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101500 - Microeconomic Theory
M-WIWI-102970 - Decision and Game Theory

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2520408	Auktionstheorie	2 SWS	Lecture (V)	Ehrhart
WS 19/20	2520409	Übungen zu Auktionstheorie	1 SWS	Practice (Ü)	Ehrhart
Exams					
WS 19/20	7900290	Auction Theory		Prüfung (PR)	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:

V Auktionstheorie
2520408, WS 19/20, 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 5.21 Course: Bifurcation Theory [T-MATH-106487]

Responsible: Dr. Rainer Mandel
Organisation: KIT Department of Mathematics
Part of: M-MATH-103259 - Bifurcation Theory

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Prerequisites
None

T 5.22 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-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530567	Blockchains & Cryptofinance	2 SWS	Lecture (V)	Schuster, Uhrig-Homburg
WS 19/20	2530568	Übung zu Blockchains & Cryptofinance	1 SWS	Practice (Ü)	Müller
Exams					
WS 19/20	7900028	Blockchains & Cryptofinance		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
The assessment consists of a written exam (75 min) (§4(2), 1 of the examination regulations).
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 up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None

Recommendation
None

Annotation
New course starting winter term 2018/2019.

T 5.23 Course: Bott Periodicity [T-MATH-108905]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-104349 - Bott Periodicity

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Prerequisites
none

T 5.24 Course: Boundary and Eigenvalue Problems [T-MATH-105833]

Responsible: Prof. Dr. Dorothee Frey
Prof. Dr. Dirk Hundertmark
Prof. Dr. Tobias Lamm
Prof. Dr. Michael Plum
Prof. Dr. Wolfgang Reichel
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-102871 - Boundary and Eigenvalue Problems

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0157500	Boundary and Eigenvalue Problems	4 SWS	Lecture (V)	Plum
SS 2020	0157510	Tutorial for 0157500	2 SWS	Practice (Ü)	Plum

T 5.25 Course: Boundary Element Methods [T-MATH-109851]

Responsible: PD Dr. Tilo Arens
Organisation: KIT Department of Mathematics
Part of: M-MATH-103540 - Boundary Element Methods

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.26 Course: Brownian Motion [T-MATH-105868]

Responsible: Prof. Dr. Nicole Bäuerle
Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Günter Last

Organisation: KIT Department of Mathematics

Part of: M-MATH-102904 - Brownian Motion

Type	Credits	Version
Oral examination	4	1

Prerequisites
none

T 5.27 Course: Business Intelligence Systems [T-WIWI-105777]

Responsible: Prof. Dr. Alexander Mädche
Mario Nadj
Peyman Toreini

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-104068 - Information Systems in Organizations

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	2

Events					
WS 19/20	2540422	Business Intelligence Systems	3 SWS	Lecture (V)	Mädche, Nadj
Exams					
WS 19/20	7900224	Business Intelligence Systems		Prüfung (PR)	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
Basic knowledge on database systems is helpful.

Below you will find excerpts from events related to this course:

V Business Intelligence Systems
2540422, WS 19/20, 3 SWS, Language: English, Open in study portal

Lecture (V)

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 analytic abilities and profound skills in SQL as wells as Python and/or R are required. Students have to apply with their CV and transcript of records.

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 5.28 Course: Business Process Modelling [T-WIWI-102697]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511210	Business Process Modelling	2 SWS	Lecture (V)	Oberweis
WS 19/20	2511211	Exercise Business Process Modelling	1 SWS	Practice (Ü)	Oberweis, Schüler, Schreiber
Exams					
WS 19/20	7900015	Business Process Modelling		Prüfung (PR)	Oberweis
SS 2020	7900047	Business Process Modelling (Registration until 13 July 2020)		Prüfung (PR)	Oberweis

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:

V Business Process Modelling

Lecture (V)

2511210, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

Learning objectives:

Students

- describe goals of business process modeling and aplly different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analysing and assessing process models to evaluate specific quality characteristics of the process model.

Recommendations:

Knowledge of course Applied Informatics I - Modelling is expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- M. Weske: Business Process Management: Concepts, Languages, Architectures. Springer 2012.
- F. Schönthaler, G.Vossen, A. Oberweis, T. Karl: Business Processes for Business Communities: Modeling Languages, Methods, Tools. Springer 2012.

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T 5.29 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	Recurrence	Version
Written examination	3	Each winter term	1

Events					
WS 19/20	2530299	Business Strategies of Banks	2 SWS	Lecture (V)	Müller
Exams					
WS 19/20	7900064	Business Strategies of Banks		Prüfung (PR)	Müller, Ruckes

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Business Strategies of Banks

2530299, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur:

- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer

T 5.30 Course: Case Studies in Sales and Pricing [T-WIWI-102834]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Examination of another type	1,5	Each winter term	3

Events					
WS 19/20	2572182	Case Studies in Sales and Pricing	1 SWS	Block (B)	Klarmann, Assistenten

Competence Certificate
Non exam assessment (§4 (2), 3 SPO 2007) respectively alternative exam assessments (§4(2), 3 SPO 2015). The assessment consists of a group presentation with a subsequent round of questions totalling 30 minutes.

Prerequisites
None

Recommendation
None

Annotation
Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the Marketing and Sales Research Group (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.

Below you will find excerpts from events related to this course:

V Case Studies in Sales and Pricing

2572182, WS 19/20, 1 SWS, Language: German/English, Open in study portal

Block (B)

Content
Students work in groups on case studies from the field of sales and pricing. The case studies contain quantitative calculations in the context of sales and pricing as well as tasks which are to be solved by logical reasoning. When solving the case studies, theoretical sales and pricing content is applied to practical problems. Finally, the results are presented by the group and discussed.

Students

- are able to work on a case study in the field of sales and pricing on their own
- are able to apply quantitative calculations on a case study in the field of sales and pricing
- are able to collect information and data beyond the case study description and make use of them for solving their tasks
- are able to apply theories from related lectures to a practical example
- are able to present their results in a a structured and concise manner
- are able to organize their teamwork and collaborate in teams

Total work load for 1.5 ECTS: ca. 45 hours

- The final presentations can be held in German or English.
- In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in winter 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 winter term starts.
- Please note that only one of the 1.5-ECTS courses 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 in the respective module to all students. Participation in a specific course cannot be guaranteed.

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.31 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

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2550494	Challenges in Supply Chain Management	3 SWS	Lecture (V)	Mohr

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 2020, 3 SWS, Language: English, Open in study portal

Lecture (V)

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.

Literature
Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.

T 5.32 Course: Classical Methods for Partial Differential Equations [T-MATH-105832]

Responsible: Prof. Dr. Dorothee Frey
Prof. Dr. Dirk Hundertmark
Prof. Dr. Tobias Lamm
Prof. Dr. Michael Plum
Prof. Dr. Wolfgang Reichel
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-102870 - Classical Methods for Partial Differential Equations

Type	Credits	Version
Written examination	8	1

Events					
WS 19/20	0105300	Classical Methods for Partial Differential Equations	4 SWS	Lecture (V)	Plum
WS 19/20	0105310	Tutorial for 0105300 (Classical Methods for Partial Differential Equations)	2 SWS	Practice (Ü)	Plum
Exams					
WS 19/20	7700045	Classical Methods for Partial Differential Equations		Prüfung (PR)	Plum, Reichel, Anapolitanos

T 5.33 Course: Combinatorics [T-MATH-105916]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: M-MATH-102950 - Combinatorics

Type	Credits	Recurrence	Version
Written examination	8	Irregular	1

Events					
SS 2020	0150300	Combinatorics	4 SWS	Lecture (V)	Aksenovich
SS 2020	0150310	Tutorial for 0150300 (Combinatorics)	2 SWS	Practice (Ü)	Aksenovich

Prerequisites
none

T 5.34 Course: Commutative Algebra [T-MATH-108398]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: M-MATH-104053 - Commutative Algebra

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.35 Course: Comparison Geometry [T-MATH-105917]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-102940 - Comparison Geometry

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Prerequisites
Keine

5.36 Course: Comparison of Numerical Integrators for Nonlinear Dispersive Equations [T-MATH-109040]

Responsible: Prof. Dr Katharina Schratz
Organisation: KIT Department of Mathematics
Part of: M-MATH-104426 - Comparison of Numerical Integrators for Nonlinear Dispersive Equations

Type	Credits	Recurrence	Version
Oral examination	4	Irregular	1

Prerequisites
none

T 5.37 Course: Complex Analysis [T-MATH-105849]

Responsible: PD Dr. Gerd Herzog
Prof. Dr. Michael Plum
Prof. Dr. Wolfgang Reichel
Dr. Christoph Schmoeger
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-102878 - Complex Analysis

Type	Credits	Version
Oral examination	8	1

T 5.38 Course: Compressive Sensing [T-MATH-105894]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-102935 - Compressive Sensing

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

T 5.39 Course: Computational Economics [T-WIWI-102680]

Responsible: Dr. rer. nat. Pradyumn Kumar Shukla
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	3

Events					
WS 19/20	2590458	Computational Economics	2 SWS	Lecture (V)	Shukla
WS 19/20	2590459	Excercises to Computational Economics	1 SWS	Practice (Ü)	Shukla
Exams					
WS 19/20	7900005	Computational Economics		Prüfung (PR)	Shukla
SS 2020	7900030	Computational Economics (Registration until 13 July 2020)		Prüfung (PR)	Shukla

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). 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). The bonus only applies to the first and second exam of the semester in which it was obtained.

Prerequisites
None

Annotation
The credits have been changed to 5 starting summer term 2016.

Below you will find excerpts from events related to this course:

V Computational Economics

2590458, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Examining complex economic problems with classic analytical methods usually requires making numerous simplifying assumptions, for example that agents behave rationally or homogeneously. Recently, widespread availability of computing power gave rise to a new field in economic research that allows the modeling of heterogeneity and forms of bounded rationality: Computational Economics. Within this new discipline, computer based simulation models are used for analyzing complex economic systems. In short, an artificial world is created which captures all relevant aspects of the problem under consideration. Given all exogenous and endogenous factors, the modelled economy evolves over time and different scenarios can be analyzed. Thus, the model can serve as a virtual testbed for hypothesis verification and falsification.

Learning objectives:

The student

- understands the methods of Computational Economics and applies them on practical issues,
- evaluates agent models considering bounded rational behaviour and learning algorithms,
- analyses agent models based on mathematical basics,
- knows the benefits and disadvantages of the different models and how to use them,
- examines and argues the results of a simulation with adequate statistical methods,
- is able to support the chosen solutions with arguments and can explain them.

Literature

- R. Axelrod: "Advancing the art of simulation in social sciences". R. Conte u.a., Simulating Social Phenomena, Springer, S. 21-40, 1997.
- R. Axtel: "Why agents? On the varied motivations for agent computing in the social sciences". CSED Working Paper No. 17, The Brookings Institution, 2000.
- K. Judd: "Numerical Methods in Economics". MIT Press, 1998, Kapitel 6-7.
- A. M. Law and W. D. Kelton: "Simulation Modeling and Analysis", McGraw-Hill, 2000.
- R. Sargent: "Simulation model verification and validation". Winter Simulation Conference, 1991.
- L. Tesfation: "Notes on Learning", Technical Report, 2004.
- L. Tesfatsion: "Agent-based computational economics". ISU Technical Report, 2003.

Weiterführende Literatur:

- Amman, H., Kendrick, D., Rust, J.: "Handbook of Computational Economics". Volume 1, Elsevier North-Holland, 1996.
- Tesfatsion, L., Judd, K.L.: "Handbook of Computational Economics". Volume 2: Agent-Based Computational Economics, Elsevier North-Holland, 2006.
- Marimon, R., Scott, A.: "Computational Methods for the Study of Dynamic Economies". Oxford University Press, 1999.
- Gilbert, N., Troitzsch, K.: "Simulation for the Social Scientist". Open University Press, 1999.

5.40 Course: Computational Risk and Asset Management [T-WIWI-102878]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105032 - Data Science for Finance

Type	Credits	Recurrence	Version
Written examination	6	Each winter term	3

Events					
WS 19/20	2500015	Computational Risk and Asset Management	4 SWS	Lecture (V)	Ulrich
Exams					
WS 19/20	7900320	Computational Risk and Asset Management		Prüfung (PR)	Ulrich

Competence Certificate
The assessment consists of a written exam (90 minutes) according to §4(2) of the examination regulation.

Recommendation
Good knowledge of statistics and first programming experience with Python is recommended.

Below you will find excerpts from events related to this course:

Computational Risk and Asset Management

Lecture (V)

2500015, WS 19/20, 4 SWS, Language: English, Open in study portal

Content
The aim of this course is to master real-world challenges of computational risk and asset management and provide students with a skill set to incorporate different portfolio objectives into the investment process. It enables students to solve such challenges independently in Python.

The course covers several topics, among them:

Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization

Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation

Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor

Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

The total workload for this course is approximately 180 hours.

Students will build up on the statistics and finance knowledge from their Bachelors program to learn about to automatize modern quant portfolio strategies. Students learn about advanced topics which are relevant for a realistic, real-world asset and risk management process.

T 5.41 Course: Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems [T-MATH-105854]

Responsible: Prof. Dr. Michael Plum
Organisation: KIT Department of Mathematics
Part of: M-MATH-102883 - Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems

Type	Credits	Version
Oral examination	8	1

T 5.42 Course: Continuous Time Finance [T-MATH-105930]

Responsible: Prof. Dr. Nicole Bäuerle
Prof. Dr. Vicky Fasen-Hartmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-102860 - Continuous Time Finance

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0159400	Finanzmathematik in stetiger Zeit	4 SWS	Lecture (V)	Fasen-Hartmann
SS 2020	0159500	Übungen zu 0159400	2 SWS	Practice (Ü)	Fasen-Hartmann

T 5.43 Course: Control Theory [T-MATH-105909]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-102941 - Control Theory

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.44 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	Credits	Recurrence	Version
Written examination	4,5	Irregular	1

Exams				
WS 19/20	7900009_WS1920_HK	Convex Analysis	Prüfung (PR)	Stein

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

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.ior.kit.edu).

T 5.45 Course: Convex Geometry [T-MATH-105831]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: M-MATH-102864 - Convex Geometry

Type	Credits	Version
Oral examination	8	1

T 5.46 Course: Corporate Financial Policy [T-WIWI-102622]

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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2530214	Corporate Finance Policy	2 SWS	Lecture (V)	Ruckes
SS 2020	2530215	Übungen zu Corporate Finance Policy	1 SWS	Practice (Ü)	Ruckes, Hoang
Exams					
WS 19/20	7900058	Corporate Financial Policy		Prüfung (PR)	Ruckes

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 Finance Policy

Lecture (V)

2530214, SS 2020, 2 SWS, Language: English, Open in study portal

Literature
Weiterführende Literatur

Tirole, J. (2006): The Theory of Corporate Finance. Princeton University Press.

T 5.47 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	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
WS 19/20	2530220		SWS	Practice (Ü)	Ruckes, Hoang, Silbereis
SS 2020	2530218	Corporate Risk Management	SWS	Lecture (V)	Ruckes, Hoang
SS 2020	2530219	Übung zu Corporate Risk Management	SWS	Practice (Ü)	Silbereis, Ruckes, Hoang
Exams					
WS 19/20	7900136	Corporate Risk Management		Prüfung (PR)	Ruckes
SS 2020	7900259	Corporate Risk Management		Prüfung (PR)	Ruckes

Competence Certificate
Please note that the lecture will not be offered in summer semester 2020.

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
None

Annotation
The course will exceptionally be held in the winter semester 2019/2020. Usually, however, the event takes place as a block course in the summer semester.

Below you will find excerpts from events related to this course:

V 2530220, WS 19/20, SWS, Language: English, Open in study portal **Practice (Ü)**

Literature

- Friberg, Richard. *Managing Risk and Uncertainity: A Strategic Approach*. Cambridge, MA: Managing RIsk and Uncertainity, 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.

V **Corporate Risk Management** **Lecture (V)**
2530218, SS 2020, SWS, Language: English, Open in study portal

Literature

- Friberg, Richard. *Managing Risk and Uncertainity: A Strategic Approach.* Cambridge, MA: Managing RIsk and Uncertainity, 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.

V **Übung zu Corporate Risk Management**
2530219, SS 2020, SWS, Language: English, Open in study portal

Practice (Ü)

Literature

- Friberg, Richard. *Managing Risk and Uncertainity: A Strategic Approach.* Cambridge, MA: Managing RIsk and Uncertainity, 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 5.48 Course: Credit Risk [T-WIWI-102645]

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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530565	Credit Risk	3 SWS	Lecture / Practice (VÜ)	Uhrig-Homburg, Mitarbeiter
Exams					
WS 19/20	7900055	Credit Risk		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The examination is offered every semester and can be repeated at every regular examination date.
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 up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None

Recommendation
Knowledge from the course "Derivatives" is very helpful.

Annotation
See German version.

Below you will find excerpts from events related to this course:

V Credit Risk
2530565, WS 19/20, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)

Content
The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed.

The objective of this course is to become familiar with the credit markets and the credit risk indicators like ratings, default probabilities and credit spreads. The students learn about the components of credit risk (e.g. default time and default rate) and quantify these in different theoretical models to price credit derivatives.

The total workload for this course is approximately 135.0 hours. For further information see German version.

The assessment consists of a written exam following §4, Abs. 2, 1.

- Lando, D., Credit risk modeling: Theory and Applications, Princeton Univ. Press, (2004).
- Uhrig-Homburg, M., Fremdkapitalkosten, Bonitätsrisiken und optimale Kapitalstruktur, Beiträge zur betriebswirtschaftlichen Forschung 92, Gabler Verlag, (2001).

Elective literature:

- Bluhm, C., Overbeck, L., Wagner, C. , Introduction to Credit Risk Modelling, 2nd Edition, Chapman & Hall, CRC Financial Mathematics Series, (2010).
- Duffie, D., Singleton, K.J., Credit Risk: Pricing, Measurement and Management, Princeton Series of Finance, Prentice Hall, (2003).

Literature

- Lando, D., Credit risk modeling: Theory and Applications, Princeton Univ. Press, (2004).
- Uhrig-Homburg, M., Fremdkapitalkosten, Bonitätsrisiken und optimale Kapitalstruktur, Beiträge zur betriebswirtschaftlichen Forschung 92, Gabler Verlag, (2001).

Weiterführende Literatur:

- Bluhm, C., Overbeck, L., Wagner, C. , Introduction to Credit Risk Modelling, 2nd Edition, Chapman & Hall, CRC Financial Mathematics Series, (2010).
- Duffie, D., Singleton, K.J., Credit Risk: Pricing, Measurement and Management, Princeton Series of Finance, Prentice Hall, (2003).

T 5.49 Course: Critical Information Infrastructures [T-WIWI-109248]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	4

Events					
WS 19/20	2511400	Critical Information Infrastructures	2 SWS	Lecture (V)	Sunyaev, Dehling, Lins
WS 19/20	2511401	Exercises to Critical Information Infrastructures	1 SWS	Practice (Ü)	Sunyaev, Dehling, Lins
Exams					
WS 19/20	7900067	Critical Information Infrastructures		Prüfung (PR)	Sunyaev

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.

Prerequisites
None.

Annotation
New lecture from winter semester 2018/2019.

Below you will find excerpts from events related to this course:

V Critical Information Infrastructures

Lecture (V)

2511400, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
The course critical information infrastructures introduces students to the world of these complex sociotechnical systems that permeate societies on a global scale. Students will learn to handle the complexities involved in the design, development, operation and evaluation of critical information infrastructures. In the beginning of the lecture, critical information infrastructures will be introduced on a general level.

The following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group) on a selected case and have to write a seminar paper.

There will be a short introduction to the topics for the course paper on the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- **Blockchain**
- **Cloud Computing**
- **Digital Health**
- **Fog Computing**
- **Information Privacy**
- **Certification of critical IT-Services**

In addition to introductions to the topics, an online course is also offered to introduce students to scientific writing. This means to learn how to quote, how a scientific work is structured, and in which form the results of one's research are presented. Since we offer topics in this course that also correspond to the research interests in our research group, there may also be the opportunity to work on the topics in more depth in the course of a final thesis. Students can choose a topic from a variety of topics of the topics presented, and write a course paper in a group of four students.

Learning objectives:

Students know concepts and technologies relevant for the design and reliable operation of critical information infrastructures and can leverage them to develop solutions for real-world challenges.

Notes:

Please note the changed course structure. The course will be held as a block course.

The number of participants is limited. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3073

Please make sure that your are available at the following dates if you would like to attend the course:

- Introduction: 4 dates on which you have to participate
    - 17.10.2019, 11.30 to 13.00: Foundations of Critical Information Infrastructures. (Geb. 05.20, R1C-02)
    - 24.10.2019, 11.30 to 13.00: Introduction to topics (Geb. 05.20, R1C-02)
    - 31.10.2019: 11.30 - 13.00: Socio-Technical/Socio-Material Information Systems & Design Science Research (Geb. 05.20, R1C-02)
    - 07.11.2019, 11.30 to 13.00: The Critical Information Infrastructures Landscape (Geb. 05.20, R1C-02)
- Intermediate presentations with compulsory attendance: 13.12.2019, 10am to 4pm (Geb. 05.20, R1C-02). Exact times will be announced later.
- Final presentations with compulsory attendance: 07.02.2020, 10am to 4pm (Geb. 05.20, R1C-02). Exact times will be announced later.
- Submission of the course paper: Expected on 02.02.2019. Final date will be announced in the course.

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place at the Institute AIFB, KIT Campus South, Kollegiengebäude am Kronenplatz (Geb. 05.20) in Kaiserstr. 89.

The number of participants is limited to 24 students. The registration period is from 31.08.2019 to 29.09.2019. Participation slots are expected to be allocated on 01.10.2019 and must be accepted by the student by 06.10.2019. If the slot is not accepted, the free places will be offered to the students in the waiting list.

If you have any questions regarding this registration, please contact sebastian.lins@kit.edu or dehling@kit.edu.

T 5.50 Course: Data Mining and Applications [T-WIWI-103066]

Responsible: Rheza Nakhaeizadeh
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	Recurrence	Version
Oral examination	4,5	Each summer term	2

Events					
SS 2020	2520375	Data Mining and Applications	2/4 SWS	Lecture (V)	Nakhaeizadeh

Competence Certificate

- Conduction of a larger emprical study in groups
- reporting of milestones
- final presentation (app. 45 minutes)

Prerequisites
None

Below you will find excerpts from events related to this course:

V Data Mining and Applications

2520375, SS 2020, 2/4 SWS, Language: German, Open in study portal

Lecture (V)

Content
Learning objectives:

Students

- know the definition of Data Mining
- are familiar with the CRISP-DM
- are familiar with the most important Data Mining Algorithms like Decision Tree, K-Means, Artificial Neural Networks, Association Rules, Regression Analysis
- will be able to use a DM-Tool

Content:

Part one: Data Mining:

What is Data Mining?; History of Data Mining; Conferences and Journals on Data Mining; Potential Applications; Data Mining Process; Business Understanding; Data Understanding; Data Preparation; Modeling; Evaluation; Deployment; Interdisciplinary aspects of Data Mining; Data Mining tasks; Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks); Fuzzy Mining; OLAP and Data Warehouse; Data Mining Tools; Trends in Data Mining

Part two: Examples of application of Data Mining

Success parameters of Data Mining Projects; Application in industry; Application in Commerce

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

U. Fayyad, G. Piatetsky-Shapiro, P. Smyth, R. Uthurusamy, editors, Advances in Knowledge Discovery and Data Mining, AAAI/MIT Press, 1996 (order online from Amazon.com or from MIT Press).

Jiawei Han, Micheline Kamber, Data Mining : Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016 , 2006.

David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining , MIT Press, Fall 2000

Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer Verlag, 2001.

Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison wesley (May, 2005). Hardcover: 769 pages. ISBN: 0321321367

Ripley, B.D. (1996) Pattern Recognition and Neural Networks, Cambridge: Cambridge University Press.

Ian Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, 2nd Edition, Morgan Kaufmann, ISBN 0120884070 , 2005.

T 5.51 Course: Database Systems and XML [T-WIWI-102661]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511202	Database Systems and XML	2 SWS	Lecture (V)	Oberweis
WS 19/20	2511203	Exercises Database Systems and XML	1 SWS	Practice (Ü)	Oberweis, Fritsch, Schüler
Exams					
WS 19/20	7900007	Database Systems and XML		Prüfung (PR)	Oberweis
SS 2020	7900046	Database Systems and XML (Registration until 13 July 2020)		Prüfung (PR)	Oberweis

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:

V Database Systems and XML

Lecture (V)

2511202, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

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 5.52 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2530550	Derivatives	2 SWS	Lecture (V)	Uhrig-Homburg, Thimme
SS 2020	2530551	Übung zu Derivate	1 SWS	Practice (Ü)	Uhrig-Homburg, Eska
Exams					
WS 19/20	7900051	Derivatives		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the excercises. 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 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature

- Hull (2012): Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition

Weiterführende Literatur:
Cox/Rubinstein (1985): Option Markets, Prentice Hall

T 5.53 Course: Designing Interactive Systems [T-WIWI-110851]

Responsible: Prof. Dr. Alexander Mädche
Dr. Stefan Morana

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-104068 - Information Systems in Organizations

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	1

Events					
SS 2020	2540558	Designing Interactive Systems	3 SWS	Lecture (V)	Mädche, Gnewuch , Benke

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

Annotation
This course replaces T-WIWI-108461 "Interactive Information Systems" starting summer term 2020.

The course is held in english.

Below you will find excerpts from events related to this course:

V Designing Interactive Systems

2540558, SS 2020, 3 SWS, Language: English, Open in study portal

Lecture (V)

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 system 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 5.54 Course: Differential Geometry [T-MATH-102275]

Responsible: Dr. Sebastian Grensing
Prof. Dr. Enrico Leuzinger
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-101317 - Differential Geometry

Type	Credits	Recurrence	Version
Written examination	8	Each summer term	1

Events					
SS 2020	0100300	Differential Geometry	4 SWS	Lecture (V)	Tuschmann
SS 2020	0100310	Tutorial for 0100300 (Differential Geometry)	2 SWS	Practice (Ü)	Tuschmann
Exams					
WS 19/20	7700033	Differential Geometry - Exam		Prüfung (PR)	Leuzinger

T 5.55 Course: Digital Health [T-WIWI-109246]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	3

Events					
WS 19/20	2511402	Digital Health	2 SWS	Lecture (V)	Sunyaev, Thiebes
Exams					
WS 19/20	7900068	Digital Health		Prüfung (PR)	Sunyaev

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.

Prerequisites
None.

Below you will find excerpts from events related to this course:

V Digital Health

Lecture (V)

2511402, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Content

The course Digital Health offers students a possibility to gain insight into current developments in the digitalization of the health care system. Students will first be introduced to the basics and challenges of the digitalization of the health care system. After the introduction lecture, the course aims to give insights into current topics in the field of digital health and offers students an opportunity to prepare a scientific paper in a group of up to three students.

There will be a short introduction lecture on all topics with regard to the written assignments. It is possible for students to write their paper in one of the following topics. Furthermore, groups of students have the possibility to propose their own topics.

- **Artificial Intelligence**
- **Blockchain**
- **Cloud Computing**
- **Gamification**
- **Genomics**
- **Information Privacy**

In addition to introduction lectures on the topics, an online course is offered to introduce students to scientific writing. This includes learning how to quote, how a scientific paper is structured and in which form the results of one's research are presented. Since we offer topics that also correspond to the research interests of our research associates, there may also be the opportunity to investigate these topics more deeply in a master thesis. Students can give their preferences for the topics offered and are afterwards assigned to groups of up to three students based on their preferences.

Learning objectives:

Students are familiar with the current developments and challenges of digitization in the health care sector, can independently develop corresponding solutions, and discuss their developed solutions in groups.

Workload:

4,5 ECTS = approx. 135 hours.

Comments:

The number of participants is limited. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3107

Please keep the following dates available if you are planning to attend the course:

- **Introduction:** 3 dates you have to attend
  - **10.2019, 15.45 to 17.15:** Foundations of Digital Health. (Geb. 05.20, R1C-03)
  - **10.2019, 15.45 to 17.15:** Cloud Computing, Genomics, Information Privacy (Geb. 05.20, R1C-03)
  - **11.2019, 15.45 to 17.15:** Blockchain, Artificial Intelligence, Gamification (Geb. 05.20, R1C-03)
- **Intermediate presentation** to be attended: 04.12.2019, 10:00 to 16:00 (Building 05.20, R1A-11). Exact times will be announced soon.
- **Final presentation to be attended:** 02.2020 and 27.02.2020, 09:00 to 19:00 (Building 05.20, R1C-03). Exact times will be announced soon.
- **Submission of the written assignment:** Estimated on 12.02.2019. Final date will be announced in the event.

Further information on the procedure will be announced in the first lecture. Depending on the number of participants, each session may have a shorter duration.

The meetings will take place at the Institute AIFB, KIT-Campus Süd, Kollegiengebäude am Kronenplatz (building 05.20), Kaiserstr. 89.

The number of participants is limited to 30 students. The registration period is from **31.08.2019 to 17.10.2019**. The places are expected to be allocated on **18.10.2019** and must be accepted by the students by **22.10.2019**. If the allocation is not accepted, the free places will be offered to the students in the waiting list.

If you have any questions regarding this registration, please contact scott.thiebes@kit.edu or manuel.schmidt-kraepelin@kit.edu.

T 5.56 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

Responsible: Anja Konhäuser
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Examination of another type	1,5	Each winter term	1

Events					
WS 19/20	2572176	Digital Marketing and Sales in B2B	1 SWS	Others (sonst.)	Konhäuser
Exams					
WS 19/20	7900169	Digital Marketing and Sales in B2B		Prüfung (PR)	Klarmann

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
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.

Below you will find excerpts from events related to this course:

V Digital Marketing and Sales in B2B
2572176, WS 19/20, 1 SWS, Language: English, Open in study portal

Others (sonst.)

Content
Learning Sessions:

The class gives insights into digital marketing strategies as well as the effects and potential of different channels (e.g., SEO, SEA, Social Media). After an overview of possible activities and leverages in the digital marketing field, including their advantages and limits, the focus will turn to the B2B markets. There are certain requirements in digital strategy specific to the B2B market, particularly in relation to the value chain, sales management and customer support. Therefore, certain digital channels are more relevant for B2B marketing than for B2C marketing.
Once the digital marketing and tactics for the B2B markets are defined, further insights will be given regarding core elements of a digital strategy: device relevance (mobile, tablet), usability concepts, website appearance, app decision, market research and content management. A major advantage of digital marketing is the possibility of being able to track many aspects of of user reactions and user behaviour. Therefore, an overview of key performance indicators (KPIs) will be discussed and relationships between these KPIs will be explained. To measure the effectiveness of digital activities, a digital report should be set up and connected to the performance numbers of the company (e.g. product sales) – within the course the setup of the KPI dashboard and combination of digital and non-digital measures will be shown to calculate the Return on Investment (RoI).

Presentation Sessions:

After the learning sessions, the students will form groups and work on digital strategies within a case study format. The presentation of the digital strategy will be in front of the class whereas the presentation will take 20 minutes followed by 10 minutes questions and answers.

- Understand digital marketing and sales approaches for the B2B sector
- Recognise important elements and understand how-to-setup of digital strategies
- Become familiar with the effectiveness and usage of different digital marketing channels
- Understand the effect of digital sales on sales management, customer support and value chain
- Be able to measure and interpret digital KPIs
- Calculate the Return on Investment (RoI) for digital marketing by combining online data with company performance data

time of presentness = 15 hrs.

private study = 30 hrs.

Literature
-

T 5.57 Course: Digital Transformation of Organizations [T-WIWI-106201]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104068 - Information Systems in Organizations

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2540556	Digital Transformation of Organizations	3 SWS	Lecture (V)	Mädche
Exams					
WS 19/20	7900230	Digital Transformation of Organizations		Prüfung (PR)	Mädche

Competence Certificate
The lecture will be offered for the last time in summer semester 2020. The last possibility for examination is in winter semester 2020/21 (only for repeaters).

The assessment consists of a written exam of 1 hour length and by submitting written papers as part of the exercise. Details will be announced at the beginning of the course.

Prerequisites
None

Annotation
The course will be held in English.

Below you will find excerpts from events related to this course:

V Digital Transformation of Organizations

2540556, SS 2020, 3 SWS, Language: English, Open in study portal

Lecture (V)

Literature
siehe englischsprachige Literaturliste

T 5.58 Course: Discrete Time Finance [T-MATH-105839]

Responsible: Prof. Dr. Nicole Bäuerle
Prof. Dr. Vicky Fasen-Hartmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-102919 - Discrete Time Finance

Type	Credits	Version
Written examination	8	1

Events					
WS 19/20	0108400	Finanzmathematik in diskreter Zeit	4 SWS	Lecture (V)	Fasen-Hartmann
WS 19/20	0108500	Übungen zu 0108400	2 SWS	Practice (Ü)	Fasen-Hartmann
Exams					
WS 19/20	7700012	Discrete Time Finance		Prüfung (PR)	Fasen-Hartmann
WS 19/20	7700013	Discrete Time Finance		Prüfung (PR)	Fasen-Hartmann

Prerequisites
none

T 5.59 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible: Prof. Dr. Stefan Nickel
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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2550488	Ereignisdiskrete Simulation in Produktion und Logistik	3 SWS	Lecture (V)	Spieckermann

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 2020, 3 SWS, Language: German, Open in study portal

Lecture (V)

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.

Literature

- 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 5.60 Course: Dispersive Equations [T-MATH-109001]

Responsible: Prof. Dr. Wolfgang Reichel
Organisation: KIT Department of Mathematics
Part of: M-MATH-104425 - Dispersive Equations

Type	Credits	Recurrence	Version
Oral examination	6	Irregular	1

Prerequisites
none

T 5.61 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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2560402	Dynamic Macroeconomics	2 SWS	Lecture (V)	Scheffel
WS 19/20	2560403	Übung zu Dynamic Macroeconomics	1 SWS	Practice (Ü)	Krause
Exams					
WS 19/20	7900261	Dynamic Macroeconomics		Prüfung (PR)	Scheffel

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None.

Below you will find excerpts from events related to this course:

V Dynamic Macroeconomics

2560402, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Literatur und Skripte werden in der Veranstaltung angegeben.

T 5.62 Course: Dynamical Systems [T-MATH-106114]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: M-MATH-103080 - Dynamical Systems

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.63 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsible: PD Dr. Patrick Jochem
Prof. Dr. Russell McKenna
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Recurrence	Version
Written examination	3,5	Each summer term	1

Events					
SS 2020	2581006	Efficient Energy Systems and Electric Mobility	2 SWS	Lecture (V)	Jochem, Fichtner
Exams					
WS 19/20	7981006	Efficient Energy Systems and Electric Mobility		Prüfung (PR)	Fichtner

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Efficient Energy Systems and Electric Mobility

Lecture (V)

2581006, SS 2020, 2 SWS, Language: English, Open in study portal

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

Literature
Wird in der Vorlesung bekanntgegeben.

T 5.64 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-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2540454	eFinance: Information Systems for Securities Trading	2 SWS	Lecture (V)	Weinhardt, Notheisen
WS 19/20	2540455	Übungen zu eFinance: Wirtschaftsinformatik für den Wertpapierhandel	1 SWS	Practice (Ü)	Jaquart, Soufi
Exams					
WS 19/20	7900182	eFinance: Information Engineering and Management for Securities Trading		Prüfung (PR)	Weinhardt
WS 19/20	7900309	eFinance: Information Systems for Securities Trading		Prüfung (PR)	Weinhardt

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.

Prerequisites
see below

Below you will find excerpts from events related to this course:

V eFinance: Information Systems for Securities Trading

2540454, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature

- Picot, Arnold, Christine Bortenlänger, Heiner Röhrl (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 5.65 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-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2513404	Emerging Trends in Digital Health (Bachelor)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513405	Emerging Trends in Digital Health (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
Exams					
SS 2020	7900146	Emerging Trends in Digital Health (Master)		Prüfung (PR)	Sunyaev

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

T 5.66 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-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2513402	Emerging Trends in Internet Technologies (Bachelor)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513403	Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
Exams					
SS 2020	7900128	Emerging Trends in Internet Technologies (Master)		Prüfung (PR)	Sunyaev

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

T 5.67 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

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2581003	Energy and Environment	2 SWS	Lecture (V)	Karl
SS 2020	2581004	Übungen zu Energie und Umwelt	1 SWS	Practice (Ü)	Keles, Weinand
Exams					
WS 19/20	7981003	Energy and Environment		Prüfung (PR)	Fichtner

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None.

Below you will find excerpts from events related to this course:

V Energy and Environment

2581003, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

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 5.68 Course: Energy Market Engineering [T-WIWI-107501]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2540464	Energy Market Engineering	2 SWS	Lecture (V)	Staudt, vom Scheidt
SS 2020	2540465	Übung zu Energy Market Engineering	1 SWS	Practice (Ü)	Staudt, Richter
Exams					
WS 19/20	7901171	Energy Market Engineering (Nachklausur aus dem SS19)		Prüfung (PR)	Weinhardt

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 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

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 5.69 Course: Energy Networks and Regulation [T-WIWI-107503]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2540494	Energy Networks and Regulation	2 SWS	Lecture (V)	Rogat
WS 19/20	2540495	Übung zu Energy Networks and Regulation	1 SWS	Practice (Ü)	Rogat
Exams					
WS 19/20	7900198	Energy Networks and Regulation		Prüfung (PR)	Weinhardt
WS 19/20	7900236	Energy Networks and Regulation		Prüfung (PR)	Weinhardt

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 19/20, 2 SWS, Open in study portal

Lecture (V)

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.

5.70 Course: Energy Systems Analysis [T-WIWI-102830]

Responsible: Dr. Armin Ardone
Prof. Dr. Wolf Fichtner

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Recurrence	Version
Written examination	3	Each winter term	1

Events					
WS 19/20	2581002	Energy Systems Analysis	2 SWS	Lecture (V)	Ardone, Keles, Dengiz, Yilmaz
Exams					
WS 19/20	7981002	Energy Systems Analysis		Prüfung (PR)	Fichtner

Competence Certificate
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

Prerequisites
None

Recommendation
None

Annotation
Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

Below you will find excerpts from events related to this course:

Energy Systems Analysis

2581002, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
1. Overview and classification of energy systems modelling approaches

2. Usage of scenario techniques for energy systems analysis

3. Unit commitment of power plants

4. Interdependencies in energy economics

5. Scenario-based decision making in the energy sector

6. Visualisation and GIS techniques for decision support in the energy sector

Learning goals:

The student

- has the ability to understand and critically reflect the methods of energy system analysis, the possibilities of its application in the energy industry and the limits and weaknesses of this approach
- can use select methods of the energy system analysis by her-/himself

Literature
Weiterführende Literatur:

- Möst, D. und Fichtner, W.: **Einführung zur Energiesystemanalyse**, in: Möst, D., Fichtner, W. und Grunwald, A. (Hrsg.): Energiesystemanalyse, Universitätsverlag Karlsruhe, 2009
- Möst, D.; Fichtner, W.; Grunwald, A. (Hrsg.): **Energiesystemanalyse** - Tagungsband des Workshops "Energiesystemanalyse" vom 27. November 2008 am KIT Zentrum Energie, Karlsruhe, Universitätsverlag Karlsruhe, 2009 [PDF: http://digbib.ubka.uni-karlsruhe.de/volltexte/documents/928852]

T 5.71 Course: Engineering FinTech Solutions [T-WIWI-106193]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105036 - FinTech Innovations

Type	Credits	Recurrence	Version
Examination of another type	9	Each term	4

Events					
WS 19/20	2500020	Engineering FinTech Solutions	6 SWS	Practical course (P)	Ulrich
SS 2020	2530357	Engineering FinTech Solutions	6 SWS	Practical course (P)	Ulrich
Exams					
SS 2020	7900287	Engineering FinTech Solutions		Prüfung (PR)	Ulrich

Competence Certificate
The assessment is carried out in form of a written thesis based on the course "Engineering FinTech Solutions".

Prerequisites
In order to take the course "Engineering FinTech Solutions", students must have completed the module "Data Science for Finance".

Below you will find excerpts from events related to this course:

V Engineering FinTech Solutions
2500020, WS 19/20, 6 SWS, Language: English, Open in study portal

Practical course (P)

Content
The assessment is carried out in form of a written thesis based on the course "Engineering FinTech Solutions".

This project invites students to either pursue their own FinTech innovation project or to contribute to the Chair's ongoing innovation projects.

The course is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

In order to take the course "Engineering FinTech Solutions", students must have completed the module "Data Science for Finance" with a grade of 1.3 or better.

The total workload for this course is approximately 270 hours. This consists of regular meetings with members of the research group and time for independent work on the software project.

Students will learn to connect innovative financial research with modern information technology to build a prototype that solves some daunting tasks for professional end-users in the field of modern asset and risk management.

V Engineering FinTech Solutions
2530357, SS 2020, 6 SWS, Language: English, Open in study portal

Practical course (P)

Content
The assessment is carried out in form of a written thesis based on the course "Engineering FinTech Solutions".

This project invites students to either pursue their own FinTech innovation project or to contribute to the Chair's ongoing innovation projects.

The course is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

In order to take the course "Engineering FinTech Solutions", students must have completed the module "Data Science for Finance" with a grade of 1.3 or better.

The total workload for this course is approximately 270 hours. This consists of regular meetings with members of the research group and time for independent work on the software project.

Students will learn to connect innovative financial research with modern information technology to build a prototype that solves some daunting tasks for professional end-users in the field of modern asset and risk management.

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

T 5.72 Course: Enterprise Architecture Management [T-WIWI-102668]

Responsible: Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511600	Enterprise Architecture Management	2 SWS	Lecture (V)	Wolf
WS 19/20	2511601	Exercises to Enterprise Architecture Management	1 SWS	Practice (Ü)	Wolf
Exams					
WS 19/20	7900010	Enterprise Architecture Management		Prüfung (PR)	Oberweis
SS 2020	7900043	Enterprise Architecture Management (Registration until 13 July 2020)		Prüfung (PR)	Wolf

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 (30 min.) according to §4(2) of the examination regulation.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Enterprise Architecture Management
2511600, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content
The following topics will be covered: components of enterprise architecture, enterprise strategy including methods to develop strategies, business process (re)engineering, methods to implement changes within enterprises (management of change).

Learning objectives:

Students understand the connection between enterprise strategy, business processes and business objects and IT architecture; they know methods to depict these connections and how they can be developed based on each other.

Literature

- Nolan, R., Croson, D.: Creative Destruction: A Six-Stage Process for Transforming the Organization. Harvard Business School Press, Boston Mass. 1995
- Doppler, K., Lauterburg, Ch.: Change Management. Campus Verlag 1997
- Jacobson, I.: The Object Advantage, Business Process Reengineering with Object Technology. Addison-Wesley Publishing Company, Wokingham England 1994
- Keller, G., Teufel, Th.: SAP R/3 prozessorientiert anwenden. Addison Wesley 1998
- Österle, H.: Business Engineering Bd. 1 und 2. Springer Verlag, Berlin 1995

T 5.73 Course: Evolution Equations [T-MATH-105844]

Responsible: Prof. Dr. Dorothee Frey
Dr. Peer Kunstmann
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-102872 - Evolution Equations

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0156400	Evolution Equations	4 SWS	Lecture (V)	Schnaubelt
SS 2020	0156410	Tutorial for 0156400 (Evolution Equations)	2 SWS	Practice (Ü)	Schnaubelt

T 5.74 Course: Experimental Economics [T-WIWI-102614]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101505 - Experimental Economics
M-WIWI-102970 - Decision and Game Theory

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2540489	Experimental Economics	2 SWS	Lecture (V)	Peukert, Dorner
WS 19/20	2540493	Übung zu Experimentelle Wirtschaftsforschung	1 SWS	Practice (Ü)	Greif-Winzrieth, Pietruska
Exams					
WS 19/20	7900178	Experimental Economics		Prüfung (PR)	Weinhardt
WS 19/20	7900194	Experimental Economics		Prüfung (PR)	Weinhardt

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

Below you will find excerpts from events related to this course:

V Experimental Economics
Lecture (V)
2540489, WS 19/20, 2 SWS, Language: German, Open in study portal

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 5.75 Course: Exponential Integrators [T-MATH-107475]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: M-MATH-103700 - Exponential Integrators

Type	Credits	Recurrence	Version
Oral examination	6	Irregular	1

Prerequisites
none

T 5.76 Course: Extremal Graph Theory [T-MATH-105931]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: M-MATH-102957 - Extremal Graph Theory

Type	Credits	Recurrence	Version
Oral examination	8	Each term	1

T 5.77 Course: Extreme Value Theory [T-MATH-105908]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Norbert Henze

Organisation: KIT Department of Mathematics

Part of: M-MATH-102939 - Extreme Value Theory

Type	Credits	Version
Oral examination	4	2

Events					
SS 2020	0155600	Extremwerttheorie	2 SWS	Lecture (V)	Fasen-Hartmann
SS 2020	0155610	Übungen zu 0155600	1 SWS	Practice (Ü)	Fasen-Hartmann

T 5.78 Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
M-WIWI-101414 - Methodical Foundations of OR

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	4

Competence Certificate
Due to a research semester of Professor Nickel in WS 19/20, the course "Facility Location and Strategic Supply Chain Management" does NOT take place in WS 19/20. In particular, neither WS 19/20 nor SS 20 will offer an exam for the lecture. The follow-up exam to the lecture in WS 18/19 takes place in SS 19 and is exclusively for students in the second examination.

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.

Prerequisite for admission to examination is the succesful completion of the online assessments.

Prerequisites
Prerequisite for admission to examination is the succesful completion of the online assessments.

Recommendation
None

Annotation
The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.

T 5.79 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2530205	Financial Analysis	2 SWS	Lecture (V)	Luedecke
SS 2020	2530206	Übungen zu Financial Analysis	2 SWS	Practice (Ü)	Luedecke
Exams					
WS 19/20	7900059	Financial Analysis		Prüfung (PR)	Luedecke, Ruckes

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 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

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.

T 5.80 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

Type	Credits	Recurrence	Version
Written examination	4,5	Irregular	2

Events					
SS 2020	2520022	Financial Econometrics	2 SWS	Lecture (V)	Schienle
SS 2020	2520023	Übungen zu Financial Econometrics I	2 SWS	Practice (Ü)	Schienle, Görgen

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
The course T-MATH-105874 "Time Series Analysis" may not be chosen.

Recommendation
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics"[2520016]

Annotation
The course takes place each second summer term: 2018/2020....

Below you will find excerpts from events related to this course:

V Financial Econometrics

2520022, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Learning objectives:

The student

- shows a broad knowledge of fincancial 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 5.81 Course: Financial Intermediation [T-WIWI-102623]

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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530232	Financial Intermediation	2 SWS	Lecture (V)	Ruckes
WS 19/20	2530233	Übung zu Finanzintermediation	1 SWS	Practice (Ü)	Ruckes, Hoang, Benz
Exams					
WS 19/20	7900063	Financial Intermediation		Prüfung (PR)	Ruckes

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 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur:

- Hartmann-Wendels/Pfingsten/Weber (2014): Bankbetriebslehre, 6. Auflage, Springer Verlag.
- Freixas/Rochet (2008): Microeconomics of Banking, 2. Auflage, MIT Press.

5.82 Course: Finite Element Methods [T-MATH-105857]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102891 - Finite Element Methods

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0110300	Finite Eelement Methods	4 SWS	Lecture (V)	Wieners
WS 19/20	0110310	Tutorial for 0110300 (Finite Element Methods)	2 SWS	Practice (Ü)	Wieners
Exams					
WS 19/20	205	Finite Element Methods		Prüfung (PR)	Wieners

T 5.83 Course: Finite Group Schemes [T-MATH-106486]

Responsible: Dr. Fabian Januszewski
Organisation: KIT Department of Mathematics
Part of: M-MATH-103258 - Finite Group Schemes

Type	Credits	Recurrence	Version
Oral examination	4	Once	1

T 5.84 Course: Fixed Income Securities [T-WIWI-102644]

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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530260	Fixed Income Securities	3 SWS	Lecture / Practice (VÜ)	Uhrig-Homburg, Mitarbeiter
Exams					
WS 19/20	7900053	Fixed Income Securities		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the excercises. 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
Knowledge from the course "Derivatives" is very helpful.

Annotation
The oourse is offered as a block course.

Below you will find excerpts from events related to this course:

V Fixed Income Securities

2530260, WS 19/20, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)

Content
The lecture deals with both German and international bond markets, which are an important source of funding for both the corporate and the public sector. After an overview of the most important bond markets, various definitions of return are discussed. Based on that, the concept of the yield curve is presented. The modelling of the dynamics of the term structure of interest rates provides the theoretical foundation for the valuation of interest rate derivatives, which is discussed in the last part of the lecture.

The objective of this course is to become familiar with national and international bond markets. Therefore, we first have a look at financial instruments that are of particular importance. Thereafter, specific models and methods that allow the evaluation of interest rate derivatives are introduced and applied.

The total workload for this course is approximately 135.0 hours. For further information see German version.

The assessment consists of a written exam following §4, Abs. 2, 1.

- Bühler, W., Uhrig-Homburg, M., Rendite und Renditestruktur am Rentenmarkt, in Obst/Hintner, Geld-, Bank- und Börsenwesen - Handbuch des Finanzsystems, (2000), S.298-337.
- Sundaresan, S., Fixed Income Markets and Their Derivatives, Academic Press, 3rd Edition, (2009).

Elective literature:

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition, (2012).

Literature

- Bühler, W., Uhrig-Homburg, M., Rendite und Renditestruktur am Rentenmarkt, in Obst/Hintner, Geld-, Bank- und Börsenwesen - Handbuch des Finanzsystems, (2000), S.298-337.
- Sundaresan, S., Fixed Income Markets and Their Derivatives, Academic Press, 3rd Edition, (2009).

Weiterführende Literatur:

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition, (2012).

T 5.85 Course: Forecasting: Theory and Practice [T-MATH-105928]

Responsible: Prof. Dr. Tilmann Gneiting
Organisation: KIT Department of Mathematics
Part of: M-MATH-102956 - Forecasting: Theory and Practice

Type	Credits	Version
Oral examination	8	2

T 5.86 Course: Foundations of Continuum Mechanics [T-MATH-107044]

Responsible: Prof. Dr. Christian Wieners
Organisation: KIT Department of Mathematics
Part of: M-MATH-103527 - Foundations of Continuum Mechanics

Type	Credits	Recurrence	Version
Oral examination	3	Once	1

Prerequisites
none

T 5.87 Course: Fourier Analysis [T-MATH-105845]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-102873 - Fourier Analysis

Type	Credits	Version
Written examination	8	1

T 5.88 Course: Fourier Analysis and its Applications to PDEs [T-MATH-109850]

Responsible: Jun.-Prof. Dr. Xian Liao
Organisation: KIT Department of Mathematics
Part of: M-MATH-104827 - Fourier Analysis and its Applications to PDEs

Type	Credits	Recurrence	Version
Oral examination	3	Irregular	2

Prerequisites
none

T 5.89 Course: Functional Analysis [T-MATH-102255]

Responsible: Prof. Dr. Dorothee Frey
PD Dr. Gerd Herzog
Prof. Dr. Dirk Hundertmark
Prof. Dr. Tobias Lamm
Prof. Dr. Michael Plum
Prof. Dr. Wolfgang Reichel
Dr. Christoph Schmoeger
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-101320 - Functional Analysis

Type	Credits	Recurrence	Version
Written examination	8	Each winter term	2

Events					
WS 19/20	0104800	Functional Analysis	4 SWS	Lecture (V)	Frey
WS 19/20	0104810	Tutorial for 0104800 (Functional Analysis)	2 SWS	Practice (Ü)	Frey
Exams					
WS 19/20	0100047	Functional Analysis		Prüfung (PR)	Lamm, Hundertmark, Kunstmann, Schnaubelt, Frey

T 5.90 Course: Functions of Matrices [T-MATH-105906]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: M-MATH-102937 - Functions of Matrices

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0115800	Functions of Matrices	4 SWS	Lecture (V)	Grimm
WS 19/20	0115810	Tutorial for 0115800 (Functions of Matrices)	2 SWS	Lecture (V)	Grimm
Exams					
WS 19/20	7700056	Functions of Matrices		Prüfung (PR)	Grimm

Prerequisites
none

T 5.91 Course: Functions of Operators [T-MATH-105905]

Organisation: KIT Department of Mathematics
Part of: M-MATH-102936 - Functions of Operators

Type	Credits	Version
Oral examination	6	1

T 5.92 Course: Generalized Regression Models [T-MATH-105870]

Responsible: Prof. Dr. Norbert Henze
Dr. Bernhard Klar

Organisation: KIT Department of Mathematics

Part of: M-MATH-102906 - Generalized Regression Models

Type	Credits	Version
Oral examination	4	2

Events					
SS 2020	0161400	Generalisierte Regressionsmodelle	2 SWS	Lecture (V)	Ebner
SS 2020	0161410	Übungen zu 0161400	1 SWS	Practice (Ü)	Ebner

T 5.93 Course: Geometric Group Theory [T-MATH-105842]

Responsible: Prof. Dr. Frank Herrlich
Prof. Dr. Enrico Leuzinger
Dr. Gabriele Link
Prof. Dr Roman Sauer
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-102867 - Geometric Group Theory

Type	Credits	Recurrence	Version
Written examination	8	Irregular	1

T 5.94 Course: Geometric Numerical Integration [T-MATH-105919]

Responsible: Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke

Organisation: KIT Department of Mathematics

Part of: M-MATH-102921 - Geometric Numerical Integration

Type	Credits	Version
Oral examination	6	1

Events					
SS 2020	0154100	Geometric Numerical Integration	3 SWS	Lecture (V)	Jahnke
SS 2020	0154200	Tutorial for 0154100	1 SWS	Practice (Ü)	Jahnke

Prerequisites
none

T 5.95 Course: Geometry of Schemes [T-MATH-105841]

Responsible: Prof. Dr. Frank Herrlich
Dr. Stefan Kühnlein

Organisation: KIT Department of Mathematics

Part of: M-MATH-102866 - Geometry of Schemes

Type	Credits	Version
Oral examination	8	1

T 5.96 Course: Global Differential Geometry [T-MATH-105885]

Responsible: Dr. Sebastian Grensing
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-102912 - Global Differential Geometry

Type	Credits	Version
Oral examination	8	1

Prerequisites
none

5.97 Course: Global Optimization I [T-WIWI-102726]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Exams				
WS 19/20	7900005_WS1920_NK	Global Optimization I	Prüfung (PR)	Stein

Competence Certificate
Please note: due to the research semester of Prof. Dr. Stein the lecture will not be offered in summer semester 2020.

Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO).

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.

T 5.98 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-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	9	Each summer term	1

Exams				
WS 19/20	7900007_WS1920_NK	Global Optimization I and II	Prüfung (PR)	Stein

Competence Certificate
Please note: due to the research semester of Prof. Dr. Stein the lectures will not be offered in summer semester 2020.

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation.

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.

T 5.99 Course: Global Optimization II [T-WIWI-102727]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Exams				
WS 19/20	7900006_WS1920_NK	Global Optimization II	Prüfung (PR)	Stein

Competence Certificate
Please note: due to the research semester of Prof. Dr. Stein the lecture will not be offered in summer semester 2020.

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

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.

T 5.100 Course: Graph Theory [T-MATH-102273]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: M-MATH-101336 - Graph Theory

Type	Credits	Recurrence	Version
Written examination	8	Irregular	1

Events					
WS 19/20	0104500	Graph Theory	4 SWS	Lecture (V)	Aksenovich
WS 19/20	0104510	Tutorial for 0104500 (Graph Theory)	2 SWS	Practice (Ü)	Aksenovich
Exams					
WS 19/20	7700074	Graph Theory		Prüfung (PR)	Aksenovich

Prerequisites
None

T 5.101 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	Recurrence	Version
Written examination	4,5	Irregular	2

Exams				
WS 19/20	7900287	Graph Theory and Advanced Location Models	Prüfung (PR)	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 5.102 Course: Group Actions in Riemannian Geometry [T-MATH-105925]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-102954 - Group Actions in Riemannian Geometry

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.103 Course: Harmonic Analysis [T-MATH-110804]

Responsible: Prof. Dr. Dorothee Frey
Dr. Peer Kunstmann
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-105324 - Harmonic Analysis

Type	Credits	Version
Written examination	8	1

T 5.104 Course: Harmonic Analysis for Dispersive Equations [T-MATH-107071]

Responsible: Dr. Peer Kunstmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-103545 - Harmonic Analysis for Dispersive Equations

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.105 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	Recurrence	Version
Written examination	3	Each summer term	1

Exams				
WS 19/20	7981001	Heat Economy	Prüfung (PR)	Fichtner

Competence Certificate
The lecture will be suspended in summer semester 2019 and 2020 and will probably be offered again in summer semester 2021.

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None.

Recommendation
None

Annotation
See German version.

T 5.106 Course: Homotopy Theory [T-MATH-105933]

Responsible: Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: M-MATH-102959 - Homotopy Theory

Type	Credits	Version
Oral examination	8	1

T 5.107 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-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Exams				
WS 19/20	7900113	Human Factors in Security and Privacy	Prüfung (PR)	Volkamer
SS 2020	7900084	Human Factors in Security and Privacy (Registration until 13 July 2020)	Prüfung (PR)	Volkamer

Competence Certificate
The lecture will not be offered in the winter semester 2019/2020.

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.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
Successful participation in the exercises.

Recommendation
The prior attendance of the lecture "Information Security" is strongly recommended.

5.108 Course: Incentives in Organizations [T-WIWI-105781]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101500 - Microeconomic Theory
M-WIWI-101505 - Experimental Economics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2573003	Incentives in Organizations	2 SWS	Lecture (V)	Nieken
SS 2020	2573004	Übung zu Incentives in Organizations	2 SWS	Practice (Ü)	Nieken, Mitarbeiter
Exams					
WS 19/20	7900201	Incentives in Organizations		Prüfung (PR)	Nieken

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.

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:

Incentives in Organizations
Lecture (V)
2573003, SS 2020, 2 SWS, Language: English, Open in study portal

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: 32h

Preparation of lecture: 52h

Exam preparation: 51h

Literature

Slides

Additional case studies and research papers will be announced in the lecture.

T 5.109 Course: Information Service Engineering [T-WIWI-106423]

Responsible: Prof. Dr. Harald Sack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2511606	Information Service Engineering	2 SWS	Lecture (V)	Sack
SS 2020	2511607	Exercises to Information Service Engineering	1 SWS	Practice (Ü)	Sack
Exams					
WS 19/20	7900071	Information Service Engineering		Prüfung (PR)	Sack
SS 2020	7900070	Information Service Engineering (Registration until 13 July 2020)		Prüfung (PR)	Sack

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 **Lecture (V)**
2511606, SS 2020, 2 SWS, Language: English, Open in study portal

Content
- Information, Natural Language and the Web

- 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

- 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 Programming

- Basic Machine Learning

  - Machine Learning Fundamentals
  - Evaluation and Generalization Problems
  - Linear Regression
  - Decision Trees
  - Unsupervised Learning
  - Neural Networks and Deep Learning

- ISE Applications

  - From Data to Knowledge
  - Data Mining, Information Visualization and Knowledge Discovery
  - Semantic Search
  - Exploratory Search
  - Semantic 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.
- S. Hitzler, S. Rudolph, Foundations of Semantic Web Technologies, Chapman / Hall, 2009.
- R. Baeza-Yates, B. Ribeiro-Neto, Modern Information Retrieval, 2nd ed., Addison Wesley, 2010.
- S. Marsland, Machine Learning - An Algorithmic Perspective, 2nd ed., CRC Press, 2015

T 5.110 Course: Innovation Theory and Policy [T-WIWI-102840]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101478 - Innovation and Growth

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2560236	Innovationtheory and -policy	SWS	Lecture (V)	Ott
SS 2020	2560237		1 SWS	Practice (Ü)	Ott, Eraydin

Competence Certificate
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.

A bonus can be earned through a short written homework and its presentation in the exercise. If the grade of the written examination 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 course.

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 Innovationtheory and -policy

Lecture (V)

2560236, SS 2020, SWS, Language: German/English, Open in study portal

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 5.111 Course: Integral Equations [T-MATH-105834]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-102874 - Integral Equations

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Events					
SS 2020	0160500	Integralgleichungen	4 SWS	Lecture (V)	Arens
SS 2020	0160510	Übungen zu 0160500 (Integralgleichungen)	2 SWS	Practice (Ü)	Arens

T 5.112 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	Recurrence	Version
Written examination	3	Each summer term	1

Events					
SS 2020	2530570	International Finance	2 SWS	Lecture (V)	Walter, Uhrig-Homburg
Exams					
WS 19/20	7900052	International Finance		Prüfung (PR)	Uhrig-Homburg

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Annotation
See German version.

Below you will find excerpts from events related to this course:

V International Finance
2530570, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur:

- Eiteman, D. et al., Multinational Business Finance, 13. Auflage, 2012.
- Solnik, B. und D. McLeavey, Global Investments, 6. Auflage, 2008.

T 5.113 Course: Introduction into Particulate Flows [T-MATH-105911]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: M-MATH-102943 - Introduction into Particulate Flows

Type	Credits	Version
Oral examination	3	1

Prerequisites
none

T 5.114 Course: Introduction to Aperiodic Order [T-MATH-110811]

Responsible: Prof. Dr. Tobias Hartnick
Organisation: KIT Department of Mathematics
Part of: M-MATH-105331 - Introduction to Aperiodic Order

Type	Credits	Recurrence	Version
Oral examination	3	Irregular	1

Prerequisites
none

T 5.115 Course: Introduction to Data Science [T-WIWI-110863]

Responsible: Steffen Herbold
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Once	1

Events					
SS 2020	2511608	Introduction to Data Science	2 SWS	Lecture (V)	Herbold
SS 2020	2511609	Exercises to Introduction to Data Science	1 SWS	Practice (Ü)	Herbold
Exams					
SS 2020	7900104	Introduction to Data Science (Registration until 13 July 2020)		Prüfung (PR)	Herbold

Competence Certificate
The assessment consists of a written exam (60 min).

Please note that lecture and exam will be offered once in the summer semester 2020. The repeat examination will take place in winter semester 2020/21 (only for repeaters).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Introduction to Data Science

Lecture (V)

2511608, SS 2020, 2 SWS, Language: English, Open in study portal

Content
The main topic of this lecture is data science, i.e., methods to extract information from data with a scientific approach. We approach this topic from a practical side in this lecture. This means, that we concern ourselves directly with what algorithms do, and where they should be applied. The details of the algorithms and the theory behind them are not part of this lecture. Methods considered in this lecture include:

- Association rule mining with the APRIORI approach
- Clustering with k-means, EM for gaussian mixtures, DBSCAN, and single linkage clustering
- Classification with k-nearest neighbor, decision trees, random forests, logistic regression, naive Bayes, support vector machines, and neural networks
- Linear regression with ridge and lasso
- Time series analysis with ARMA
- Fundamentals of text mining

Additionally, we will consider the analysis of Big Data. In this context, we will consider the following topics:

- The MapReduce paradigm
- Apache Hadoop and Apache Spark

Literature
To be announced.

T 5.116 Course: Introduction to Geometric Measure Theory [T-MATH-105918]

Responsible: PD Dr. Steffen Winter
Organisation: KIT Department of Mathematics
Part of: M-MATH-102949 - Introduction to Geometric Measure Theory

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.117 Course: Introduction to Homogeneous Dynamics [T-MATH-110323]

Responsible: Prof. Dr. Tobias Hartnick
Organisation: KIT Department of Mathematics
Part of: M-MATH-105101 - Introduction to Homogeneous Dynamics

Type	Credits	Recurrence	Version
Oral examination	6	Irregular	1

Prerequisites
none

T 5.118 Course: Introduction to Kinetic Theory [T-MATH-108013]

Responsible: Prof. Dr. Martin Frank
Organisation: KIT Department of Mathematics
Part of: M-MATH-103919 - Introduction to Kinetic Theory

Type	Credits	Recurrence	Version
Oral examination	4	Each winter term	1

Events					
WS 19/20	0155450	Introduction to Kinetic Theory	2 SWS	Lecture (V)	Frank
WS 19/20	0155460	Tutorial for 0155450 (Introduction to Kinetic Theory)	1 SWS	Practice (Ü)	Frank
Exams					
WS 19/20	7700078	Introduction to Kinetic Theory		Prüfung (PR)	Frank

Prerequisites
none

Below you will find excerpts from events related to this course:

V Introduction to Kinetic Theory
0155450, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

T 5.119 Course: Introduction to Matlab and Numerical Algorithms [T-MATH-105913]

Responsible: Dr. Daniel Weiß
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102945 - Introduction to Matlab and Numerical Algorithms

Type	Credits	Version
Written examination	5	1

Prerequisites
none

T 5.120 Course: Introduction to Scientific Computing [T-MATH-105837]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102889 - Introduction to Scientific Computing

Type	Credits	Version
Oral examination	8	2

Events					
SS 2020	0165000	Einführung in das Wissenschaftliche Rechnen	3 SWS	Lecture (V)	Hochbruck
SS 2020	0166000	Praktikum zu 0165000 (Einführung in das Wissenschaftliche Rechnen)	3 SWS	Practical course (P)	Hochbruck

T 5.121 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2550470	Einführung in die Stochastische Optimierung	2 SWS	Lecture (V)	Rebennack
SS 2020	2550471	Übung zur Einführung in die Stochastische Optimierung	1 SWS	Practice (Ü)	Rebennack, Sinske
SS 2020	2550474	Rechnerübung zur Einführung in die Stochastische Optimierung	SWS	Practice (Ü)	Rebennack, Sinske
Exams					
WS 19/20	7900242	Introduction to Stochastic Optimization		Prüfung (PR)	Rebennack

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 5.122 Course: Inverse Problems [T-MATH-105835]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich
Prof. Dr. Andreas Rieder

Organisation: KIT Department of Mathematics

Part of: M-MATH-102890 - Inverse Problems

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0105100	Inverse Problems	4 SWS	Lecture (V)	Griesmaier
WS 19/20	0105110	Tutorial for 0105100 (Inverse Problems)	2 SWS	Practice (Ü)	Griesmaier
Exams					
WS 19/20	7700075	Inverse Problems		Prüfung (PR)	Griesmaier

T 5.123 Course: Key Moments in Geometry [T-MATH-108401]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-104057 - Key Moments in Geometry

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Prerequisites
none

T 5.124 Course: Knowledge Discovery [T-WIWI-102666]

Responsible: Prof. Dr. York Sure-Vetter
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511302	Knowledge Discovery	2 SWS	Lecture (V)	Sure-Vetter, Färber
WS 19/20	2511303	Exercises to Knowledge Discovery	1 SWS	Practice (Ü)	Sure-Vetter, Färber, Weller
Exams					
WS 19/20	7900013	Knowledge Discovery		Prüfung (PR)	Sure-Vetter
SS 2020	7900039	Knowledge Discovery (Registration until 13 July 2020)		Prüfung (PR)	Sure-Vetter

Competence Certificate
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation.

Students can be awarded a bonus on their final grade if they successfully complete special assignments.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Knowledge Discovery

2511302, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
The lecture 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.

Learning obejctives:

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 preperation and postprocessing: 60 hours
- Exam and exam preperation: 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

V **Exercises to Knowledge Discovery** **Practice (Ü)**
2511303, WS 19/20, 1 SWS, Language: English, Open in study portal

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 5.125 Course: L2-Invariants [T-MATH-105924]

Responsible: Dr. Holger Kammeyer
Prof. Dr Roman Sauer
Organisation: KIT Department of Mathematics
Part of: M-MATH-102952 - L2-Invariants

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.126 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Exams				
WS 19/20	7900244	Large-scale Optimization	Prüfung (PR)	Rebennack

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 5.127 Course: Lie Groups and Lie Algebras [T-MATH-108799]

Responsible: Prof. Dr. Enrico Leuzinger
Organisation: KIT Department of Mathematics
Part of: M-MATH-104261 - Lie Groups and Lie Algebras

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

T 5.128 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-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511500	Machine Learning 1 - Fundamental Methods	2 SWS	Lecture (V)	Zöllner
WS 19/20	2511501	Exercises to Machine Learning 1 - Fundamental Methods	1 SWS	Practice (Ü)	Zöllner
Exams					
WS 19/20	7900076	Machine Learning 1 - Basic Methods		Prüfung (PR)	Zöllner
SS 2020	7900154	Machine Learning 1 - Basic Methods (Registration until 13 July 2020)		Prüfung (PR)	Zöllner

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 Machine Learning 1 - Fundamental Methods

Lecture (V)

2511500, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The field of knowledge acquisition and machine learning is a rapidly expanding field of knowledge and the subject of numerous research and development projects. The acquisition of knowledge can take place in different ways. Thus a system can benefit from experiences already made, it can be trained, or it draws conclusions from extensive background knowledge.

The lecture covers symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as sub-symbolic techniques such as neural networks, support vector machines and genetic algorithms. The lecture introduces the basic principles and structures of learning systems and examines the algorithms developed so far. The structure and operation of learning systems is presented and explained with some examples, especially from the fields of robotics and image processing.

Learning obectives:

- 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 of machine learning.

Literature
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- 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 5.129 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-101472 - Informatics
M-WIWI-101637 - Analytics and Statistics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2511502	Machine Learning 2 - Advanced methods	2 SWS	Lecture (V)	Zöllner
SS 2020	2511503	Exercises for Machine Learning 2 - Advanced Methods	1 SWS	Practice (Ü)	Zöllner
Exams					
WS 19/20	7900050	Machine Learning 2 – Advanced Methods		Prüfung (PR)	Zöllner
SS 2020	7900080	Machine Learning 2 – Advanced Methods (Registration until 13 July 2020)		Prüfung (PR)	Zöllner

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 Machine Learning 2 - Advanced methods

2511502, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

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 advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning), pulsed networks, hierarchical approaches, e.g. As well as dynamic, probabilistic relational methods. 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 (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

- 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 5.130 Course: Management of IT-Projects [T-WIWI-102667]

Responsible: Dr. Roland Schätzle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	3

Events					
SS 2020	2511214	Management of IT-Projects	2 SWS	Lecture (V)	Schätzle
SS 2020	2511215	Übungen zu Management von Informatik-Projekten	1 SWS	Practice (Ü)	Schätzle
Exams					
WS 19/20	7900014	Management of IT-Projects		Prüfung (PR)	Oberweis
SS 2020	7900045	Management of IT-Projects (Registration until 13 July 2020)		Prüfung (PR)	Oberweis

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.

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.

The exact details will be announced in the lecture.

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
Lecture (V)

2511214, SS 2020, 2 SWS, Language: German, Open in study portal

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 infrastructur
- 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 appropiate 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.

V **Übungen zu Management von Informatik-Projekten**
2511215, SS 2020, 1 SWS, Language: German, Open in study portal

Practice (Ü)

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 5.131 Course: Market Research [T-WIWI-107720]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2571150	Market Research	2 SWS	Lecture (V)	Klarmann
SS 2020	2571151	Market Research Tutorial	1 SWS	Practice (Ü)	Honold
Exams					
WS 19/20	7900217	Market Research		Prüfung (PR)	Klarmann

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

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 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

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
- Strategical 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 consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

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 seminar or master thesis positions at the chair of marketing.

Literature
Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.132 Course: Marketing Strategy Business Game [T-WIWI-102835]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Examination of another type	1,5	Each summer term	1

Events					
SS 2020	2571183	Marketing Strategy Business Game	1 SWS	Block (B)	Klarmann, Mitarbeiter

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.

Below you will find excerpts from events related to this course:

V Marketing Strategy Business Game

2571183, SS 2020, 1 SWS, Language: German, Open in study portal

Block (B)

Content

Using Markstrat, a marketing strategy business game, students work in groups representing a company that competes on a simulated market against the other groups' companies.

Students

- are able to operate the strategic marketing simulation software "Markstrat"

- are able to take strategic marketing decisions in groups

- know how to apply strategic marketing concepts to practical contexts (e.g. for market segmentation, product launches, coordination of the marketing mix, market research, choice of the distribution channel or competitive behavior)

- are capable to collect and to select information usefully with the aim of decision-making

- are able to react appropriately to predetermined market conditions

- know how to present their strategies in a clear and consistent way

- are able to talk about the success, problems, critical incidents, external influences and strategy changes during the experimental game and to reflect and present their learning success

Non exam assessment (following §4(2), 3 of the examination regulation).

The total workload for this course is approximately 45.0 hours. For further information see German version.

- 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 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.

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.133 Course: Markov Decision Processes [T-MATH-105921]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: M-MATH-102907 - Markov Decision Processes

Type	Credits	Version
Oral examination	5	1

Events					
SS 2020	0159900	Markovsche Entscheidungsprozesse	3 SWS	Lecture (V)	Bäuerle
SS 2020	0159910	Übungen zu 0159900 (Markovsche Entscheidungsprozesse)	1 SWS	Practice (Ü)	Bäuerle

Prerequisites
none

T 5.134 Course: Master Thesis [T-MATH-105878]

Responsible:	Dr. Sebastian Grensing
Organisation:	KIT Department of Mathematics
Part of:	M-MATH-102917 - Master Thesis

Type	Credits	Version
Final Thesis	30	1

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 5.135 Course: Mathematical Methods in Signal and Image Processing [T-MATH-105862]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-102897 - Mathematical Methods in Signal and Image Processing

Type	Credits	Version
Oral examination	8	1

Prerequisites
none

T 5.136 Course: Mathematical Methods of Imaging [T-MATH-106488]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-103260 - Mathematical Methods of Imaging

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Events					
SS 2020	0102900	Mathematische Methoden der Bildgebung	2+2 SWS	Lecture (V)	Rieder
SS 2020	0102910	Übungen zu 0102900	2 SWS	Practice (Ü)	Rieder

Prerequisites
None

T 5.137 Course: Mathematical Modelling and Simulation in Practise [T-MATH-105889]

Responsible: PD Dr. Gudrun Thäter
Organisation: KIT Department of Mathematics
Part of: M-MATH-102929 - Mathematical Modelling and Simulation in Practise

Type	Credits	Version
Oral examination	4	2

Events					
WS 19/20	0109400	Mathematical Modelling and Simulation	2 SWS	Lecture (V)	Thäter
WS 19/20	0109410	Tutorial for 0109400	1 SWS	Practice (Ü)	Thäter
Exams					
WS 19/20	0100055	Mathematical Modelling and Simulation in Practise		Prüfung (PR)	Thäter

Below you will find excerpts from events related to this course:

V Mathematical Modelling and Simulation

0109400, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

T 5.138 Course: Mathematical Statistics [T-MATH-105872]

Responsible: Prof. Dr. Norbert Henze
Dr. Bernhard Klar

Organisation: KIT Department of Mathematics

Part of: M-MATH-102909 - Mathematical Statistics

Type	Credits	Version
Oral examination	4	1

Events					
SS 2020	0162300	Mathematische Statistik	2 SWS	Lecture (V)	Klar
SS 2020	0162310	Übungen zu 0162300	1 SWS	Practice (Ü)	Klar

Prerequisites
none

T 5.139 Course: Mathematical Topics in Kinetic Theory [T-MATH-108403]

Responsible: Prof. Dr. Dirk Hundertmark
Organisation: KIT Department of Mathematics
Part of: M-MATH-104059 - Mathematical Topics in Kinetic Theory

Type	Credits	Recurrence	Version
Oral examination	4	Irregular	1

Prerequisites
none

T 5.140 Course: Maxwell's Equations [T-MATH-105856]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-102885 - Maxwell's Equations

Type	Credits	Version
Oral examination	8	1

Exams				
WS 19/20	7700055	Maxwell's Equations	Prüfung (PR)	Hettlich, Arens

T 5.141 Course: Medical Imaging [T-MATH-105861]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-102896 - Medical Imaging

Type	Credits	Version
Oral examination	8	1

Exams				
WS 19/20	7305261	Medical Imaging Techniques I	Prüfung (PR)	Dössel

Prerequisites
none

T 5.142 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	Recurrence	Version
Written examination	4,5	Irregular	1

Events					
WS 19/20	2550138	Mixed-integer Programming I	2 SWS	Lecture (V)	Stein
WS 19/20	2550139	Exercises Mixted Integer Programming I	SWS	Practice (Ü)	Stein
Exams					
WS 19/20	7900008_WS1920_HK	Mixed Integer Programming I		Prüfung (PR)	Stein

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

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.ior.kit.edu).

Below you will find excerpts from events related to this course:

V Mixed-integer Programming I
Lecture (V)
2550138, WS 19/20, 2 SWS, Language: German, Open in study portal

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, portfolio optimization with limitations on the number of securities, the choice of locations to serve customers at minimum cost, and the optimal design of vote allocations in election procedures. 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 5.143 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	Recurrence	Version
Written examination	4,5	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 examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

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.ior.kit.edu).

T 5.144 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-102832 - Operations Research in Supply Chain Management

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	2

Events					
WS 19/20	2550490	Modellieren und OR-Software: Fortgeschrittene Themen	3 SWS	Practical course (P)	Pomes, Zander, Bakker
Exams					
WS 19/20	00019	Modeling and OR-Software: Advanced Topics		Prüfung (PR)	Nickel

Competence Certificate
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

Prerequisites
None.

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 Modellieren und OR-Software: Fortgeschrittene Themen

Practical course (P)

2550490, WS 19/20, 3 SWS, Language: German, Open in study portal

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 progamming languages are OPL and ILOG Script.

T 5.145 Course: Modeling and OR-Software: Introduction [T-WIWI-106199]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2550490	Modellieren und OR-Software: Einführung	3 SWS	Practical course (P)	Nickel, Pomes

Competence Certificate
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

Prerequisites
None

Recommendation
Firm knowledge of the contents from the lecture *Introduction to Operations Research I* [2550040] of the module *Operations Research.*

Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is offered 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 Modellieren und OR-Software: Einführung

2550490, SS 2020, 3 SWS, Language: German, Open in study portal

Practical course (P)

Content
After an introduction to general concepts of modelling tools (implementation, data handling, result interpretation, ...), the software IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL will be discussed which can be used to solve OR problems on a computer-aided basis. Subsequently, a broad range of exercises will be discussed. The main goals of the exercises from literature and practical applications are to learn the process of modeling optimization problems as linear or mixed-integer programs, to efficiently utilize the presented tools for solving these optimization problems and to implement heuristic solution procedures for mixed-integer programs.

T 5.146 Course: Monotonicity Methods in Analysis [T-MATH-105877]

Responsible: PD Dr. Gerd Herzog
Organisation: KIT Department of Mathematics
Part of: M-MATH-102887 - Monotonicity Methods in Analysis

Type	Credits	Version
Oral examination	3	1

T 5.147 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2550554	Multivariate Verfahren	2 SWS	Lecture (V)	Grothe
SS 2020	2550555	Übung zu Multivariate Verfahren	2 SWS	Practice (Ü)	Grothe, Kächele

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4).

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 Multivariate Verfahren

2550554, SS 2020, 2 SWS, Open in study portal

Lecture (V)

Literature
Skript zur Vorlesung

T 5.148 Course: Nature-Inspired Optimization Methods [T-WIWI-102679]

Responsible: Dr. rer. nat. Pradyumn Kumar Shukla
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2511106	Nature-Inspired Optimization Methods	2 SWS	Lecture (V)	Shukla
SS 2020	2511107	Übungen zu Nature-Inspired Optimization Methods	1 SWS	Practice (Ü)	Shukla
Exams					
WS 19/20	7900016	Nature-Inspired Optimisation Methods		Prüfung (PR)	Shukla
SS 2020	7900026	Nature-Inspired Optimization Methods (Registration until 13 July 2020)		Prüfung (PR)	Shukla

Competence Certificate
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called "bonus exam", 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exersices . The bonus exam may be split into several shorter written tests.

The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Nature-Inspired Optimization Methods

2511106, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Many optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.

Learning objectives:

Students learn:

- Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
- Different aspects and limitation of the methods
- Applications of such methods
- Multi-objective optimization methods
- Constraint handling methods
- Different aspects in parallelization and computing platforms

Literature

* E. L. Aarts and J. K. Lenstra: 'Local Search in Combinatorial Optimization'. Wiley, 1997 * D. Corne and M. Dorigo and F. Glover: 'New Ideas in Optimization'. McGraw-Hill, 1999 * C. Reeves: 'Modern Heuristic Techniques for Combinatorial Optimization'. McGraw-Hill, 1995 * Z. Michalewicz, D. B. Fogel: How to solve it: Modern Heuristics. Springer, 1999 * E. Bonabeau, M. Dorigo, G. Theraulaz: 'Swarm Intelligence'. Oxford University Press, 1999 * A. E. Eiben, J. E. Smith: 'Introduction to Evolutionary Computation'. * M. Dorigo, T. Stützle: 'Ant Colony Optimization'. Bradford Book, 2004 Springer, 2003

T 5.149 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	Recurrence	Version
Written examination	4,5	Irregular	1

Events					
WS 19/20	2521300	Non- and Semiparametrics	2 SWS	Lecture (V)	Schienle
WS 19/20	2521301		2 SWS	Practice (Ü)	Schienle, Görgen
Exams					
WS 19/20	7900223	Non- and Semiparametrics		Prüfung (PR)	Schienle
WS 19/20	7900227	Non- and Semiparametrics		Prüfung (PR)	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:

V Non- and Semiparametrics — Lecture (V)
2521300, WS 19/20, 2 SWS, Language: German, Open in study portal

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 5.150 Course: Nonlinear Analysis [T-MATH-107065]

Responsible: Prof. Dr. Tobias Lamm
Organisation: KIT Department of Mathematics
Part of: M-MATH-103539 - Nonlinear Analysis

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.151 Course: Nonlinear Maxwell Equations [T-MATH-110283]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-105066 - Nonlinear Maxwell Equations

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Exams				
WS 19/20	7700083	Nonlinear Maxwell Equations	Prüfung (PR)	Schnaubelt

Prerequisites
none

T 5.152 Course: Nonlinear Maxwell Equations [T-MATH-106484]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-103257 - Nonlinear Maxwell Equations

Type	Credits	Recurrence	Version
Oral examination	3	Irregular	1

Prerequisites
Keine

T 5.153 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	4

Events					
WS 19/20	2550111	Nonlinear Optimization I	2 SWS	Lecture (V)	Stein
WS 19/20	2550112	Exercises Nonlinear Optimization I + II	SWS	Practice (Ü)	Stein
Exams					
WS 19/20	7900002_WS1920_HK	Nonlinear Optimization I		Prüfung (PR)	Stein

Competence Certificate
The assessment consits of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation.

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 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

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 condtions
- 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, SpringerSpektrum, 2018

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 5.154 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-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	9	Each winter term	6

Events					
WS 19/20	2550111	Nonlinear Optimization I	2 SWS	Lecture (V)	Stein
WS 19/20	2550112	Exercises Nonlinear Optimization I + II	SWS	Practice (Ü)	Stein
WS 19/20	2550113	Nonlinear Optimization II	2 SWS	Lecture (V)	Stein
Exams					
WS 19/20	7900004_WS1920_HK	Nonlinear Optimization I and II		Prüfung (PR)	Stein

Competence Certificate
The assessment consits of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

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:

V Nonlinear Optimization I

2550111, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

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 condtions
- 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, SpringerSpektrum, 2018

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

V **Nonlinear Optimization II** **Lecture (V)**
2550113, WS 19/20, 2 SWS, Language: German, Open in study portal

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, SpringerSpektrum, 2018

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 5.155 Course: Nonlinear Optimization II [T-WIWI-102725]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	3

Events					
WS 19/20	2550112	Exercises Nonlinear Optimization I + II	SWS	Practice (Ü)	Stein
WS 19/20	2550113	Nonlinear Optimization II	2 SWS	Lecture (V)	Stein
Exams					
WS 19/20	7900003_WS1920_HK	Nonlinear Optimization II		Prüfung (PR)	Stein

Competence Certificate
The assessment consits of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

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:

V Nonlinear Optimization II

Lecture (V)

2550113, WS 19/20, 2 SWS, Language: German, Open in study portal

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, SpringerSpektrum, 2018

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 5.156 Course: Nonlinear Wave Equations [T-MATH-110806]

Responsible: Dr. Birgit Schörkhuber
Organisation: KIT Department of Mathematics
Part of: M-MATH-105326 - Nonlinear Wave Equations

Type	Credits	Recurrence	Version
Oral examination	4	Irregular	1

Prerequisites
none

T 5.157 Course: Nonparametric Statistics [T-MATH-105873]

Responsible: Prof. Dr. Norbert Henze
Dr. Bernhard Klar

Organisation: KIT Department of Mathematics

Part of: M-MATH-102910 - Nonparametric Statistics

Type	Credits	Version
Oral examination	4	2

Events					
WS 19/20	0162300	Nichtparametrische Statistik	2 SWS	Lecture (V)	Ebner
WS 19/20	0162310	Übungen zu 0162300 (Nichtparametrische Statistik)	1 SWS	Practice (Ü)	Ebner
Exams					
WS 19/20	7700029	Nonparametric Statistics		Prüfung (PR)	Ebner

T 5.158 Course: Numerical Continuation Methods [T-MATH-105912]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: M-MATH-102944 - Numerical Continuation Methods

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.159 Course: Numerical Linear Algebra for Scientific High Performance Computing [T-MATH-107497]

Responsible: Dr. Hartwig Anzt
Organisation: KIT Department of Mathematics
Part of: M-MATH-103709 - Numerical Linear Algebra for Scientific High Performance Computing

Type	Credits	Recurrence	Version
Examination of another type	3	Irregular	1

Events					
SS 2020	0110650	Numerical Linear Algebra for Scientific High Performance Computing	2 SWS	Lecture (V)	Anzt

Prerequisites
none

T 5.160 Course: Numerical Linear Algebra in Image Processing [T-MATH-108402]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: M-MATH-104058 - Numerical Linear Algebra in Image Processing

Type	Credits	Recurrence	Version
Oral examination	6	Irregular	1

Prerequisites
none

5.161 Course: Numerical Methods for Differential Equations [T-MATH-105836]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102888 - Numerical Methods for Differential Equations

Type	Credits	Version
Written examination	8	1

Events					
WS 19/20	0110700	Numerische Methoden für Differentialgleichungen	4 SWS	Lecture (V)	Hochbruck
WS 19/20	0110800	Übungen zu 0110700	2 SWS	Practice (Ü)	Hochbruck
Exams					
WS 19/20	7700046	Numerical Methods for Differential Equations		Prüfung (PR)	Hochbruck
WS 19/20	7700047	Numerical Methods for Differential Equations		Prüfung (PR)	Hochbruck

5.162 Course: Numerical Methods for Hyperbolic Equations [T-MATH-105900]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: M-MATH-102915 - Numerical Methods for Hyperbolic Equations

Type	Credits	Version
Oral examination	6	1

Exams				
WS 19/20	7700067	Numerical Methods for Hyperbolic Equations	Prüfung (PR)	Dörfler

Prerequisites
none

T 5.163 Course: Numerical Methods for Integral Equations [T-MATH-105901]

Responsible: PD Dr. Tilo Arens
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-102930 - Numerical Methods for Integral Equations

Type	Credits	Version
Oral examination	8	1

T 5.164 Course: Numerical Methods for Maxwell's Equations [T-MATH-105920]

Responsible: Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke

Organisation: KIT Department of Mathematics

Part of: M-MATH-102931 - Numerical Methods for Maxwell's Equations

Type	Credits	Version
Oral examination	6	1

T 5.165 Course: Numerical Methods for Time-Dependent Partial Differential Equations [T-MATH-105899]

Responsible: Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: M-MATH-102928 - Numerical Methods for Time-Dependent Partial Differential Equations

Type	Credits	Version
Oral examination	8	1

T 5.166 Course: Numerical Methods in Computational Electrodynamics [T-MATH-105860]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102894 - Numerical Methods in Computational Electrodynamics

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.167 Course: Numerical Methods in Fluid Mechanics [T-MATH-105902]

Responsible: Prof. Dr. Willy Dörfler
PD Dr. Gudrun Thäter

Organisation: KIT Department of Mathematics

Part of: M-MATH-102932 - Numerical Methods in Fluid Mechanics

Type	Credits	Version
Oral examination	4	1

Events					
SS 2020	0164200	Numerische Methoden in der Strömungsmechanik	2 SWS	Lecture (V)	Thäter
SS 2020	0164210	Übungen zu 0164210 (numerische Methoden in der Strömungsmechanik)	1 SWS	Practice (Ü)	Thäter

T 5.168 Course: Numerical Methods in Mathematical Finance [T-MATH-105865]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: M-MATH-102901 - Numerical Methods in Mathematical Finance

Type	Credits	Version
Oral examination	8	1

Prerequisites
none

T 5.169 Course: Numerical Methods in Mathematical Finance II [T-MATH-105880]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: M-MATH-102914 - Numerical Methods in Mathematical Finance II

Type	Credits	Version
Oral examination	8	1

Competence Certificate
Mündliche Prüfung im Umfang von ca. 30 Minuten

Prerequisites
none

T 5.170 Course: Numerical Optimisation Methods [T-MATH-105858]

Responsible: Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-102892 - Numerical Optimisation Methods

Type	Credits	Version
Oral examination	8	1

T 5.171 Course: Numerical Simulation in Molecular Dynamics [T-MATH-110807]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: M-MATH-105327 - Numerical Simulation in Molecular Dynamics

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Prerequisites
none

T 5.172 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	Recurrence	Version
Written examination	4,5	Irregular	2

Events					
SS 2020	2550495	Operations Research in Health Care Management	2 SWS	Lecture (V)	Nickel
SS 2020	2550496	Übungen zu OR im Health Care Management	1 SWS	Practice (Ü)	Bakker

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:

V Operations Research in Health Care Management

2550495, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

5.173 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	Recurrence	Version
Written examination	4,5	Irregular	2

Exams				
WS 19/20	7900288	Operations Research in Supply Chain Management	Prüfung (PR)	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 and in the lectures Facility Location and Strategic SCM,Tactical and operational SCMis 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 5.174 Course: Optimisation and Optimal Control for Differential Equations [T-MATH-105864]

Organisation: KIT Department of Mathematics
Part of: M-MATH-102899 - Optimisation and Optimal Control for Differential Equations

Type	Credits	Version
Oral examination	4	1

Prerequisites
none

T 5.175 Course: Optimization in Banach Spaces [T-MATH-105893]

Responsible: Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-102924 - Optimization in Banach Spaces

Type	Credits	Version
Oral examination	8	1

Prerequisites
none

T 5.176 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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2550140	Optimization Models and Application	2 SWS	Lecture (V)	Stein, Sudermann-Merx
Exams					
WS 19/20	7900010_WS1920_HK	Optimization Models and Applications		Prüfung (PR)	Stein

Competence Certificate
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.

5.177 Course: Optimization under Uncertainty [T-WIWI-106545]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2550464	Optimierungsansätze unter Unsicherheit	SWS	Lecture (V)	Rebennack
WS 19/20	2550465	Übungen zu Optimierungsansätze unter Unsicherheit	SWS	Practice (Ü)	Rebennack, Füllner
WS 19/20	2550466		2 SWS	Practice (Ü)	Rebennack, Füllner
Exams					
WS 19/20	7900240	Optimization under Uncertainty		Prüfung (PR)	Rebennack
WS 19/20	7900330	Optimization under Uncertainty		Prüfung (PR)	Rebennack

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 5.178 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2520320	Panel Data	2 SWS	Lecture (V)	Heller
SS 2020	2520321	Übungen zu Paneldaten	2 SWS	Practice (Ü)	Heller

Prerequisites
None

Below you will find excerpts from events related to this course:

V Panel Data

2520320, SS 2020, 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 5.179 Course: Parallel Computing [T-MATH-102271]

Responsible: Dr. rer. nat. Mathias Krause
Prof. Dr. Christian Wieners

Organisation: KIT Department of Mathematics

Part of: M-MATH-101338 - Parallel Computing

Type	Credits	Version
Oral examination	5	1

T 5.180 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	Recurrence	Version
Written examination	4,5	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 examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

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.ior.kit.edu).

T 5.181 Course: Percolation [T-MATH-105869]

Responsible: Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: M-MATH-102905 - Percolation

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.182 Course: Poisson Processes [T-MATH-105922]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Daniel Hug
Prof. Dr. Günter Last

Organisation: KIT Department of Mathematics

Part of: M-MATH-102922 - Poisson Processes

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.183 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2520357	Portfolio and Asset Liability Management	2 SWS	Lecture (V)	Safarian
SS 2020	2520358	Übungen zu Portfolio and Asset Liability Management	2 SWS	Practice (Ü)	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:

V Portfolio and Asset Liability Management

2520357, SS 2020, 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

Literature
To be announced in the lecture

T 5.184 Course: Potential Theory [T-MATH-105850]

Responsible: PD Dr. Tilo Arens
PD Dr. Frank Hettlich
Prof. Dr. Andreas Kirsch
Prof. Dr. Wolfgang Reichel

Organisation: KIT Department of Mathematics

Part of: M-MATH-102879 - Potential Theory

Type	Credits	Version
Oral examination	8	1

T 5.185 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	Recurrence	Version
Examination of another type	4,5	Each term	2

Events					
SS 2020	2550498	Practical seminar: Health Care Management	3 SWS	Practical course (P)	Nickel, Mitarbeiter

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.ior.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 toOperations 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 5.186 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-104068 - Information Systems in Organizations

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each term	2

Events					
SS 2020	2540554	Practical Seminar: Information Systems & Service Design (Master)	3 SWS	Lecture (V)	Mädche
Exams					
WS 19/20	7900332	Practical Seminar: Information Systems and Service Design		Prüfung (PR)	Mädche

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)

Lecture (V)

2540554, SS 2020, 3 SWS, Open in study portal

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 5.187 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-101505 - Experimental Economics

Type	Credits	Recurrence	Version
Written examination	4,5	Irregular	1

Events					
WS 19/20	2520402	Predictive Mechanism and Market Design	2 SWS	Lecture (V)	Reiß
WS 19/20	2520403		SWS	Practice (Ü)	Reiß
Exams					
WS 19/20	7900318	Predictive Mechanism and Market Design		Prüfung (PR)	Reiß

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.

T 5.188 Course: Predictive Modeling [T-WIWI-110868]

Responsible: Jun.-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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2521311	Predictive Modeling	2 SWS	Lecture (V)	Krüger
SS 2020	2521312	Predictive Modeling (Tutorial)	2 SWS	Practice (Ü)	Krüger

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 through an additional performance (short presentation). 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). Details will be announced in the lecture.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Predictive Modeling
2521311, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature

- Elliott, G., und A. Timmermann (Hsg.): "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.
- Hansen, B.E.: "Econometrics", Online-Text (https://www.ssc.wisc.edu/~bhansen/econometrics), 2020.
- Hastie, T., Tibshirani, R., and J. Friedman: "The Elements of Statistical Learning", 2. Ausgabe, Springer, 2009.
- Weitere Literatur wird in der Vorlesung bekanntgegeben.

V Predictive Modeling (Tutorial)
2521312, SS 2020, 2 SWS, Language: English, Open in study portal

Practice (Ü)

T 5.189 Course: Price Negotiation and Sales Presentations [T-WIWI-102891]

Responsible: Prof. Dr. Martin Klarmann
Mark Schröder

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Examination of another type	1,5	Each winter term	3

Events					
WS 19/20	2572198	Price Negotiation and Sales Presentations	1 SWS	Block (B)	Klarmann, Schröder
Exams					
WS 19/20	7900148	Price Negotiation and Sales Presentations		Prüfung (PR)	Klarmann

Competence Certificate
This alternative exam assessment consists of a presentation with a subsequent discussion totalling 25 minutes. Moreover learning contents are checked by realistic 30-minute price negotiations.

Prerequisites
None

Recommendation
None

Annotation
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 & 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 courses from the election block can be attended in the module.

Below you will find excerpts from events related to this course:

V Price Negotiation and Sales Presentations

2572198, WS 19/20, 1 SWS, Language: German, Open in study portal

Block (B)

Content
At first, theoretical knowledge about the behavior in selling contexts is discussed. Then, in a practical part, students will apply this knowledge in their own price negotiations.

Students

- gain a clear impression of the theoretical knowledge about price negotiations and sales presentations
- improve their own negotiation abilities

Non exam assessment (following §4(2), 3 of the examination regulation).

The total workload for this course is approximately 45.0 hours. For further information see German version.

- In order to participate in this course, you need to apply. Applications usually start with the lecture period in the winter term. Detailed information on the application process is provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.
- Please note that only one of the 1.5 ECTS courses 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 in the respective module to all students. Participation in a specific course cannot be guaranteed.

5.190 Course: Probability Theory and Combinatorial Optimization [T-MATH-105923]

Responsible: Prof. Dr. Daniel Hug
Prof. Dr. Günter Last
Organisation: KIT Department of Mathematics
Part of: M-MATH-102947 - Probability Theory and Combinatorial Optimization

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0160000	Probability Theory and Combinatorial Optimization	4 SWS	Lecture (V)	Hug
SS 2020	0160010	Tutorial for 0160000 (Probability Theory and Combinatorial Optimization)	2 SWS	Practice (Ü)	Hug

Prerequisites
none

Below you will find excerpts from events related to this course:

Probability Theory and Combinatorial Optimization

0160000, SS 2020, 4 SWS, Language: English, Open in study portal

Lecture (V)

Content
This course is devoted to the analysis of algorithms and combinatorial optimization problems in a probabilistic framework. A natural setting for the investigation of such problems is often provided by a (geometric) graph. For a given system (graph), the average or most likely behavior of an objective function of the system will be studied. In addition to asymptotic results, which describe a system as its size increases, quantitative laws for systems of fixed size will be described. Among the specific problems to be explored are

- the long-common-subsequence problem,
- packing problems,
- the Euclidean traveling salesman problem,
- minimal Euclidean matching,
- minimal Euclidean spanning tree.

For the analysis of problems of this type, several techniques and concepts have been developed and will be introduced and applied in this course. Some of these are

- concentration inequalities and concentration of measure,
- subadditivity and superadditivity,
- martingale methods,
- isoperimetry,
- entropy.

Literature

- Boucheron, S., Lugosi, G., Massart, P. Concentration Inequalities, Oxford University Press, Oxford, 2013.
- Dubhashi, D., Panconesi, A. Concentration of Measure for the Analysis of Randomized Algorithms, Cambridge University Press, Cambridge, 2009.
- Ledoux, M. The Concentration of Measure Phenomenon. American Mathematical Society, vol. 89, 2001.
- Steele, J.M. Probability Theory and Combinatorial Optimization. SIAM, 1997.
- Yukich, J.E. Probability Theory of Classical Euclidean Optimization Problems. Lecture Notes in Mathematics, Vol. 1675, Springer, Berlin, 1998.
- Vershynin, R. High-dimensional probability. An Introduction with Applications in Data Science. Cambridge University Press. 2018.

T 5.191 Course: Process Mining [T-WIWI-109799]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2511204	Process Mining	2 SWS	Lecture (V)	Oberweis
SS 2020	2511205	Exercise Process Mining	1 SWS	Practice (Ü)	Oberweis, Schreiber
Exams					
WS 19/20	7900033	Process Mining		Prüfung (PR)	Oberweis
SS 2020	7900048	Process Mining (Registration until 13 July 2020)		Prüfung (PR)	Oberweis

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

Annotation
Former name (up to winter semester 2018/1019) "Workflow Management".

Below you will find excerpts from events related to this course:

V Process Mining

Lecture (V)

2511204, SS 2020, 2 SWS, Language: German, Open in study portal

Content

The area of process mining covers approaches which aim at deducting new knowledge on the basis of logfiles generated by information systems. Such information systems are e.g., workflow-management-systems which are used for an efficient control of processes in enterprises and organisations. The lecture introduces the foundations of processes and respective modeling and analysis techniques. In the following, the foundations of process mining and the three classical types of approaches - discovery, conformance and enhancement - will be taught. In addition to the theoretical basics, tools, application scenarios in practice and open research questions are covered as well.

Learning objectives:

Students

- understand the concepts and approaches of process mining and know how they are applied,
- create and evaluate business process models,
- analyze static and dynamic properties of workflows,
- apply approaches and tools of process mining.

Recommendations:

Knowledge of course Applied Informatics - Modelling is expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- W. van der Aalst, H. van Kees: Workflow Management: Models, Methods and Systems, Cambridge, The MIT Press, 2002.
- W. van der Aalst: Process Mining: Data Science in Action. Springer, 2016.
- J. Carmona, B. van Dongen, A. Solti, M. Weidlich: Conformance Checking: Relating Processes and Models. Springer, 2018.
- A. Drescher, A. Koschmider, A. Oberweis: Modellierung und Analyse von Geschäftsprozessen: Grundlagen und Übungsaufgaben mit Lösungen. De Gruyter Studium, 2017.
- A. Oberweis: Modellierung und Ausführung von Workflows mit Petri-Netzen. Teubner-Reihe Wirtschaftsinformatik, B.G. Teubner Verlag, 1996.
- R. Peters, M. Nauroth: Process-Mining: Geschäftsprozesse: smart, schnell und einfach, Springer, 2019.
- F. Schönthaler, G.Vossen, A. Oberweis, T. Karle: Business Processes for Business Communities: Modeling Languages, Methods, Tools. Springer, 2012.
- M. Weske: Business Process Management: Concepts, Languages, Architectures. Springer, 2012.

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T 5.192 Course: Product and Innovation Management [T-WIWI-109864]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Written examination	3	Each summer term	1

Events					
SS 2020	2571154	Product and Innovation Management	2 SWS	Lecture (V)	Feurer

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Below you will find excerpts from events related to this course:

V Product and Innovation Management
2571154, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

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 consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

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 5.193 Course: Project Centered Software-Lab [T-MATH-105907]

Responsible: PD Dr. Gudrun Thäter
Organisation: KIT Department of Mathematics
Part of: M-MATH-102938 - Project Centered Software-Lab

Type	Credits	Version
Examination of another type	4	1

Events					
SS 2020	0161700	Projektorientiertes Softwarepraktikum	4 SWS	Practical course (P)	Thäter, Krause

Prerequisites
none

T 5.194 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-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each winter term	2

Events					
WS 19/20	2512501	Project lab Cognitive automobiles and robots	3 SWS	Practical course (P)	Zöllner
SS 2020	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar (S)	Zöllner
Exams					
WS 19/20	7900107	Advanced Lab Cognitive Automobile and Robots		Prüfung (PR)	Zöllner
SS 2020	7900147	Cognitive Automobiles and Robots		Prüfung (PR)	Zöllner

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 Cognitive automobiles and robots
2512501, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

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.

V

Cognitive Automobiles and Robots

2513500, SS 2020, 2 SWS, Language: German/English, Open in study portal

Seminar (S)

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.

T 5.195 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-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2512500	Project Lab Machine Learning	3 SWS	Practical course (P)	Zöllner
Exams					
SS 2020	7900086	Project Lab Machine Learning		Prüfung (PR)	Zöllner

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 2020, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

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.

5.196 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

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2561127	Public Management	3 SWS	Lecture / Practice (VÜ)	Wigger

Competence Certificate
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

Prerequisites
None

Recommendation
Basic knowledge of Public Finance is required.

Below you will find excerpts from events related to this course:

V Public Management

Lecture / Practice (VÜ)

2561127, WS 19/20, 3 SWS, Language: German, Open in study portal

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

T 5.197 Course: Python for Computational Risk and Asset Management [T-WIWI-110213]

Responsible: Prof. Dr Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105032 - Data Science for Finance

Type	Credits	Recurrence	Version
Examination of another type	3	Each winter term	1

Events					
WS 19/20	2500016	Python for Computational Risk and Asset Management	2 SWS	Practical course (P)	Ulrich
Exams					
WS 19/20	7900220	Python for Computational Risk and Asset Management		Prüfung (PR)	Ulrich

Competence Certificate
The assessment is carried out in form of twelve weekly Python programming tasks and offered each winter term. The grade of this course is determined by the points achieved in the programming tasks.

Prerequisites
None.

Recommendation
Good knowledge of statistics and first programming experience with Python is recommended.

Below you will find excerpts from events related to this course:

V Python for Computational Risk and Asset Management

2500016, WS 19/20, 2 SWS, Language: English, Open in study portal

Practical course (P)

Content
The aim of this course is to provide students with strong knowledge in Python to independently solve real-world data problems related to automated robo investment advisory.

The course covers several topics from a programming perspective, among them:

Quantitative Portfolio Strategies: Extensions to Mean-Variance Portfolio Optimization

Return Densities: Forecasting with Traditional and Machine Learning Approaches, Monte Carlo Simulation

Financial Economics: Rationalizing Risk Premiums via Stochastic Discount Factor

Multi-Asset Valuation: DCF Approach, No-Arbitrage and Ito Calculus

The total workload for this course is approximately 90 hours.

Prior knowledge of AIFB programming and KIT statistics classes is recommended.

The course introduces students to Python. Students will solve problems related to the agenda of the lecture 'Computational Risk and Asset Management'. This enables them to work with financial data, perform various statistical analysis and estimate their own time series models.

T 5.198 Course: Random Graphs [T-MATH-105929]

Responsible: Dr. Matthias Schulte
Organisation: KIT Department of Mathematics
Part of: M-MATH-102951 - Random Graphs

Type	Credits	Version
Oral examination	6	1

Prerequisites
none

T 5.199 Course: Real World Lab: Innovation Communication [T-WIWI-110920]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Recurrence	Version
Examination of another type	1,5	Once	1

Competence Certificate
Alternative exam assessment (two team presentations).

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 5.200 Course: Ruin Theory [T-MATH-108400]

Responsible: Prof. Dr. Vicky Fasen-Hartmann
Organisation: KIT Department of Mathematics
Part of: M-MATH-104055 - Ruin Theory

Type	Credits	Recurrence	Version
Oral examination	4	Irregular	1

Prerequisites
none

T 5.201 Course: Scattering Theory [T-MATH-105855]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-102884 - Scattering Theory

Type	Credits	Version
Oral examination	8	1

T 5.202 Course: Selected Issues in Critical Information Infrastructures [T-WIWI-109251]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each summer term	2

Events					
SS 2020	2512403	Praktikum Blockchain und Distributed Ledger Technology (Master)	SWS	Practical course (P)	Sunyaev, Beyene, Kannengießer, Pandl
Exams					
SS 2020	7900172	Lab Blockchain and Distributed Ledger Technology (Master)		Prüfung (PR)	Sunyaev

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Prerequisites
None.

Annotation
T-WIWI-109251 "Selected Issues in Critical Information Infrastructures" serves to credit an extracurricular course in the module "Critical Digital Infrastructures".

T 5.203 Course: Selected Topics in Harmonic Analysis [T-MATH-109065]

Responsible: Prof. Dr. Dirk Hundertmark
Organisation: KIT Department of Mathematics
Part of: M-MATH-104435 - Selected Topics in Harmonic Analysis

Type	Credits	Recurrence	Version
Oral examination	3	Irregular	1

Prerequisites
none

T 5.204 Course: Semantic Web Technologies [T-WIWI-110848]

Responsible: Prof. Dr. York Sure-Vetter
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2511310	Semantic Web Technologies	2 SWS	Lecture (V)	Sure-Vetter, Acosta Deibe, Käfer
SS 2020	2511311	Exercises to Semantic Web Technologies	1 SWS	Practice (Ü)	Sure-Vetter, Acosta Deibe, Käfer
Exams					
SS 2020	7900028	Semantic Web Technologies (Registration until 13 July 2020)		Prüfung (PR)	Sure-Vetter

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:

V Semantic Web Technologies

Lecture (V)

2511310, SS 2020, 2 SWS, Language: English, Open in study portal

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 preperation and postprocessing: 60 hours
- Exam and exam preperation: 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.

V **Exercises to Semantic Web Technologies** **Practice (Ü)**
2511311, SS 2020, 1 SWS, Language: English, Open in study portal

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.

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.

T 5.205 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-102971 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2500006	Seminar Human Resource Management (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
WS 19/20	2500007	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
WS 19/20	2500029	Seminar in Data Science for Finance	2 SWS	Seminar (S)	Ulrich
WS 19/20	2530293		2 SWS	Seminar (S)	Ruckes, Hoang, Benz, Strych, Luedecke, Silbereis, Stengel, Schubert
WS 19/20	2540473	Data Science in Service Management	2 SWS	Seminar (S)	Haubner, Frankenhauser, Gröschel
WS 19/20	2540475	Electronic Markets & User behavior	2 SWS	Seminar (S)	Dorner, Knierim, Dann, Jaquart
WS 19/20	2540477	Digital Experience and Participation	2 SWS	Seminar (S)	Straub, Peukert, Hoffmann, Kloker, Pusmaz, Willrich, Kloepper, Fegert, Greif-Winzrieth
WS 19/20	2540478	Smart Grids and Energy Markets	2 SWS	Seminar (S)	Dinther, Staudt, Richter, Huber, vom Scheidt, Golla, Schmidt
WS 19/20	2540510	Masterseminar in Data Science and Machine Learning	2 SWS	Seminar (S)	Geyer-Schulz, Schweigert, Schweizer, Nazemi
WS 19/20	2540557	Literature Review Seminar: Information Systems and Service Design	3 SWS	Seminar (S)	Mädche
WS 19/20	2540559	Digital Service Design Seminar	2 SWS	Seminar (S)	Mädche
WS 19/20	2545107	Methoden im Innovationsmanagement	2 SWS	Seminar (S)	Koch
WS 19/20	2572181		2 SWS	Seminar (S)	Klarmann
WS 19/20	2577915	Strategische Unternehmensführung	2 SWS	Seminar (S)	Klopfer
WS 19/20	2579919	Seminar Management Accounting - Special Topics	2 SWS	Seminar (S)	Riar
WS 19/20	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar (S)	Glöser-Chahoud, Schultmann
WS 19/20	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar (S)	Volk, Schultmann
WS 19/20	2581978	Seminar in Production and Operations Management III	2 SWS	Seminar (S)	Wiens, Schultmann
WS 19/20	2581980		2 SWS	Seminar (S)	Keles, Fett, Yilmaz
WS 19/20	2581981		2 SWS	Seminar (S)	Ardone, Ruppert, Sandmeier, Slednev

WS 19/20	2581990		2 SWS	Seminar (S)	Schultmann, Schumacher
SS 2020	2400121	Interactive Analytics Seminar	2 SWS		Beigl, Mädche, Pescara
SS 2020	2500006	Seminar Human Resource Management (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
SS 2020	2500007	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
SS 2020	2530372	Advances in Financial Machine Learning	2 SWS	Seminar (S)	Ulrich
SS 2020	2530580	Seminar in Finance	2 SWS	Seminar (S)	Uhrig-Homburg, Eska, Schuster, Eberbach, Reichenbacher
SS 2020	2540510	Masterseminar in Data Science and Machine Learning	2 SWS	Seminar (S)	Geyer-Schulz
SS 2020	2540559	Digital Service Design Seminar	3 SWS	Seminar (S)	Mädche, Feine
SS 2020	2545002	Entrepreneurship Research	2 SWS	Seminar (S)	Terzidis, Henn
SS 2020	2550493	Hospital Management	2 SWS	Block (B)	Hansis
SS 2020	2571180	Seminar in Marketing und Vertrieb (Bachelor)	2 SWS	Seminar (S)	Klarmann, Mitarbeiter, Feurer
SS 2020	2571181	Seminar in Marketing und Vertrieb (Master)	2 SWS	Seminar (S)	Klarmann, Mitarbeiter, Feurer
SS 2020	2579909	Seminar Management Accounting	2 SWS	Seminar (S)	Wouters, Hammann, Disch
SS 2020	2579919	Seminar in Management Accounting - Special Topics	2 SWS	Seminar (S)	Wouters, Ebinger
SS 2020	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar (S)	Volk, Schultmann
SS 2020	2581980	Seminar Energiewirtschaft II	2 SWS	Seminar (S)	Keles
SS 2020	2581990		2 SWS	Seminar (S)	Schultmann, Schumacher, Baumgartner
Exams					
WS 19/20	7900017	Seminar Smart Grid and Energy Markets		Prüfung (PR)	Weinhardt
WS 19/20	7900106	Hospital Management		Prüfung (PR)	Nickel
WS 19/20	7900133	Digital Service Design Seminar		Prüfung (PR)	Mädche
WS 19/20	7900141	Innovation Processes Live		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900143	Methods in Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900151	Master Seminar in Data Science and Machine Learning		Prüfung (PR)	Geyer-Schulz
WS 19/20	7900159	Seminar in Marketing and Sales		Prüfung (PR)	Klarmann
WS 19/20	7900163	Seminar Human Resource Management (Master)		Prüfung (PR)	Nieken
WS 19/20	7900164	Seminar Human Resources and Organizations (Master)		Prüfung (PR)	Nieken
WS 19/20	7900165	Seminar Digital Experience and Participation		Prüfung (PR)	Weinhardt
WS 19/20	7900184	Seminar in Finance (Master)		Prüfung (PR)	Ruckes
WS 19/20	7900203	Seminar in Finance		Prüfung (PR)	Uhrig-Homburg
WS 19/20	7900222	Seminar Strategic Management (Master)		Prüfung (PR)	Lindstädt
WS 19/20	7900233	Literature Review Seminar: Information Systems and Service Design (Seminar)		Prüfung (PR)	Mädche
WS 19/20	7900237	Case Studies Seminar: Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900239	Technologies for Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900312	Seminar Business Data Analytics (Master)		Prüfung (PR)	Weinhardt
WS 19/20	7900324	Seminar in Business Administration A (Master)		Prüfung (PR)	Ulrich

WS 19/20	7900327	Electronic Markets & User behavior (Seminar)	Prüfung (PR)	Weinhardt
WS 19/20	79-2579919-M	Seminar Management Accounting - Special Topics (Master)	Prüfung (PR)	Wouters
WS 19/20	7981976	Seminar in Production and Operations Management I	Prüfung (PR)	Schultmann
WS 19/20	7981977	Seminar in Production and Operations Management II	Prüfung (PR)	Schultmann
WS 19/20	7981978	Seminar in Production and Operations Management III	Prüfung (PR)	Schultmann
WS 19/20	7981979	Seminar in Business Administration A (Master)	Prüfung (PR)	Fichtner
WS 19/20	7981980	Seminar in Business Administration A (Master)	Prüfung (PR)	Fichtner
WS 19/20	7981981	Seminar in Business Administration (Bachelor)	Prüfung (PR)	Fichtner
SS 2020	7900017	Die Aushandlung von Open Innovation	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7900052	Entrepreneurship Research	Prüfung (PR)	Terzidis
SS 2020	7900093	Seminar in Business Administration A	Prüfung (PR)	Weinhardt
SS 2020	7900219	Seminar in Business Administration A (Master)	Prüfung (PR)	Ulrich
SS 2020	7900238	Technology Assessment	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7900242	Applied Risk and Asset Management	Prüfung (PR)	Ulrich
SS 2020	7900284	Digital Transformation and Business Models	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7981976	Seminar in Production and Operations Management I	Prüfung (PR)	Schultmann
SS 2020	7981977	Seminar in Production and Operations Management II	Prüfung (PR)	Schultmann
SS 2020	7981978	Seminar in Production and Operations Management III	Prüfung (PR)	Schultmann
SS 2020	7981980	Seminar Energy Economics II	Prüfung (PR)	Fichtner
SS 2020	7981981	Seminar Energy Economics III	Prüfung (PR)	Fichtner

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 **Seminar Human Resource Management (Master)** **Seminar (S)**
2500006, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

V **Seminar Human Resources and Organizations (Master)** **Seminar (S)**
2500007, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

V **Seminar in Data Science for Finance** **Seminar (S)**
2500029, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
The aim of this seminar is to master real-world challenges of computational risk and asset management. The CRAM team offers a wide range of topics across different asset classes and different stages of the investment process.

Students will work on a quantitative problem related to risk and asset management. This seminar is ideally suited for students who want to deepen and apply their statistics / programming skills and knowledge about financial markets. Industry-relevant problems will be solved with financial data and modern statistical tools in close collaboration with a supervisor. Topics which students solved in the past include the option-based pricing of dividends during the Euro crisis, the estimation of risk neutral moments with high-frequent data and the application of a particle filter to estimate stochastic volatility. The current topics will be presented during the first meeting.

V **Data Science in Service Management** **Seminar (S)**
2540473, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Content
wird auf deutsch und englisch gehalten

V **Masterseminar in Data Science and Machine Learning** **Seminar (S)**
2540510, WS 19/20, 2 SWS, Language: German, Open in study portal

V **Digital Service Design Seminar** **Seminar (S)**
2540559, WS 19/20, 2 SWS, Open in study portal

V **Methoden im Innovationsmanagement** **Seminar (S)**
2545107, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

V **Seminar (S)**
2572181, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The seminary teaches students to gain a systematic overview of a field of literature in Marketing - an important prerequisite for a successful master thesis. Central aspects are identification of relevant literature sources, systematization of the field, working out central insights, writing comprehensively, and identification of research gaps.

Students

- can exploit a literature field systematically
- are able to write an academic paper in a formally correct way
- can assess the relevance and quality of sources
- are able to get an overview of sources very quickly
- know how to find relevant sources for a literature field
- are capable to write a convincing outline
- know how to categorize a subject under a research field
- understand how to systematize literature fields theoretically and empirically with the help of literature tables
- can identify the most important findings in a huge number of sources
- are able to present a research field
- can discuss the theoretical and practical implications of a topic
- are capable to identify interesting research gaps

The total workload for this course is approximately 90 hours. For further information see German version.

Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Literature
werden im Seminar bekannt gegeben./will be anounced in the seminary.

V

Seminar Management Accounting - Special Topics

Seminar (S)

2579919, WS 19/20, 2 SWS, Language: English, Open in study portal

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.

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 16 students.

Literature

Will be announced in the course.

V

Interactive Analytics Seminar

2400121, SS 2020, 2 SWS, Language: English, Open in study portal

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.

V

Seminar Human Resource Management (Master)

Seminar (S)

2500006, SS 2020, 2 SWS, Language: German, Open in study portal

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.

V	**Seminar Human Resources and Organizations (Master)** 2500007, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

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.

V	**Advances in Financial Machine Learning** 2530372, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

V	**Seminar in Finance** 2530580, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Literature
Wird jeweils am Ende des vorherigen Semesters bekanntgegeben.

V	**Masterseminar in Data Science and Machine Learning** 2540510, SS 2020, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

V	**Digital Service Design Seminar** 2540559, SS 2020, 3 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
Description
In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype

Learning objectives

The students

- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites

No specific prerequisites are required for the seminar

Literature

Further literature will be made available in the seminar.

V	**Entrepreneurship Research** 2545002, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Literature
Wird im Seminar bekannt gegeben.

V	**Hospital Management** 2550493, SS 2020, 2 SWS, Language: German, Open in study portal	**Block (B)**

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.

V	**Seminar Management Accounting** 2579909, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

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.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Literature
Will be announced in the course.

V Seminar in Management Accounting - Special Topics

2579919, SS 2020, 2 SWS, Language: English, Open in study portal

Seminar (S)

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.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Literature
Will be announced in the course.

T 5.206 Course: Seminar in Business Administration B (Master) [T-WIWI-103476]

Responsible: Professorenschaft des Fachbereichs Betriebswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102972 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2500006	Seminar Human Resource Management (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
WS 19/20	2500007	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
WS 19/20	2500029	Seminar in Data Science for Finance	2 SWS	Seminar (S)	Ulrich
WS 19/20	2530293		2 SWS	Seminar (S)	Ruckes, Hoang, Benz, Strych, Luedecke, Silbereis, Stengel, Schubert
WS 19/20	2540473	Data Science in Service Management	2 SWS	Seminar (S)	Haubner, Frankenhauser, Gröschel
WS 19/20	2540475	Electronic Markets & User behavior	2 SWS	Seminar (S)	Dorner, Knierim, Dann, Jaquart
WS 19/20	2540477	Digital Experience and Participation	2 SWS	Seminar (S)	Straub, Peukert, Hoffmann, Kloker, Pusmaz, Willrich, Kloepper, Fegert, Greif-Winzrieth
WS 19/20	2540478	Smart Grids and Energy Markets	2 SWS	Seminar (S)	Dinther, Staudt, Richter, Huber, vom Scheidt, Golla, Schmidt
WS 19/20	2540510	Masterseminar in Data Science and Machine Learning	2 SWS	Seminar (S)	Geyer-Schulz, Schweigert, Schweizer, Nazemi
WS 19/20	2540557	Literature Review Seminar: Information Systems and Service Design	3 SWS	Seminar (S)	Mädche
WS 19/20	2540559	Digital Service Design Seminar	2 SWS	Seminar (S)	Mädche
WS 19/20	2545107	Methoden im Innovationsmanagement	2 SWS	Seminar (S)	Koch
WS 19/20	2572181		2 SWS	Seminar (S)	Klarmann
WS 19/20	2577915	Strategische Unternehmensführung	2 SWS	Seminar (S)	Klopfer
WS 19/20	2579919	Seminar Management Accounting - Special Topics	2 SWS	Seminar (S)	Riar
WS 19/20	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar (S)	Glöser-Chahoud, Schultmann
WS 19/20	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar (S)	Volk, Schultmann
WS 19/20	2581978	Seminar in Production and Operations Management III	2 SWS	Seminar (S)	Wiens, Schultmann
WS 19/20	2581980		2 SWS	Seminar (S)	Keles, Fett, Yilmaz
WS 19/20	2581981		2 SWS	Seminar (S)	Ardone, Ruppert, Sandmeier, Slednev

WS 19/20	2581990		2 SWS	Seminar (S)	Schultmann, Schumacher
SS 2020	2500006	Seminar Human Resource Management (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
SS 2020	2500007	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar (S)	Nieken, Mitarbeiter
SS 2020	2530372	Advances in Financial Machine Learning	2 SWS	Seminar (S)	Ulrich
SS 2020	2530580	Seminar in Finance	2 SWS	Seminar (S)	Uhrig-Homburg, Eska, Schuster, Eberbach, Reichenbacher
SS 2020	2540510	Masterseminar in Data Science and Machine Learning	2 SWS	Seminar (S)	Geyer-Schulz
SS 2020	2540559	Digital Service Design Seminar	3 SWS	Seminar (S)	Mädche, Feine
SS 2020	2545002	Entrepreneurship Research	2 SWS	Seminar (S)	Terzidis, Henn
SS 2020	2550493	Hospital Management	2 SWS	Block (B)	Hansis
SS 2020	2571180	Seminar in Marketing und Vertrieb (Bachelor)	2 SWS	Seminar (S)	Klarmann, Mitarbeiter, Feurer
SS 2020	2571181	Seminar in Marketing und Vertrieb (Master)	2 SWS	Seminar (S)	Klarmann, Mitarbeiter, Feurer
SS 2020	2579909	Seminar Management Accounting	2 SWS	Seminar (S)	Wouters, Hammann, Disch
SS 2020	2579919	Seminar in Management Accounting - Special Topics	2 SWS	Seminar (S)	Wouters, Ebinger
SS 2020	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar (S)	Volk, Schultmann
SS 2020	2581980	Seminar Energiewirtschaft II	2 SWS	Seminar (S)	Keles
SS 2020	2581990		2 SWS	Seminar (S)	Schultmann, Schumacher, Baumgartner
Exams					
WS 19/20	7900017	Seminar Smart Grid and Energy Markets		Prüfung (PR)	Weinhardt
WS 19/20	7900106	Hospital Management		Prüfung (PR)	Nickel
WS 19/20	7900133	Digital Service Design Seminar		Prüfung (PR)	Mädche
WS 19/20	7900141	Innovation Processes Live		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900143	Methods in Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900151	Master Seminar in Data Science and Machine Learning		Prüfung (PR)	Geyer-Schulz
WS 19/20	7900159	Seminar in Marketing and Sales		Prüfung (PR)	Klarmann
WS 19/20	7900163	Seminar Human Resource Management (Master)		Prüfung (PR)	Nieken
WS 19/20	7900164	Seminar Human Resources and Organizations (Master)		Prüfung (PR)	Nieken
WS 19/20	7900165	Seminar Digital Experience and Participation		Prüfung (PR)	Weinhardt
WS 19/20	7900184	Seminar in Finance (Master)		Prüfung (PR)	Ruckes
WS 19/20	7900203	Seminar in Finance		Prüfung (PR)	Uhrig-Homburg
WS 19/20	7900222	Seminar Strategic Management (Master)		Prüfung (PR)	Lindstädt
WS 19/20	7900233	Literature Review Seminar: Information Systems and Service Design (Seminar)		Prüfung (PR)	Mädche
WS 19/20	7900237	Case Studies Seminar: Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900239	Technologies for Innovation Management		Prüfung (PR)	Weissenberger-Eibl
WS 19/20	7900312	Seminar Business Data Analytics (Master)		Prüfung (PR)	Weinhardt
WS 19/20	7900324	Seminar in Business Administration A (Master)		Prüfung (PR)	Ulrich
WS 19/20	7900327	Electronic Markets & User behavior (Seminar)		Prüfung (PR)	Weinhardt

WS 19/20	79-2579919-M	Seminar Management Accounting - Special Topics (Master)	Prüfung (PR)	Wouters
WS 19/20	7981976	Seminar in Production and Operations Management I	Prüfung (PR)	Schultmann
WS 19/20	7981977	Seminar in Production and Operations Management II	Prüfung (PR)	Schultmann
WS 19/20	7981978	Seminar in Production and Operations Management III	Prüfung (PR)	Schultmann
WS 19/20	7981979	Seminar in Business Administration A (Master)	Prüfung (PR)	Fichtner
WS 19/20	7981980	Seminar in Business Administration A (Master)	Prüfung (PR)	Fichtner
WS 19/20	7981981	Seminar in Business Administration (Bachelor)	Prüfung (PR)	Fichtner
SS 2020	7900017	Die Aushandlung von Open Innovation	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7900052	Entrepreneurship Research	Prüfung (PR)	Terzidis
SS 2020	7900093	Seminar in Business Administration A	Prüfung (PR)	Weinhardt
SS 2020	7900238	Technology Assessment	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7900242	Applied Risk and Asset Management	Prüfung (PR)	Ulrich
SS 2020	7900284	Digital Transformation and Business Models	Prüfung (PR)	Weissenberger-Eibl
SS 2020	7981976	Seminar in Production and Operations Management I	Prüfung (PR)	Schultmann
SS 2020	7981977	Seminar in Production and Operations Management II	Prüfung (PR)	Schultmann
SS 2020	7981978	Seminar in Production and Operations Management III	Prüfung (PR)	Schultmann
SS 2020	7981980	Seminar Energy Economics II	Prüfung (PR)	Fichtner
SS 2020	7981981	Seminar Energy Economics III	Prüfung (PR)	Fichtner

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 **Seminar Human Resource Management (Master)** **Seminar (S)**
2500006, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

V **Seminar Human Resources and Organizations (Master)** **Seminar (S)**
2500007, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

V **Seminar in Data Science for Finance** **Seminar (S)**
2500029, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
The aim of this seminar is to master real-world challenges of computational risk and asset management. The CRAM team offers a wide range of topics across different asset classes and different stages of the investment process.

Students will work on a quantitative problem related to risk and asset management. This seminar is ideally suited for students who want to deepen and apply their statistics / programming skills and knowledge about financial markets. Industry-relevant problems will be solved with financial data and modern statistical tools in close collaboration with a supervisor. Topics which students solved in the past include the option-based pricing of dividends during the Euro crisis, the estimation of risk neutral moments with high-frequent data and the application of a particle filter to estimate stochastic volatility. The current topics will be presented during the first meeting.

V **Data Science in Service Management** **Seminar (S)**
2540473, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Content
wird auf deutsch und englisch gehalten

V **Masterseminar in Data Science and Machine Learning** **Seminar (S)**
2540510, WS 19/20, 2 SWS, Language: German, Open in study portal

V **Digital Service Design Seminar** **Seminar (S)**
2540559, WS 19/20, 2 SWS, Open in study portal

V **Methoden im Innovationsmanagement** **Seminar (S)**
2545107, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

V **Seminar (S)**
2572181, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
The seminary teaches students to gain a systematic overview of a field of literature in Marketing - an important prerequisite for a successful master thesis. Central aspects are identification of relevant literature sources, systematization of the field, working out central insights, writing comprehensively, and identification of research gaps.

Students

- can exploit a literature field systematically
- are able to write an academic paper in a formally correct way
- can assess the relevance and quality of sources
- are able to get an overview of sources very quickly
- know how to find relevant sources for a literature field
- are capable to write a convincing outline
- know how to categorize a subject under a research field
- understand how to systematize literature fields theoretically and empirically with the help of literature tables
- can identify the most important findings in a huge number of sources
- are able to present a research field
- can discuss the theoretical and practical implications of a topic
- are capable to identify interesting research gaps

The total workload for this course is approximately 90 hours. For further information see German version.

Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Literature
werden im Seminar bekannt gegeben./will be anounced in the seminary.

V

Seminar Management Accounting - Special Topics

Seminar (S)

2579919, WS 19/20, 2 SWS, Language: English, Open in study portal

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.

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 16 students.

Literature

Will be announced in the course.

V

Seminar Human Resource Management (Master)

Seminar (S)

2500006, SS 2020, 2 SWS, Language: German, Open in study portal

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.

V	**Seminar Human Resources and Organizations (Master)** 2500007, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

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.

V	**Advances in Financial Machine Learning** 2530372, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content

Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Literature

Literatur wird in der ersten Vorlesung bekannt gegeben.

V	**Seminar in Finance** 2530580, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Literature

Wird jeweils am Ende des vorherigen Semesters bekanntgegeben.

V	**Masterseminar in Data Science and Machine Learning** 2540510, SS 2020, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

V	**Digital Service Design Seminar** 2540559, SS 2020, 3 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
Description

In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype

Learning objectives

The students

- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites

No specific prerequisites are required for the seminar

Literature

Further literature will be made available in the seminar.

V	**Entrepreneurship Research** 2545002, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Literature
Wird im Seminar bekannt gegeben.

V	**Hospital Management** 2550493, SS 2020, 2 SWS, Language: German, Open in study portal	**Block (B)**

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.

V	**Seminar Management Accounting** 2579909, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

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.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Literature
Will be announced in the course.

V **Seminar in Management Accounting - Special Topics** **Seminar (S)**
2579919, SS 2020, 2 SWS, Language: English, Open in study portal

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.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Literature
Will be announced in the course.

T 5.207 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-102971 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2560140	Topics in Political Economy (Bachelor)	2 SWS	Seminar (S)	Ehrlich, Huber
WS 19/20	2560141	Morals & Social Behavior (Bachelor & Master)	2 SWS	Seminar (S)	Huber, Ehrlich
WS 19/20	2560142	Topics in Political Economy (Master)	2 SWS	Seminar (S)	Ehrlich, Huber
WS 19/20	2561208	Ausgewählte Aspekte der europäischen Verkehrsplanung und -modellierung	1 SWS	Seminar (S)	Szimba
SS 2020	2521310	Advanced Topics in Econometrics	2 SWS	Seminar (S)	Schienle, Krüger, Buse, Görgen
SS 2020	2560282	Wirtschaftspolitisches Seminar	2 SWS	Seminar (S)	Ott, Assistenten
SS 2020	2560554	Fighting Climate Change, Seminar on Morals and Social Behavior (Bachelor)	2 SWS	Seminar (S)	Szech, Zhao
SS 2020	2560556	Designing the Digital Economy, Topics on Political Economy (Bachelor)	2 SWS	Seminar (S)	Szech, Huber
SS 2020	2560557	Designing the Digital Economy, Topics on Political Economy (Master)	2 SWS	Seminar (S)	Szech, Huber
Exams					
WS 19/20	7900103	Data-driven innovation and science communication (Master)		Prüfung (PR)	Ott
WS 19/20	7900132	Seminar in Economics A (Master)		Prüfung (PR)	Fuchs-Seliger
WS 19/20	7900139	Seminar in Economics (Bachelor/Master)		Prüfung (PR)	Mitusch
WS 19/20	7900140	Seminar in Economics A (Master)		Prüfung (PR)	Szech, Puppe
WS 19/20	7900186	Seminar Debt, Money and Markets: Economic Narrative and Anthropological Evidence		Prüfung (PR)	Puppe
WS 19/20	7900207	Seminar in Macroeconomics I		Prüfung (PR)	Scheffel
WS 19/20	7900221	Topics in Experimental Economics		Prüfung (PR)	Reiß
WS 19/20	7900259	Seminar in Macroeconomics II		Prüfung (PR)	Scheffel
WS 19/20	7900278	Seminar on Morals and Social Behavior		Prüfung (PR)	Szech, Puppe
WS 19/20	79sefi2	Seminar in Economics A (Master)		Prüfung (PR)	Wigger
SS 2020	7900081	Seminar in Macroeconomics I		Prüfung (PR)	Scheffel

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 **Topics in Political Economy (Bachelor)** **Seminar (S)**
2560140, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
For Bachelor 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

Seminar Papers of 8–10 pages are to be handed in.

For bachelor students grades will be based on the quality of presentations in the seminar (50%) and the seminar paper (50%). Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V **Morals & Social Behavior (Bachelor & Master)** **Seminar (S)**
2560141, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

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.

For bachelor students grades will be based on the quality of presentations in the seminar (50%) and the seminar paper (50%).

For Master students, grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally Master students will have to hand in two abstracts with their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade.

Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V **Topics in Political Economy (Master)** **Seminar (S)**
2560142, WS 19/20, 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 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

Seminar Papers of 8–10 pages are to be handed in.

For Master 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 their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade. Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V **Advanced Topics in Econometrics** — **Seminar (S)**
2521310, SS 2020, 2 SWS, Language: English, Open in study portal

V **Fighting Climate Change, Seminar on Morals and Social Behavior (Bachelor)** — **Seminar (S)**
2560554, SS 2020, 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 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 lenghts (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.

V **Designing the Digital Economy, Topics on Political Economy (Bachelor)** — **Seminar (S)**
2560556, SS 2020, 2 SWS, Language: English, Open in study portal

V **Designing the Digital Economy, Topics on Political Economy (Master)** — **Seminar (S)**
2560557, SS 2020, 2 SWS, Language: English, Open in study portal

T 5.208 Course: Seminar in Economics B (Master) [T-WIWI-103477]

Responsible: Professorenschaft des Fachbereichs Volkswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102972 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2560140	Topics in Political Economy (Bachelor)	2 SWS	Seminar (S)	Ehrlich, Huber
WS 19/20	2560141	Morals & Social Behavior (Bachelor & Master)	2 SWS	Seminar (S)	Huber, Ehrlich
WS 19/20	2560142	Topics in Political Economy (Master)	2 SWS	Seminar (S)	Ehrlich, Huber
WS 19/20	2561208	Ausgewählte Aspekte der europäischen Verkehrsplanung und -modellierung	1 SWS	Seminar (S)	Szimba
SS 2020	2521310	Advanced Topics in Econometrics	2 SWS	Seminar (S)	Schienle, Krüger, Buse, Görgen
SS 2020	2560282	Wirtschaftspolitisches Seminar	2 SWS	Seminar (S)	Ott, Assistenten
SS 2020	2560554	Fighting Climate Change, Seminar on Morals and Social Behavior (Bachelor)	2 SWS	Seminar (S)	Szech, Zhao
SS 2020	2560556	Designing the Digital Economy, Topics on Political Economy (Bachelor)	2 SWS	Seminar (S)	Szech, Huber
SS 2020	2560557	Designing the Digital Economy, Topics on Political Economy (Master)	2 SWS	Seminar (S)	Szech, Huber
Exams					
WS 19/20	7900103	Data-driven innovation and science communication (Master)		Prüfung (PR)	Ott
WS 19/20	7900132	Seminar in Economics A (Master)		Prüfung (PR)	Fuchs-Seliger
WS 19/20	7900140	Seminar in Economics A (Master)		Prüfung (PR)	Szech, Puppe
WS 19/20	7900186	Seminar Debt, Money and Markets: Economic Narrative and Anthropological Evidence		Prüfung (PR)	Puppe
WS 19/20	7900207	Seminar in Macroeconomics I		Prüfung (PR)	Scheffel
WS 19/20	7900221	Topics in Experimental Economics		Prüfung (PR)	Reiß
WS 19/20	7900259	Seminar in Macroeconomics II		Prüfung (PR)	Scheffel
WS 19/20	7900278	Seminar on Morals and Social Behavior		Prüfung (PR)	Szech, Puppe
WS 19/20	7900281	Seminar in Economics B (Master), Seminar in Economics A (Bachelor)		Prüfung (PR)	Mitusch
WS 19/20	79sefi3	Seminar in Economics B (Master)		Prüfung (PR)	Wigger
SS 2020	7900081	Seminar in Macroeconomics I		Prüfung (PR)	Scheffel

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 **Topics in Political Economy (Bachelor)** **Seminar (S)**
2560140, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
For Bachelor 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

Seminar Papers of 8–10 pages are to be handed in.

For bachelor students grades will be based on the quality of presentations in the seminar (50%) and the seminar paper (50%). Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V **Morals & Social Behavior (Bachelor & Master)** **Seminar (S)**
2560141, WS 19/20, 2 SWS, Language: English, Open in study portal

Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

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.

For bachelor students grades will be based on the quality of presentations in the seminar (50%) and the seminar paper (50%).

For Master students, grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally Master students will have to hand in two abstracts with their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade.

Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V	**Topics in Political Economy (Master)** 2560142, WS 19/20, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
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

Seminar Papers of 8–10 pages are to be handed in.

For Master 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 their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade. Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

V	**Advanced Topics in Econometrics** 2521310, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

V	**Fighting Climate Change, Seminar on Morals and Social Behavior (Bachelor)** 2560554, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
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 lenghts (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.

V	**Designing the Digital Economy, Topics on Political Economy (Bachelor)** 2560556, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

V	**Designing the Digital Economy, Topics on Political Economy (Master)** 2560557, SS 2020, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

T 5.209 Course: Seminar in Informatics A (Master) [T-WIWI-103479]

Responsible: Professorenschaft des Fachbereichs Informatik
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102973 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2400125	Security and Privacy Awareness	2 SWS	Seminar (S)	Boehm, Seidel-Saul, Volkamer, Aldag, Gerber, Gottschalk
WS 19/20	2512301	Linked Data and the Semantic Web	3 SWS		Sure-Vetter, Acosta Deibe, Käfer, Heling
WS 19/20	2512311	Real-World Challenges in Data Science and Analytics	3 SWS		Sure-Vetter, Nickel, Weinhardt, Zehnder, Brandt
WS 19/20	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar (S)	Zöllner
WS 19/20	2595470	Seminar Service Science, Management & Engineering	3 SWS	Seminar (S)	Weinhardt, Satzger, Nickel, Fromm, Fichtner, Sure-Vetter
SS 2020	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar (S)	Oberweis, Fritsch, Frister, Schreiber, Schüler, Ullrich
SS 2020	2513309	Seminar Knowledge Discovery and Data Mining (Master)	3 SWS	Seminar (S)	Sure-Vetter, Färber, Nguyen, Noullet , Saier
SS 2020	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar (S)	Sure-Vetter, Riemer, Zehnder
SS 2020	2513403	Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513405	Emerging Trends in Digital Health (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar (S)	Zöllner
SS 2020	2513553	Seminar E-Voting (Master)	2 SWS	Seminar (S)	Beckert, Müller-Quade, Volkamer, Dörre, Düzgün, Kirsten, Schwerdt
SS 2020	2513555	Seminar Security, Usability and Society (Master)	2 SWS	Seminar (S)	Volkamer, Aldag, Reinheimer
SS 2020	2595470	Seminar Service Science, Management & Engineering	2 SWS	Seminar (S)	Weinhardt, Nickel, Fichtner, Satzger, Sure-Vetter, Fromm

Exams				
WS 19/20	7900038	Linked Data and the Semantic Web	Prüfung (PR)	Sure-Vetter
WS 19/20	7900044	Seminar Service Science, Management & Engineering	Prüfung (PR)	Sure-Vetter
WS 19/20	7900119	Cognitive automobiles and robots	Prüfung (PR)	Zöllner
WS 19/20	7900129	Security and Privacy Awareness	Prüfung (PR)	Volkamer
WS 19/20	7900187	Real-World Challenges in Data Science und Analytics	Prüfung (PR)	Sure-Vetter
SS 2020	7900092	Seminar Service Science, Management & Engineering	Prüfung (PR)	Sure-Vetter
SS 2020	7900128	Emerging Trends in Internet Technologies (Master)	Prüfung (PR)	Sunyaev

SS 2020	7900146	Emerging Trends in Digital Health (Master)	Prüfung (PR)	Sunyaev
SS 2020	7900194	Seminar Mathematics	Prüfung (PR)	Volkamer
SS 2020	7900196	Seminar Business Information Systems (Master)	Prüfung (PR)	Oberweis
SS 2020	7900198	Seminar Data Science & Real-time Big Data Analytics (Master)	Prüfung (PR)	Sure-Vetter
SS 2020	7900200	Seminar E-Voting (Master)	Prüfung (PR)	Volkamer
SS 2020	7900202	Seminar Knowledge Discovery and Data Mining (Master)	Prüfung (PR)	Sure-Vetter
SS 2020	7900218	Seminar Security, Usability and Society (Master)	Prüfung (PR)	Volkamer

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.

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 **Security and Privacy Awareness** **Seminar (S)**
2400125, WS 19/20, 2 SWS, Open in study portal

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.

Dates:

- Kick-Off (with topic placing): 25.10.19, 11:30-13:00 Building 5.20 Room 1C-01
- Final version: 10.03.20
- Presentation: 25.03.20

Topics will be assigned at the Kick-Off.

Topics:

- Mass surveillance of communication nodes and chilling effects - a legal and ethical debate (Supervisor: Prof. Seidel, Prof. Boehm, Gottschalk)
- Ethical analysis of so-called attack studies in the context of the survey of security awareness (Supervisor: Prof. Seidel, Prof. Volkamer)
- Privacy awareness in the context of Alexa and Co. (Supervisor: Prof. Boehm, Gottschalk, Prof. Volkamer, Aldag)
- Security awareness in the context of 2 factor authentication when paying with credit cards on the Internet (Supervisor: Prof. Volkamer, Aldag)
- What is the worth of privacy? (Supervisor: Prof. Seidel)
- Processing Social Media Content for Law Enforcement (Supervisor: Prof. Boehm, Gottschalk)

ATTENTION: The seminar is only for MASTER students!

V **Linked Data and the Semantic Web**
2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V **Real-World Challenges in Data Science and Analytics**
2512311, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V Cognitive Automobiles and Robots

2513500, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Seminar (S)

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.

V Seminar Service Science, Management & Engineering

2595470, WS 19/20, 3 SWS, Language: German, Open in study portal

Seminar (S)

Content

Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Learning objectives:

The student

- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:

Lecture *eServices* [2595466] is recommended.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature

Die Basisliteratur wird entsprechend der zu bearbeitenden Themen bereitgestellt.

V Seminar Knowledge Discovery and Data Mining (Master)

2513309, SS 2020, 3 SWS, Language: English, Open in study portal

Seminar (S)

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

The exact dates and information for registration will be announced at the event page.

Literature

Detaillierte Referenzen werden zusammen mit den jeweiligenThemen 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.

V **Seminar Data Science & Real-time Big Data Analytics (Master)** Seminar (S)

2513311, SS 2020, 2 SWS, Language: English, Open in study portal

Content

In this practical 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.

V **Cognitive Automobiles and Robots** Seminar (S)

2513500, SS 2020, 2 SWS, Language: German/English, Open in study portal

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.

V **Seminar E-Voting (Master)** Seminar (S)

2513553, SS 2020, 2 SWS, Open in study portal

Content
This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

V **Seminar Security, Usability and Society (Master)** **Seminar (S)**
2513555, SS 2020, 2 SWS, Language: German, Open in study portal

Content
Seminar:

The main topic of this seminar is security, usability, and society. The goal is to analyze these topics from different perspectives. Always important is the human, as we are interested in how humans interact with certain problems and how it might be possible to tackle it. For instance, phishing detection, how is it possible to ensure a higher detection. To tackle this problem, you can either focus on the technical side, awareness training, regulations by organizations.

Further important information:

Because of the current situation, every meeting will be held online. This might change during the semester, depending on the course of the corona situation.

Important dates:

- Kick-Off 22.04
- Final submission 01.07
- Presentation 14.07

Topics:

Will be announced on the 30.03

This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

V **Seminar Service Science, Management & Engineering** **Seminar (S)**
2595470, SS 2020, 2 SWS, Language: German, Open in study portal

Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

Learning objectives:

The student

- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:

Lecture *eServices* [2595466] is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Literature
Die Basisliteratur wird entsprechend der zu bearbeitenden Themen bereitgestellt.

T 5.210 Course: Seminar in Informatics B (Master) [T-WIWI-103480]

Responsible: Professorenschaft des Fachbereichs Informatik
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102974 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2400125	Security and Privacy Awareness	2 SWS	Seminar (S)	Boehm, Seidel-Saul, Volkamer, Aldag, Gerber, Gottschalk
WS 19/20	2512301	Linked Data and the Semantic Web	3 SWS		Sure-Vetter, Acosta Deibe, Käfer, Heling
WS 19/20	2512311	Real-World Challenges in Data Science and Analytics	3 SWS		Sure-Vetter, Nickel, Weinhardt, Zehnder, Brandt
WS 19/20	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar (S)	Zöllner
WS 19/20	2595470	Seminar Service Science, Management & Engineering	3 SWS	Seminar (S)	Weinhardt, Satzger, Nickel, Fromm, Fichtner, Sure-Vetter
SS 2020	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar (S)	Oberweis, Fritsch, Frister, Schreiber, Schüler, Ullrich
SS 2020	2513309	Seminar Knowledge Discovery and Data Mining (Master)	3 SWS	Seminar (S)	Sure-Vetter, Färber, Nguyen, Noullet , Saier
SS 2020	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar (S)	Sure-Vetter, Riemer, Zehnder
SS 2020	2513403	Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513405	Emerging Trends in Digital Health (Master)	2 SWS	Seminar (S)	Lins, Sunyaev, Thiebes
SS 2020	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar (S)	Zöllner
SS 2020	2513553	Seminar E-Voting (Master)	2 SWS	Seminar (S)	Beckert, Müller-Quade, Volkamer, Dörre, Düzgün, Kirsten, Schwerdt
SS 2020	2513555	Seminar Security, Usability and Society (Master)	2 SWS	Seminar (S)	Volkamer, Aldag, Reinheimer
SS 2020	2595470	Seminar Service Science, Management & Engineering	2 SWS	Seminar (S)	Weinhardt, Nickel, Fichtner, Satzger, Sure-Vetter, Fromm
Exams					
WS 19/20	7500175	Seminar: Energy Informatics		Prüfung (PR)	Wagner
WS 19/20	7500220	Seminar Ubiquitous Computing		Prüfung (PR)	Beigl
WS 19/20	7900038	Linked Data and the Semantic Web		Prüfung (PR)	Sure-Vetter
WS 19/20	7900044	Seminar Service Science, Management & Engineering		Prüfung (PR)	Sure-Vetter
WS 19/20	7900119	Cognitive automobiles and robots		Prüfung (PR)	Zöllner
WS 19/20	7900129	Security and Privacy Awareness		Prüfung (PR)	Volkamer
WS 19/20	7900187	Real-World Challenges in Data Science und Analytics		Prüfung (PR)	Sure-Vetter
SS 2020	7900092	Seminar Service Science, Management & Engineering		Prüfung (PR)	Sure-Vetter

SS 2020	7900128	Emerging Trends in Internet Technologies (Master)	Prüfung (PR)	Sunyaev
SS 2020	7900146	Emerging Trends in Digital Health (Master)	Prüfung (PR)	Sunyaev
SS 2020	7900194	Seminar Mathematics	Prüfung (PR)	Volkamer
SS 2020	7900196	Seminar Business Information Systems (Master)	Prüfung (PR)	Oberweis
SS 2020	7900198	Seminar Data Science & Real-time Big Data Analytics (Master)	Prüfung (PR)	Sure-Vetter
SS 2020	7900200	Seminar E-Voting (Master)	Prüfung (PR)	Volkamer
SS 2020	7900202	Seminar Knowledge Discovery and Data Mining (Master)	Prüfung (PR)	Sure-Vetter
SS 2020	7900218	Seminar Security, Usability and Society (Master)	Prüfung (PR)	Volkamer

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:

V **Security and Privacy Awareness** **Seminar (S)**
2400125, WS 19/20, 2 SWS, Open in study portal

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.

Dates:

- Kick-Off (with topic placing): 25.10.19, 11:30-13:00 Building 5.20 Room 1C-01
- Final version: 10.03.20
- Presentation: 25.03.20

Topics will be assigned at the Kick-Off.

Topics:

- Mass surveillance of communication nodes and chilling effects - a legal and ethical debate (Supervisor: Prof. Seidel, Prof. Boehm, Gottschalk)
- Ethical analysis of so-called attack studies in the context of the survey of security awareness (Supervisor: Prof. Seidel, Prof. Volkamer)
- Privacy awareness in the context of Alexa and Co. (Supervisor: Prof. Boehm, Gottschalk, Prof. Volkamer, Aldag)
- Security awareness in the context of 2 factor authentication when paying with credit cards on the Internet (Supervisor: Prof. Volkamer, Aldag)
- What is the worth of privacy? (Supervisor: Prof. Seidel)
- Processing Social Media Content for Law Enforcement (Supervisor: Prof. Boehm, Gottschalk)

ATTENTION: The seminar is only for MASTER students!

V Linked Data and the Semantic Web

2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V Real-World Challenges in Data Science and Analytics

2512311, WS 19/20, 3 SWS, Language: German/English, Open in study portal

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.

V Cognitive Automobiles and Robots

2513500, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Seminar (S)

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.

V Seminar Service Science, Management & Engineering

2595470, WS 19/20, 3 SWS, Language: German, Open in study portal

Seminar (S)

Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Learning objectives:

The student

- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:

Lecture *eServices* [2595466] is recommended.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Basisliteratur wird entsprechend der zu bearbeitenden Themen bereitgestellt.

V Seminar Knowledge Discovery and Data Mining (Master)

2513309, SS 2020, 3 SWS, Language: English, Open in study portal

Seminar (S)

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

The exact dates and information for registration will be announced at the event page.

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligenThemen 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.

V **Seminar Data Science & Real-time Big Data Analytics (Master)** **Seminar (S)**
2513311, SS 2020, 2 SWS, Language: English, Open in study portal

Content
In this practical 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.

V **Cognitive Automobiles and Robots** **Seminar (S)**
2513500, SS 2020, 2 SWS, Language: German/English, Open in study portal

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.

V **Seminar E-Voting (Master)** **Seminar (S)**
2513553, SS 2020, 2 SWS, Open in study portal

Content
This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

V	**Seminar Security, Usability and Society (Master)** 2513555, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Content
Seminar:

The main topic of this seminar is security, usability, and society. The goal is to analyze these topics from different perspectives. Always important is the human, as we are interested in how humans interact with certain problems and how it might be possible to tackle it. For instance, phishing detection, how is it possible to ensure a higher detection. To tackle this problem, you can either focus on the technical side, awareness training, regulations by organizations.

Further important information:

Because of the current situation, every meeting will be held online. This might change during the semester, depending on the course of the corona situation.

Important dates:

- Kick-Off 22.04
- Final submission 01.07
- Presentation 14.07

Topics:

Will be announced on the 30.03

This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

V	**Seminar Service Science, Management & Engineering** 2595470, SS 2020, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

Learning objectives:

The student

- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:

Lecture *eServices* [2595466] is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Literature
Die Basisliteratur wird entsprechend der zu bearbeitenden Themen bereitgestellt.

T 5.211 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-102973 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2550473	Seminar on Power Systems Optimization (Master)	2 SWS	Seminar (S)	Rebennack, Sinske
WS 19/20	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar (S)	Nickel, Mitarbeiter
SS 2020	2550473	Seminar on Power Systems Optimization (Master)	2 SWS	Seminar (S)	Rebennack
SS 2020	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar (S)	Nickel, Mitarbeiter

Exams				
WS 19/20	7900012_WS1920	Seminar in Operations Research A (Master)	Prüfung (PR)	Stein
WS 19/20	7900156	Modern OR and Innovative Logistics	Prüfung (PR)	Nickel
WS 19/20	7900212	Real-World Challenges in Data Science und Analytics	Prüfung (PR)	Nickel
WS 19/20	7900314	Seminar in Operations Research A (Master)	Prüfung (PR)	Rebennack

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 Seminar: Modern OR and Innovative Logistics

Seminar (S)

2550491, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar: Modern OR and Innovative Logistics** **Seminar (S)**
2550491, SS 2020, 2 SWS, Language: German, Open in study portal

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.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

T 5.212 Course: Seminar in Operations Research B (Master) [T-WIWI-103482]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102974 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
WS 19/20	2550473	Seminar on Power Systems Optimization (Master)	2 SWS	Seminar (S)	Rebennack, Sinske
WS 19/20	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar (S)	Nickel, Mitarbeiter
SS 2020	2550473	Seminar on Power Systems Optimization (Master)	2 SWS	Seminar (S)	Rebennack
SS 2020	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar (S)	Nickel, Mitarbeiter
Exams					
WS 19/20	7900158	Modern OR and Innovative Logistics		Prüfung (PR)	Nickel

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 Seminar: Modern OR and Innovative Logistics

2550491, WS 19/20, 2 SWS, Language: German, Open in study portal

Seminar (S)

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.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar: Modern OR and Innovative Logistics**
2550491, SS 2020, 2 SWS, Language: German, Open in study portal

Seminar (S)

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.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

T 5.213 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-102971 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
SS 2020	2521310	Advanced Topics in Econometrics	2 SWS	Seminar (S)	Schienle, Krüger, Buse, Görgen

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 Advanced Topics in Econometrics

Seminar (S)

2521310, SS 2020, 2 SWS, Language: English, Open in study portal

T 5.214 Course: Seminar in Statistics B (Master) [T-WIWI-103484]

Responsible: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102972 - Seminar

Type	Credits	Recurrence	Version
Examination of another type	3	Each term	1

Events					
SS 2020	2521310	Advanced Topics in Econometrics	2 SWS	Seminar (S)	Schienle, Krüger, Buse, Görgen

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 Advanced Topics in Econometrics

Seminar (S)

2521310, SS 2020, 2 SWS, Language: English, Open in study portal

T 5.215 Course: Seminar Mathematics [T-MATH-105686]

Organisation: KIT Department of Mathematics
Part of: M-MATH-102730 - Seminar

Type	Credits	Version
Completed coursework	3	1

Exams				
WS 19/20	7700048	Seminar Mathematics	Prüfung (PR)	Kühnlein

T 5.216 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	Recurrence	Version
Written examination	3	Each winter term	1

Events					
WS 19/20	2581023	(Smart) Energy Infrastructure	2 SWS	Lecture (V)	Ardone, Pustisek, Jochem
Exams					
WS 19/20	7981023	Smart Energy Infrastructure		Prüfung (PR)	Fichtner

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None.

Annotation
New course starting winter term 2017/2018.

Below you will find excerpts from events related to this course:

V (Smart) Energy Infrastructure

Lecture (V)

2581023, WS 19/20, 2 SWS, Language: German, Open in study portal

Content

- Basic terms and concepts
- Meaning of infrastructure
- Excursus: regulation of infrastructure
- Natural gas transportation
- Natural gas storage
- Electricity transmission
- (Overview) Crude oil and oil product transportation

T 5.217 Course: Smart Grid Applications [T-WIWI-107504]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2540452	Smart Grid Applications	2 SWS	Lecture (V)	Staudt, van Dinther
WS 19/20	2540453	Übung zu Smart Grid Applications	1 SWS	Lecture (V)	Staudt, Golla
Exams					
WS 19/20	7900235	Smart Grid Applications		Prüfung (PR)	Weinhardt
WS 19/20	7900308	Smart Grid Applications		Prüfung (PR)	Weinhardt

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 be read for the first time in winter term 2018/19.

T 5.218 Course: Sobolev Spaces [T-MATH-105896]

Responsible: Prof. Dr. Andreas Kirsch
Organisation: KIT Department of Mathematics
Part of: M-MATH-102926 - Sobolev Spaces

Type	Credits	Version
Oral examination	5	1

T 5.219 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	Recurrence	Version
Written examination	4,5	Each summer term	1

Events					
SS 2020	2520537	Social Choice Theory	2 SWS	Lecture (V)	Puppe
SS 2020	2520539	Übung zu Social Choice Theory	1 SWS	Practice (Ü)	Puppe, Kretz

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

Below you will find excerpts from events related to this course:

V Social Choice Theory

2520537, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Basisliteratur:

- Herve´ 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.

weiterführende Literatur:

- 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 5.220 Course: Sociotechnical Information Systems Development [T-WIWI-109249]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Examination of another type	4,5	Each term	2

Events					
WS 19/20	2512400	Sociotechnical Information Systems Development	3 SWS	Practical course (P)	Sunyaev, Sturm
SS 2020	2512400	Development of Sociotechnical Information Systems (Bachelor)	3 SWS	Practical course (P)	Sunyaev, Sturm
SS 2020	2512401	Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course (P)	Sunyaev, Sturm
Exams					
WS 19/20	7900115	Development of Sociotechnical Information Systems		Prüfung (PR)	Sunyaev
SS 2020	7900173	Development of Sociotechnical Information Systems (Master)		Prüfung (PR)	Sunyaev

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 Sociotechnical Information Systems Development
2512400, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

Content
The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

Learning objectives:

- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form

V Development of Sociotechnical Information Systems (Bachelor)
2512400, SS 2020, 3 SWS, Language: German/English, Open in study portal

Practical course (P)

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	**Development of Sociotechnical Information Systems (Master)** 2512401, SS 2020, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)**

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 5.221 Course: Software Quality Management [T-WIWI-102895]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Events					
SS 2020	2511208	Software Quality Management	2 SWS	Lecture (V)	Oberweis
SS 2020	2511209	Übungen zu Software-Qualitätsmanagement	1 SWS	Practice (Ü)	Oberweis, Frister
Exams					
WS 19/20	7900027	Software Quality Management		Prüfung (PR)	Oberweis
SS 2020	7900031	Software Quality Management (Registration until 13 July 2020)		Prüfung (PR)	Oberweis

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:

V Software Quality Management — Lecture (V)

2511208, SS 2020, 2 SWS, Language: German, Open in study portal

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 mail models of sofware 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 5.222 Course: Spatial Economics [T-WIWI-103107]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101496 - Growth and Agglomeration

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2561260	Spatial Economics	2 SWS	Lecture (V)	Ott
WS 19/20	2561261		1 SWS	Practice (Ü)	Ott, Bälz
Exams					
WS 19/20	7900075	Spatial Economics		Prüfung (PR)	Ott

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

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 is not offered in the winter term 2018/19.

Below you will find excerpts from events related to this course:

V Spatial Economics

Lecture (V)

2561260, WS 19/20, 2 SWS, Language: English, Open in study portal

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 5.223 Course: Spatial Stochastics [T-MATH-105867]

Responsible: Prof. Dr. Daniel Hug
Prof. Dr. Günter Last

Organisation: KIT Department of Mathematics

Part of: M-MATH-102903 - Spatial Stochastics

Type	Credits	Version
Oral examination	8	1

Events					
WS 19/20	0105600	Spatial Stochastics	4 SWS	Lecture (V)	Hug
WS 19/20	0105610	Tutorial for 0105600 (Spatial Stochastics)	2 SWS	Practice (Ü)	Hug
Exams					
WS 19/20	6700029	Spatial Stochastics		Prüfung (PR)	Hug
WS 19/20	7700052	Spatial Stochastics		Prüfung (PR)	Last, Hug

Prerequisites
none

T 5.224 Course: Special Functions and Applications in Potential Theory [T-MATH-102274]

Responsible: Prof. Dr. Andreas Kirsch
Organisation: KIT Department of Mathematics
Part of: M-MATH-101335 - Special Functions and Applications in Potential Theory

Type	Credits	Version
Oral examination	5	1

Prerequisites
None

T 5.225 Course: Special Topics of Numerical Linear Algebra [T-MATH-105891]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: M-MATH-102920 - Special Topics of Numerical Linear Algebra

Type	Credits	Version
Oral examination	8	1

Exams				
WS 19/20	77Spezielle Themen der numerischen linearen Algebr a (Mündliche Prüfung), WS 2019/20	Special Topics of Numerical Linear Algebra	Prüfung (PR)	Neher

Prerequisites
none

T 5.226 Course: Spectral Theory - Exam [T-MATH-103414]

Responsible: Prof. Dr. Dorothee Frey
PD Dr. Gerd Herzog
Dr. Peer Kunstmann
Dr. Christoph Schmoeger
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-101768 - Spectral Theory

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0163700	Spektraltheorie	4 SWS	Lecture (V)	Frey
SS 2020	0163710	Übung zu 0163700 (Spektraltheorie)	2 SWS	Practice (Ü)	Frey

Below you will find excerpts from events related to this course:

V Spektraltheorie

Lecture (V)

0163700, SS 2020, 4 SWS, Language: English, Open in study portal

Literature

Auf meiner Homepage findet man die PDF Datei des Skriptums meiner Vorlesung Spectral Theory vom Sommersemester 2010. Eine aktualisierte Fassung wird vermutlich vorlesungsbegleitend erstellt werden. Einige einschlägige Monographien:

- H.W. Alt: Lineare Funktionalanalysis. Springer.
- H. Brezis: Functional Analysis, Sobolev Spaces and Partial Differential Equations. Springer.
- J.B. Conway: A Course in Functional Analysis. Springer.
- N. Dunford, J.T. Schwartz: Linear Operators. Part I: General Theory. Wiley.
- T Kato: Perturbation Theory of Linear Operators. Springer.
- A.E. Taylor, D.C. Lay: Introduction to Functional Analysis. Wiley.
- D. Werner: Funktionalanalysis. Springer.

T 5.227 Course: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature [T-MATH-105932]

Responsible: Stephan Klaus
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-102958 - Spin Manifolds, Alpha Invariant and Positive Scalar Curvature

Type	Credits	Version
Oral examination	5	1

T 5.228 Course: Splitting Methods for Evolution Equations [T-MATH-110805]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: M-MATH-105325 - Splitting Methods for Evolution Equations

Type	Credits	Recurrence	Version
Oral examination	6	Irregular	1

Prerequisites
none

T 5.229 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

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2521350	Statistical Modeling of Generalized Regression Models	2 SWS	Lecture (V)	Heller
Exams					
WS 19/20	7900146	Statistical Modeling of generalized regression models		Prüfung (PR)	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 — Lecture (V)

2521350, WS 19/20, 2 SWS, Open in study portal

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

T 5.230 Course: Stein's Method [T-MATH-105914]

Responsible: Dr. Matthias Schulte
Organisation: KIT Department of Mathematics
Part of: M-MATH-102946 - Stein's Method

Type	Credits	Version
Oral examination	5	1

Prerequisites
none

T 5.231 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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2521331	Stochastic Calculus and Finance	2 SWS	Lecture (V)	Safarian
Exams					
WS 19/20	7900225	Stochastic Calculus and Finance		Prüfung (PR)	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:

V Stochastic Calculus and Finance

2521331, WS 19/20, 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 we 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

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

T 5.232 Course: Stochastic Control [T-MATH-105871]

Responsible: Prof. Dr. Nicole Bäuerle
Organisation: KIT Department of Mathematics
Part of: M-MATH-102908 - Stochastic Control

Type	Credits	Version
Oral examination	4	1

Prerequisites
none

T 5.233 Course: Stochastic Differential Equations [T-MATH-105852]

Responsible: Prof. Dr. Dorothee Frey
Prof. Dr. Roland Schnaubelt

Organisation: KIT Department of Mathematics

Part of: M-MATH-102881 - Stochastic Differential Equations

Type	Credits	Version
Oral examination	8	1

T 5.234 Course: Stochastic Evolution Equations [T-MATH-105910]

Responsible: Prof. Dr. Lutz Weis
Organisation: KIT Department of Mathematics
Part of: M-MATH-102942 - Stochastic Evolution Equations

Type	Credits	Version
Oral examination	8	1

Prerequisites
none

T 5.235 Course: Stochastic Geometry [T-MATH-105840]

Responsible: Prof. Dr. Daniel Hug
Prof. Dr. Günter Last

Organisation: KIT Department of Mathematics

Part of: M-MATH-102865 - Stochastic Geometry

Type	Credits	Version
Oral examination	8	1

Events					
SS 2020	0152600	Stochastic Geometry	4 SWS	Lecture (V)	Winter
SS 2020	0152610	Tutorial for 0152600 (Stochastic Geometry)	2 SWS	Practice (Ü)	Winter

T 5.236 Course: Strategic Finance and Technoloy 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	Recurrence	Version
Written examination	1,5	Each winter term	1

Events					
WS 19/20	2530214	Strategic Finance and Technology Change	1 SWS	Lecture (V)	N.N.
Exams					
WS 19/20	7900219	Strategic Finance and Technoloy Change		Prüfung (PR)	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 5.237 Course: Strategic Management of Information Technology [T-WIWI-102669]

Responsible: Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	2

Exams				
WS 19/20	7900030	Strategic Management of Information Technology	Prüfung (PR)	Wolf
SS 2020	7900034	Strategic Management of Information Technology (Registration until 13 July 2020)	Prüfung (PR)	Wolf

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 5.238 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	Recurrence	Version
Examination of another type	3	Irregular	1

Events					
WS 19/20	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar (S)	Lindstädt
SS 2020	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar (S)	Lindstädt
Exams					
WS 19/20	7900120	Strategy and Management Theory: Developments and "Classics"		Prüfung (PR)	Lindstädt

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) — **Seminar (S)**
2577921, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:

Students

- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

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 final meeting. Details on the design of the success control will be announced during the lecture.

Note:

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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

V **Strategy and Management Theory: Developments and "Classics" (Master)** **Seminar (S)**
2577921, SS 2020, 2 SWS, Language: German, Open in study portal

Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:

Students

- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

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 final meeting. Details on the design of the success control will be announced during the lecture.

Note:

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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

T 5.239 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each term	1

Competence Certificate
The assessment of this course is a written examination (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

Prerequisites
None

T 5.240 Course: Supplement Software- and Systemsengineering [T-WIWI-110372]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each term	1

Competence Certificate
The assessment consists of an 1h written exam in the first week after lecture period.

Prerequisites
None

Annotation
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot assigned to another course of this topic.

T 5.241 Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research

Type	Credits	Recurrence	Version
Written examination	4,5	Each summer term	3

Events					
SS 2020	2550486	Taktisches und operatives SCM	2 SWS	Lecture (V)	Nickel
SS 2020	2550487	Übungen zu Taktisches und operatives SCM	1 SWS	Practice (Ü)	Dunke
Exams					
WS 19/20	00012	Tactical and Operational Supply Chain Management		Prüfung (PR)	Nickel

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.

Prerequisite for admission to examination is the succesful completion of the online assessments.

Prerequisites
Prerequisite for admission to examination is the succesful completion of the online assessments.

Recommendation
None

Annotation
The lecture is held in 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 Taktisches und operatives SCM

2550486, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer). The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, 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. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot. The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case
studies from practice will be discussed in detail.

Literature
Weiterführende Literatur

- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Domschke: Logistik: Rundreisen und Touren, 4. Auflage, Oldenbourg, 1997
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005
- Simchi-Levi, Kaminsky, Simchi-Levi: Designing and Managing the Supply Chain, 3rd edition, McGraw-Hill, 2008
- Silver, Pyke, Peterson: Inventory management and production planning and scheduling, 3rd edition, Wiley, 1998

T 5.242 Course: The Riemann Zeta Function [T-MATH-105934]

Responsible: Dr. Fabian Januszewski
Organisation: KIT Department of Mathematics
Part of: M-MATH-102960 - The Riemann Zeta Function

Type	Credits	Version
Oral examination	4	1

T 5.243 Course: Theory of Endogenous Growth [T-WIWI-102785]

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	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2561503	Theory of endogenous growth	2 SWS	Lecture (V)	Ott
WS 19/20	2561504		1 SWS	Practice (Ü)	Ott, Eraydin

Competence Certificate
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.

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.

Annotation
Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

Below you will find excerpts from events related to this course:

V Theory of endogenous growth

Lecture (V)

2561503, WS 19/20, 2 SWS, Language: German/English, Open in study portal

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 5.244 Course: Time Series Analysis [T-MATH-105874]

Responsible: Prof. Dr. Norbert Henze
Dr. Bernhard Klar

Organisation: KIT Department of Mathematics

Part of: M-MATH-102911 - Time Series Analysis

Type	Credits	Version
Oral examination	4	2

Events					
SS 2020	0161100	Time Series Analysis	2 SWS	Lecture (V)	Gneiting
SS 2020	0161110	Tutorial for 0161100	1 SWS	Practice (Ü)	Gneiting

T 5.245 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	Recurrence	Version
Written examination	4,5	Irregular	1

Events					
SS 2020	2560232	Topics in Experimental Economics	2 SWS	Lecture (V)	Reiß
SS 2020	25602333	Übungen zu Topics in Experimental Economics	1 SWS	Practice (Ü)	Reiß
Exams					
WS 19/20	7900221	Topics in Experimental Economics		Prüfung (PR)	Reiß

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.

5.246 Course: Topological Groups [T-MATH-110802]

Responsible: Dr. rer. nat. Rafael Dahmen
Prof. Dr. Wilderich Tuschmann

Organisation: KIT Department of Mathematics

Part of: M-MATH-105323 - Topological Groups

Type	Credits	Recurrence	Version
Oral examination	5	Irregular	1

Prerequisites
none

T 5.247 Course: Traveling Waves [T-MATH-105897]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: M-MATH-102927 - Traveling Waves

Type	Credits	Version
Oral examination	6	1

T 5.248 Course: Uncertainty Quantification [T-MATH-108399]

Responsible: Prof. Dr. Martin Frank
Organisation: KIT Department of Mathematics
Part of: M-MATH-104054 - Uncertainty Quantification

Type	Credits	Recurrence	Version
Oral examination	4	Irregular	1

Events					
SS 2020	0164400	Uncertainty Quantification	2 SWS	Lecture (V)	Frank
SS 2020	0164410	Tutorial for 0164400	1 SWS	Practice (Ü)	Frank
Exams					
WS 19/20	7700058	Uncertainty Quantification		Prüfung (PR)	Frank

Prerequisites
none

Below you will find excerpts from events related to this course:

V Uncertainty Quantification

0164400, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature

- R.C. Smith: Uncertainty Quantification: Theory, Implementation, and Applications, SIAM, 2014.
- T.J. Sullivan: Introduction to Uncertainty Quantification, Springer-Verlag, 2015.
- D. Xiu: Numerical Methods for Stochastic Computations, Princeton University Press, 2010.
- O.P. Le Maître, O.M. Knio: Spectral Methods for Uncertainty Quantification, Springer-Verlag, 2010.
- R. Ghanem, D. Higdon, H. Owhadi:Handbook of Uncertainty Quantification, Springer-Verlag, 2017.

T 5.249 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

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	1

Events					
WS 19/20	2530212	Valuation	2 SWS	Lecture (V)	Ruckes
WS 19/20	2530213	Übungen zu Valuation	1 SWS	Practice (Ü)	Ruckes, Stengel
Exams					
WS 19/20	7900057	Valuation		Prüfung (PR)	Ruckes

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Valuation
2530212, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur
Titman/Martin (2013): *Valuation - The Art and Science of Corporate Investment Decisions*, 2nd. ed. Pearson International.

T 5.250 Course: Variational Methods [T-MATH-110302]

Responsible: Prof. Dr. Wolfgang Reichel
Organisation: KIT Department of Mathematics
Part of: M-MATH-105093 - Variational Methods

Type	Credits	Version
Oral examination	8	1

Exams				
WS 19/20	7700044	Variational Methods	Prüfung (PR)	Reichel

T 5.251 Course: Wavelets [T-MATH-105838]

Responsible: Prof. Dr. Andreas Rieder
Organisation: KIT Department of Mathematics
Part of: M-MATH-102895 - Wavelets

Type	Credits	Recurrence	Version
Oral examination	8	Irregular	1

Competence Certificate
Mündliche Prüfung im Umfang von ca. 30 Minuten.

Prerequisites
none

T 5.252 Course: Web Science [T-WIWI-103112]

Responsible: Prof. Dr. York Sure-Vetter
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

Type	Credits	Recurrence	Version
Written examination	4,5	Each winter term	2

Events					
WS 19/20	2511312	Web Science	2 SWS	Lecture (V)	Sure-Vetter
WS 19/20	2511313	Exercises to Web Science	1 SWS	Practice (Ü)	Sure-Vetter, Heling
Exams					
WS 19/20	7900031	Web Science		Prüfung (PR)	Sure-Vetter
SS 2020	7900032	Web Science (Registration until 13 July 2020)		Prüfung (PR)	Sure-Vetter

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 Web Science

2511312, WS 19/20, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
The lecture provides insights into the analysis of social networks and the used metrics. Thereby, in particular, web phenomena and the available technologies are considered.

Web Science is the emergent study of the people and technologies, applications, processes and practices that shape and are shaped by the World Wide Web. Web Science aims to draw together theories, methods and findings from across academic disciplines, and to collaborate with industry, business, government and civil society, to develop our knowledge and understanding of the Web: the largest socio-technical infrastructure in human history.

The lecture provides an introduction to basic concepts of Web Science. Essential theoretical foundations, phenomena and approaches are presented and explained.

This course aims to provide students with a basic knowledge and understanding about the structure and analysis of selected web phenomena and technologies. Topics include the small world problem, network theory, social network analysis, graph search and technologies/standards/architectures.

Learning objectives:

The students

- look critically into current research topics in the field of Web Science and learns in particular about the topics small-world-problem, network theory, social network analysis, bibliometrics, as well as link analysis and search.
- apply interdisciplinary thinking.
- train the application of technological approaches to social science problems.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preperation and postprocessing: 60 hours
- Exam and exam preperation: 30 hours

Literature

- Networks, Crowds, and Markets: Reasoning About a Highly Connected World, by David Easley and Jon Kleinberg, 2010 (free online book: http://www.cs.cornell.edu/home/kleinber/networks-book/)
- Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73)

V **Exercises to Web Science** **Practice (Ü)**
2511313, WS 19/20, 1 SWS, Language: English, Open in study portal

Content
The exercises are related to the lecture Web Science.

Multiple exercises are held that capture the topics, held in the lecture Web Scienceand discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

This course aims to provide students with a basic knowledge and understanding about the structure and analysis of selected web phenomena and technologies. Topics include the small world problem, network theory, social network analysis, graph search and technologies/standards/architectures.

Learning objectives:

The students

- look critically into current research topics in the field of Web Science and learns in particular about the topics small-world-problem, network theory, social network analysis, bibliometrics, as well as link analysis and search.
- apply interdisciplinary thinking.
- train the application of technological approaches to social science problems.

Literature

- Networks, Crowds, and Markets: Reasoning About a Highly Connected World, by David Easley and Jon Kleinberg, 2010 (free online book: http://www.cs.cornell.edu/home/kleinber/networks-book/)
- Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73)

T 5.253 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	Recurrence	Version
Examination of another type	3	Irregular	1

Events					
WS 19/20	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar (S)	Lindstädt
Exams					
WS 19/20	7900172	Workshop Business Wargaming – Analyzing Strategic Interactions		Prüfung (PR)	Lindstädt

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)

Seminar (S)

2577922, WS 19/20, 2 SWS, Language: German, Open in study portal

Content
In this lecture, current economic trends will be discussed from a perspective of competition analysis and corporate strategies. Using appropriate frameworks, the students will be able to analyze collectively selected case studies and derive business strategies.

Learning Objectives:

Students

- are able to analyze business strategies and derive recommendations for the management
- learn to express their position through compelling reasoning in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the success control will be announced during the lecture.

Note:

This course is admission restricted. If you werealready admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

T 5.254 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	Recurrence	Version
Examination of another type	3	Irregular	1

Events					
SS 2020	2577923	Workshop aktuelle Themen Strategie und Management (Master)	2 SWS	Seminar (S)	Lindstädt

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)

Seminar (S)

2577923, SS 2020, 2 SWS, Language: German, Open in study portal

Content

In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:

Students

- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

The assessment of performance is made through active participation in the discussion rounds; adequate preparation is expressed here and a clear understanding of the topic and framework becomes evident. Further details on the design of the success control will be announced during the lecture.

Note:

This course is admission restricted. If you werealready admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.