Vorlesungsverzeichnis

English-taught courses of the Faculty

WiSe 2025/26

Stand 23.02.2026

English-taught courses of the Faculty

202001 Primary hazards and risks: Seismic monitoring / Regional ground motion

J. Schwarz, L. Abrahamczyk, C. Kaufmann, S. Beinersdorf Veranst. SWS: 4
Integrierte Vorlesung
1-Gruppe Di, wöch., 13:30 - 15:00, Coudraystraße 11 C - Pool-Raum 101, Exercise Group A
2-Gruppe Mo, wöch., 13:30 - 15:00, Coudraystraße 13 B - Pool Fak. B 007, Exercise Group B
3-Gruppe Mo, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Exercise Group C
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D
Do, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal D

Beschreibung

Seismic Monitoring

Basics of Engineering Seismology (parameters of source, path, attenuation; site conditions and shaking); Macroseismic scales, Intensity measures and correlations; Time- and frequency dependent description of seismic action; recording instruments, input parameters for seismic hazard assessment; EQ-Action for building design; Measurements for site response evaluation; site categorization and response studies; Building Monitoring Systems: tasks and developments, analysis of instrumental data; identification of dynamic and structural parameters

Regional Ground Motion

Identification of hazard describing parameters; seismic networks, availability/ elaboration of ground motion data and records; strong-Motion Databases; selection of site-related ground motion; handling of data files; Ground Motion Prediction Equations (GMPEs); application of ground motions models and tools to the study area and target site; re-interpretation of national code background.

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 Project report

”Regional Ground Motion” (17%) / **WiSe**

2 written exams

”Seismic Monitoring” / 180 min (50%) / **WiSe** + SuSe

”Wind Engineering” / 90 min (33%) / **WiSe** + SuSe

204017 Primary hazards and risks: Wind Engineering

G. Morgenthal, I. Kavrakov, A. Athanasiou, S. Beinersdorf, G. Tondo Veranst. SWS: 2
Integrierte Vorlesung
Fr, wöch., 09:15 - 12:30, LH B M13B* dates by arrangementTime schedule will be announced by the responsible lecturers. Lecture shares time slot with lecture Structural engineering.

Beschreibung

Wind Risk Mitigation in Structural Engineering

meteorology, stochastic wind effects including aeroelasticity, extreme value analysis; risk chain, storm tracks with high damage accumulation, hazard maps; basics of wind resistant design and environmental

planning, wind tunnel technology, monitoring and simulations, risk control (control of exposition, shelter projects, wind effects at new types of infrastructures), examples and applications

Leistungsnachweis

1 Project report

”Regional Ground Motion” (17%) / **WiSe**

2 written exams

”Seismic Monitoring” / 180 min (50%) / **WiSe** + SuSe

”Wind Engineering” / 90 min (33%) / **WiSe** + SuSe

204019 Life-lines engineering (Lecture)

G. Morgenthal, S. Chawdhury, G. Tondo, I. Kavrakov Veranst. SWS: 4
Integrierte Vorlesung
Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal C, 16.10.2025 - 04.12.2025
Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal C, 11.12.2025 - 05.02.2026

Beschreibung

The students will be familiar with bridges in the context of their functions as critical infrastructure. They will be familiar with the design objectives with specific emphasis on risks associated with natural hazards and with strategies to limit damage and to ensure operability after a major natural disaster. They will be able to develop structural concepts and to carry out detailed design of such structures, including the application of relevant codes of practice.

Life-lines Engineering
History of bridge engineering; types of bridges; structural concepts and articulation; planning and design; construction methods; structural modelling and analysis; elastic and plastic design approaches; performance-based design; structural detailing; dynamic characteristics and behaviour under dynamic loading; seismic response and isolation; response to wind loading

Training in:
Structural modelling and Finite Element Analysis; design of post-tensioning systems in bridges; design and detailing of girders and piers; seismic response; wind response, analysis of cable stayed bridges

Leistungsnachweis

1 written exam

”Life-lines Engineering ”/ 180 min (100%) / **WiSe** + SuSe

901005 Project- and Disaster Management

H. Bargstädt, J. Melzner, A. Azimian, B. Bode, S. Beinersdorf Veranst. SWS: 2
Integrierte Vorlesung
Fr, Einzel, 13:30 - 15:00, Coudraystraße 13 A - Hörsaal 2, 14.11.2025 - 14.11.2025
Fr, Einzel, 13:30 - 15:00, Coudraystraße 13 A - Hörsaal 2, 21.11.2025 - 21.11.2025
Fr, Einzel, 13:30 - 15:00, Coudraystraße 13 A - Hörsaal 2, 05.12.2025 - 05.12.2025
Fr, Einzel, 13:30 - 16:45, Coudraystraße 13 A - Hörsaal 2, 23.01.2026 - 23.01.2026
Fr, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

Acquisition of knowledge of the methods of the project management and acquisition of skills with their practical application:
Imparting of means and methods as well as of social and technical aspects of the project management in the construction industry (the-oretical and on the basis practical examples)
Consolidate of knowledge in handling a project management soft-ware

Additional: Lecture of "Sociology of disaster"

Bemerkung

Modul "Disaster management and mitigation strategies" --> 6 ECTS

Part "Mitigation strategies" --> see lecture "Sociology of disaster"

Leistungsnachweis

1 written exam ”Project and disaster management” or ”sociology of disaster”/ 60 min (50%) / **WiSe** + SuSe

1 Presentation + presentation paper ”sociology of disaster” or ”project and disaster management” (50%) / **WiSe**

To be announced with the begin of the lectures

901033 Sociology of disaster

J. Melzner, H. Bargstädt, S. Beinersdorf, B. Bode Veranst. SWS: 2
Integrierte Vorlesung
Mo, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal D

engl. Beschreibung

Modul "Disaster management and mitigation strategies" --> 6 ECTS

Part "Mitigation strategies" --> see lecture "Urban Sociology"

Bemerkung

lecture starts 03.11.2025

Leistungsnachweis

1 written exam ”Project and disaster management” or ”sociology of disaster”/ 60 min (50%) / **WiSe** + SuSe

1 Presentation + presentation paper ”sociology of disaster” or ”project and disaster management” (50%) / **WiSe**

To be announced with the begin of the lectures

904002 Geographical information systems (GIS) and building stock survey (Lecture)

V. Rodehorst Veranst. SWS: 1
Integrierte Vorlesung
Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, dates by arrangement

Beschreibung

Students will be trained to reproduce existing natural hazard and risk related data in GIS format using GIS Software Solutions and Tools, will be able to create basic layers for hazard and risk assessment and to establish relevant links and to solve simple example tasks. Students will be trained in building stock survey, vulnerability assessment, damage interpretation and handling of tools for detailed empirical and instrumental elaboration. Training in

instruments, equipment, and technologies for advanced detailed building survey (geodetic, photogrammetric, satellite data).

Content:

Fundamentals of three-dimensional positioning, photogrammetry, GIS/cartography, land management / cadastre; earthwork computation; spatial data in daily life; instruments, equipment, and technologies for advanced detailed building survey (geodetic, photogrammetric, satellite data).

Bemerkung

Zum Bestehen des Moduls und der Anrechnung von 6 CP ist die Teilnahme an Vorlesung und des zugeordneten Seminars notwendig. Prüfungsleistung wird in Form eines Projektbeleges und einer Zwischenabgabe erbracht.

In order to pass the module and to reach the credits of 6 CP the participation in lectures and the assigned seminar is necessary. Examination is in form of a Project report and an intermediate submission.

Voraussetzungen

Prüfungsleistung wird in Form eines Projektbeleges und Präsentation erbracht.

Examination is in form of a Project report and presentation.

Leistungsnachweis

1 written exam

”Geographical Information Systems (GIS) and building stock survey” / 90 min (100%) / **WiSe** + SuSe

1 written report

”Geographical Information Systems (GIS) and building stock survey” (Examination requirement) / **WiSe**

202005 Risk projects and evaluation of structures

J. Schwarz, L. Abrahamczyk, H. Maiwald, P. Hasan, A. Uzair, S. Beinersdorf Veranst. SWS: 4

Vorlesung

Mo, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 101, lecture
Di, wöch., 11:00 - 12:30, Marienstraße 7 B - Seminarraum 205, exercise

Beschreibung

Students will be familiar with the different risk elements in disaster mitigation studies and problems encountered in the design of buildings against earthquake and wind action. Students will be able to apply methods and current state in natural hazard and risk assessment integrating research and practical applications to urban settlements or structure-specific risk analysis and planning decisions. Students will be familiar with different analysis methods, knowledge-based techniques and tools of empirical and analytical vulnerability assessment. Students will be familiar with the existing building typologies and be able to evaluate the quality of structural systems, to interpret the performance under horizontal action. Students are encouraged to contribute reports of regionally particular building types to World Housing Encyclopedia and/or NHRE database (collection of world-wide case studies à wind or earthquake dominated design; tall & high-rise buildings à comparison of horizontal actions).

Methods for risk assessment of buildings and urban settlements (L)

Lessons from recent events (earthquake, wind, flood) and field missions; assessment of hazard phenomena; reinterpretation of observed response for different building types; building taxonomies; knowledge-based exposure modelling; empirical and analytical vulnerability assessment; damage classification and fragility functions; damage modelling for large building stocks (earthquake, wind, flood); social risk modelling; decision support systems for

OEF, EEW and RRE; building assessment criteria for existing and new building stock; assessment of structural performance under wind and earthquake.

Response estimate for disastrous events (E, P)

Training in risk scenarios: elaboration of input data for the target area (home countries), generation of shake maps; elaboration of fragility functions; generation of risk scenarios for testbeds or virtual cities and application of decision support system; simulation of mitigation measures.

Studies on Recent Natural Hazard Events (P)

Description and assessment of hazard phenomena; affected regions; building types; reinterpretation of observed damages for different building types; conclusions from rapid response actions; initiated/necessary mitigation measures (consequences of the event); recent developments in design and construction.

Voraussetzungen

B.Sc.

Seismic Monitoring / Earthquake Engineering

Leistungsnachweis

1 written exam ”Risk evaluation for buildings and urban settlements” 90 min (50%) / **WiSe** + SuSe

1 Project presentation (oral) ”Response estimate for disastrous and recent events” (35%) / **WiSe**

1 Project presentation (oral) ”Studies on Recent Natural Hazard Events” (15%) / **WiSe**

205014-2 Design and interpretation of experiments: Experiments in Structural Engineering

M. Kraus, S. Ibañez Sánchez Veranst. SWS: 2

Integrierte Vorlesung

Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal C, Experiments in structural engineering, 14.10.2025 - 02.12.2025
Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal C, Experiments in structural engineering, 09.12.2025 - 03.02.2026

Beschreibung

Students will be familiar with following: Design and setup as well as evaluation and interpretation of experimental testing in structural engineering. Provision of techniques linking experimental and mathematical / numerical modelling. Parallel assessment of steps being part of any verification and validation procedure. Discussion of common techniques of optimal experimental designs

Bemerkung

The course gives an overview on experiments and their evaluation regarding different tasks and scopes of structural engineering. Next to different testing techniques applied for diverse aims, the equipment and measuring devices employed for testing are treated as well.

Besides the experiment itself, it is an important question, how we can use the experimental data for the calibration and validation of models in engineering. In this course, we give insights to techniques called parameter and system identification.

As often signals are not useable directly, transforms are necessary, like filtering, Fourier Transform, Wavelet Transform and, in particular for signals with noise, averaging techniques. Having models at hand, the experiment can be designed virtually by means of nonlinear optimization.

Leistungsnachweis

1 written exam / 120 min / **WiSe** + SuSe including

”Experiments in Structural Engineering” and

”Signal Processing, Design of Experiments and System Identification”

906023 Advanced geotechnical engineering

P. Staubach, G. Aselmeyer, C. Rodríguez Lugo Veranst. SWS: 4
Integrierte Vorlesung
Mo, wöch., 13:30 - 15:00, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202
Di, wöch., 09:15 - 10:45, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202

Beschreibung

This module aims to enhance students' skills in managing geotechnical risks posed by natural hazards such as earthquakes and heavy rainfall. Students will learn advanced techniques for investigating and monitoring potentially unstable soil and rock masses. They will deepen their understanding of slope stability analysis under both static and seismic conditions and become proficient in methods of geotechnical earthquake engineering to assess the risk of geotechnical failure due to seismic events. Students will also gain the ability to study slope stability using the finite element method. Additionally, they will learn various slope stabilization methods and soil improvement techniques to mitigate risks from natural hazards. An engineering-geological aim is to identify various natural discontinuity planes in a rock mass and their properties to independently assess their impact on the stability of slopes and embankments. The theoretical knowledge gained will be applied in a project work.

Bemerkung

Different methods of slope stability analysis in cases of static and seismic loading (pseudo-static method, Newmark sliding block analysis); Slope investigation and monitoring; Slope stabilization methods; Analysis of slope stability by means of the finite element method; Seismic design of retaining structures; Soil improvement techniques; Seismic ground response analysis; Stability of rock masses

Voraussetzungen

Geo- and hydrotechnical Engineering (Soil Mechanics)

Leistungsnachweis

1 Project report

”Advanced geotechnical engineering” (33%) / **WiSe**

1 written exam

”Advanced geotechnical engineering”/ 90 min (67%) / **WiSe** + SuSe

204019 Life-lines engineering (Exercise)

G. Morgenthal, S. Chawdhury, G. Tondo, I. Kavrakov Veranst. SWS: 2
Seminar
Do, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal C, 16.10.2025 - 04.12.2025
Do, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal C, 11.12.2025 - 05.02.2026

Beschreibung

Training in:

Structural modelling and Finite Element Analysis; design of post-tensioning systems in bridges; design and detailing of girders and piers; seismic response; wind response, analysis of cable stayed bridges

204034 Analysis and Design of Concrete Structures

G. Morgenthal, S. Chawdhury, G. Tondo Veranst. SWS: 4

Integrierte Vorlesung

Fr, wöch., 09:15 - 12:30, LectureRoom LH B M13C* dates by arrangementTime schedule will be announced by the responsible lecturers. Lecture shares time slot with lecture Structural engineering / Wind Engineering.
Fr, wöch., 13:30 - 16:45, ExerciseRoom H BH11 / Audimax St6 (see the announcements by the lecturers)* dates by arrangementTime schedule will be announced by the responsible lecturers. Exercise shares time slot with lecture Structural engineering / Wind Engineering.

Beschreibung

Students will be familiar with the history of structures and structural forms, with building materials and building methods. They will understand the concepts of structural engineering design, including safety concepts, loads and structural design codes. They will be able to convert a structural concept into a mechanical model to determine internal demand and to design and detail the components of the structure, with an emphasis on reinforced concrete as well as steel and steel-concrete composite structures.

Content: History of structures; building materials; structural form and structural behaviour; actions on structures; structural reliability and codes of practice; mechanical modelling of structures; design of reinforced concrete structures

Bemerkung

This module is comprised of:

”Analysis and Design of Reinforced Concrete Structures” (Lecture, 2 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Exercise, 1 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Project, 1 SWS)

Voraussetzungen

B.Sc.

Leistungsnachweis

Written exam (60%),

Project (40%)

205007 Modelling of steel structures and numerical simulation (L + E)

M. Kraus, S. Ibañez Sánchez, S. Chowdhury Veranst. SWS: 4

Vorlesung

Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 22.10.2025 - 22.10.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 12.11.2025 - 12.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 26.11.2025 - 26.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 10.12.2025 - 10.12.2025
Di, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Lecture, ab 06.01.2026
Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Exercise, ab 07.01.2026

Beschreibung

The students will be familiar with skills and expertise in the field of nonlinear structural analyses. Extensive knowledge of theoretical basics and modern modelling methods, including numerical representations are the aim of the course. The students will acquire skills in handling advanced tools for the analysis and the design of structures.

Design of steel structures using finite element methods; basics of the design; modelling of structures and loads; nonlinear material behaviour, numerical analyses of steel-members and structures regarding geometric and physical nonlinearities; stability behaviour of members including flexural and lateral torsional buckling

Voraussetzungen

B.Sc.

Mechanics

Leistungsnachweis

1 Project report

”Modelling of steel structures and numerical simulation” (0%) / **WiSe**

1 written exam

”Modelling of steel structures and numerical simulation”/ 120 min (100%) / **WiSe** + SuSe

205032 Structural engineering – Reinforced and post-tensioned concrete structures (Exercise)

G. Morgenthal, S. Chawdhury, I. Kavrakov, S. Rau, C. Taube, G. Tondo Veranst. SWS: 1

Seminar

1-Gruppe Fr, wöch., 13:30 - 16:45, Bauhausstraße 11 - R 015, Group 1 dates by arrangement
2-Gruppe Fr, Einzel, 13:30 - 16:45, Marienstraße 13 C - Hörsaal C, Group 2 dates by arrangement, 21.11.2025 - 21.11.2025
2-Gruppe Fr, wöch., 13:30 - 16:45, Steubenstraße 6, Haus F - Hörsaal K20, Group 2 dates by arrangement

205032 Structural engineering – Reinforced and post-tensioned concrete structures (Lecture)

G. Morgenthal, S. Chawdhury, I. Kavrakov, S. Rau, G. Tondo Veranst. SWS: 2

Vorlesung

Fr, wöch., 09:15 - 12:30, Marienstraße 13 C - Hörsaal B, dates by arrangement

Beschreibung

Structural Engineering – Standard systems:

History of structures; building materials; structural form and structural behavior; actions on structures; structural reliability and codes of practice; mechanical modelling of structures; design of reinforced concrete and steel structures

Leistungsnachweis

2 written exams

”Reinforced and post-tensioned concrete structures” / 90 min (50%) / **WiSe** + SuSe

”Steel structures” / 90 min (50%) / **SuSe** + WiSe

2301012-2 Mathematics for risk management (MBM) - Exercices

T. Lahmer, Z. Jaouadi Veranst. SWS: 1
Übung
Fr, unger. Wo, 07:30 - 09:00, ab 17.10.2025

253001 Structural design and performance assessment (for extreme loading conditions)

L. Abrahamczyk, H. Maiwald, J. Schwarz, P. Hasan, A. Uzair, S. Beinersdorf Veranst. SWS: 6
Vorlesung
Di, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 205, Lecture *dates by arrangement
Do, wöch., 09:15 - 12:30, Marienstraße 7 B - Seminarraum 205, Lecture / Exercise
Do, wöch., 09:15 - 12:30, Marienstraße 7 B - Projektraum 301, Lecture / Exercise

Beschreibung

Students will acquire knowledge of methods for structural performance assessment, compliance criteria, and design principles for masonry building types. They will develop the ability to evaluate the quality of masonry structures, interpret the seismic performance under horizontal actions, derive suitable analytical models, and determine the applicability of equivalent or simplified modelling approaches. The course introduces students to equivalent frame modelling, both local and global out-of-plane failure mechanisms, and the theoretical foundations of seismic design and assessment according to Eurocode 6 and 8.

In addition, students will be introduced to ongoing research projects and recent developments that are directly linked to the course topics, including opportunities for further academic qualification (e.g., master's thesis). The course aims to strengthen students' capacity to apply methods reflecting the current state of practice in the assessment of masonry structures. They will learn to use modern software tools to transform buildings into dynamic models and to evaluate their seismic response characteristics. Depending on the design situation and performance-based requirements, students will be guided to identify design deficiencies and to assess the adequacy of strengthening measures.

Structural design and performance assessment – Masonry structures (L)

URM in seismic regions, failure mechanism, modelling techniques, equivalent frame method; Nonlinear constitutive relationships, failure mode interaction, correlation to observed damages; Basics of masonry design (EN1996), code requirements and calculation examples; Simple masonry buildings (EN1998), design rules, evaluation criteria and calculation examples; Out of plane collapse, flange effect, irregular openings, limitations of the equivalent frame method; Assessment of dynamic soil-structure interaction; Evaluation of existing structures - strengthening (EN 1998-3).

Earthquake Performance Assessment of Unreinforced Masonry Structures – (E, P)

Advanced modelling techniques for nonlinear analysis and earthquake performance evaluation of unreinforced masonry (URM) structures; determination of building capacity and corresponding performance objectives for different seismic acceleration levels; performing of a detailed damage prognosis; comparison with existing building type specific fragility functions.

Language Coaching

The course will be taught bilingually (German and English). Parallel German language coaching is offered by the Bauhaus-Universität Weimar Language Centre. The language component is not part of the course evaluation.

Leistungsnachweis

1 Project report (written report + oral presentation) 100% / **WiSe**

2909020 Macroscopic Transport Modelling

K. McFarland, L. Thiebes, U. Plank-Wiedenbeck, J. Uhlmann Veranst. SWS: 4
Integrierte Vorlesung
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Projektraum 302
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - PC-Pool Luna-red

Beschreibung

Part A: Principles in Transport Modelling
We will consider the transport modelling framework, incl. methodologies, procedures, data-requirements (e.g. land-use-data, behavioral data, opertional and network data). The standard 4-step modelling approach and related methods and algorithms will be discussed.
Part B: Transport Model Development
We get known both sides of transport modelling - demand side (passenger) and supply side (e.g. network, transport modes). Modelling from infrastructure modelling, traffic generation, traffic destinations, mode choice and route choice calculation methods are considered
Part C: Transport Model Quality
The value of a transport model is determined by its quality. Quality evaluation is based on model validation and calibration. Which are suitable empirical data (e.g. meaning of traffic counts) and how can they be used for quality evaluation?
Part D: Transport Model Application
We discuss the meaning of transport models for other disciplines like transport planning. Within selected use cases model setup and configuration are considered according to different planning tasks.
Part E: Practical Exercises
Practical exercises on transport modelling are provided in parallel to the lectures. Within these guided exercixes macroscopic transport modelling software (PTV Visum) will be appllied. Application of learned methodological approach(es) and critical reflection of the model outputs.Perspectives in transport modelling. Student presentation.

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bestätigung der Professur Verkehrssystemplanung notwendig

Bewerbung bis 14.10.2025 ausschließlich per Mail an vsp@bauing.uni-weimar.de. Bitte kurz den fachlichen Hintergrund und die Motivation für die Kursteilnahme schildern.

Notwendig: Vorkenntnisse in der Modellierung/ Simulation und Verkehrsplanung und-technik. **Sollten keine Vorkenntnisse im Bereich der Verkehrsplanung vorliegen muss zuerst der Kurs "International Case Studies in Transportation" belegt werden.**

Leistungsnachweis

Part 1: based on section E

Project work and presentation, english, 50%

IMPORTANT: Submission of the project is a prerequsite for participation in exam.

Part 2: based on sections A, B, C, D:

Written exam (120 Min), english, 50%

301012-1 Applied mathematics (Lecture)

B. Rüffer, N. Gorban Veranst. SWS: 2
Vorlesung
Mo, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal D

Beschreibung

Applied mathematics:

Fundamentals of linear algebra, eigenvalue problems, fixed point principles, solvers; Fourier series, convergence, Fourier transform, Laplace transform; Solution of initial value problems, boundary value problems and eigenvalue problems for ordinary differential equations; All topics are discussed from the mathematical point of view and their implementation will be studied.

Leistungsnachweis

1 written exam

”Applied mathematics and stochastics for risk assessment” / 180 min (100%) / **WiSe** + SuSe

301012-2 Applied mathematics (Exercise)

B. Rüffer, N. Gorban Veranst. SWS: 1

Seminar

1-Gruppe Do, gerade Wo, 15:15 - 16:45, Coudraystraße 13 B - Seminarraum 210, Group 1
2-Gruppe Do, unger. Wo, 15:15 - 16:45, Marienstraße 13 C - Hörsaal D, Group 2

Beschreibung

Applied mathematics:

Fundamentals of linear algebra, eigenvalue problems, fixed point principles, solvers; Fourier series, convergence, Fourier transform, Laplace transform; Solution of initial value problems, boundary value problems and eigenvalue problems for ordinary differential equations; All topics are discussed from the mathematical point of view and their implementation will be studied.

Leistungsnachweis

1 written exam

”Applied mathematics and stochastics for risk assessment” / 180 min (100%) / **WiSe** + SuSe

301012-3 Stochastics for risk assessment (Lecture) / Mathematics for risk management (MBM)

T. Lahmer, Z. Jaouadi, R. Das, N. Hazrati Veranst. SWS: 2

Vorlesung

Di, wöch., 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

Stochastics for risk assessment:

Introduction to probability theory with focus on situations characterized by low probabilities. Random events, discrete and continuous random variables and associated distributions. Descriptive statistics, parameter estimation. Risk Assessment by means of FORM and Monte Carlo Simulations. Introduction to reliability theory: Extreme value distributions; stochastic modeling with software tools e.g. MATLAB, Octave, Excel, R. Reliability Analysis of Systems. Catastrophic events + risk problems, Applications

Leistungsnachweis

1 written exam

”Applied mathematics and stochastics for risk assessment” / 180 min (100%) / **WiSe** + SuSe

301012-4 Stochastics for risk assessment / Mathematics for risk management (MBM) (Exercise)

T. Lahmer, Z. Jaouadi, R. Das, N. Hazrati Veranst. SWS: 1

Seminar

1-Gruppe Do, unger. Wo, 15:15 - 16:45, Coudraystraße 13 B - Seminarraum 210, Exercise for NHRE (Group 1) and DE
1-Gruppe Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium for NHRE (Group 1) and DE
2-Gruppe Do, gerade Wo, 15:15 - 16:45, Marienstraße 13 C - Hörsaal D, Exercise for NHRE (Group 2)
2-Gruppe Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 206, Tutorium for NHRE (Group 2) and DE

Beschreibung

Stochastics for risk assessment:

Introduction to probability theory with focus on situations characterized by low probabilities. Random events, discrete and continuous random variables and associated distributions. Descriptive statistics, parameter estimation. Risk Assessment by means of FORM and Monte Carlo Simulations. Introduction to reliability theory: Extreme value distributions; stochastic modeling with software tools e.g. MATLAB, Octave, Excel, R. Reliability Analysis of Systems. Catastrophic events + risk problems, Applications

Leistungsnachweis

1 written exam

”Applied mathematics and stochastics for risk assessment” / 180 min (100%) / **WiSe** + SuSe

303005 Object-oriented Modeling and Programming in Engineering

C. Koch, M. Artus Veranst. SWS: 4

Vorlesung

1-Gruppe Di, wöch., 15:15 - 16:45, Marienstraße 7 B - Projektraum 301, ExerciseNHRE
3-Gruppe Fr, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, ExerciseDEM
4-Gruppe Fr, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, ExerciseDEM
Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 B - Hörsaal 3, 17.10.2025 - 17.10.2025
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, lecture

Beschreibung

Objektorientierte Modellierung und Programmierung für Ingenieure

In diesem Modul wird fundamentales Wissen vermittelt, um objektorientierte Softwarelösungen für Ingenieuraufgaben zu konzipieren und zu implementieren. Dies beinhaltet Fähigkeiten zur Analyse von Ingenieurproblemen, um entsprechende objektorientierte Modelle zu erzeugen und geeignete Algorithmen auszuwählen. Die verwendete Programmiersprache ist Java. Da die Basiskonzepte allgemeingültig beschrieben werden, werden die Studierenden in die Lage versetzt, auch andere modernen Programmiersprachen zu einzusetzen.

Inhalte:

- Kontrollstrukturen (alternatives, loops, sequences)
- Grundlegende Datenstrukturen und Algorithmen
- Prinzipien der objektorientierten Softwareentwicklung (Datenkapselung, Vererbung, Polymorphie)
- Unified Modeling Language als Werkzeug für Softwareentwurf und –dokumentation
- Entwicklung grafischer Nutzerschnittstellen mithilfe des Model-View-Controller-Entwurfsmusters

engl. Beschreibung

Object-oriented Modeling and Programming in Engineering

This module covers the basic knowledge needed to develop and implement object-oriented software solutions for engineering problems. This includes the ability to analyse an engineering problem, so that corresponding object-oriented models can be created and suitable algorithms can be selected. The programming language used in this module is Java. However, the since fundamental concepts are described in general, students will be able to program in other modern programming languages.

Content:

- Essential programming constructs (alternatives, loops, sequences)
- Fundamental data structures and algorithms
- Principles of object oriented software development (encapsulation, inheritance and polymorphism)
- The Unified Modeling Language as a tool for software design and documentation

Development of graphical user interfaces using the Model-View-Controller pattern

Leistungsnachweis

schriftliche Klausur

1 written exam

”Object-oriented Modeling and Programming in Engineering”

120min (100%) / **WiSe** + SuSe

303013 Collaboration in BIM projects

L. Abrahamczyk, O. Kammler, C. Koch, S. Schneider Veranst. SWS: 2
Vorlesung
Mi, wöch., 17:00 - 18:30

Beschreibung

Adopting BIM means establishing a continuous flow of information, as with BIM, information is collected digitally to be available when it is needed, wherever it is needed, during every phase of the building process. Students will be familiar with well-structured workflows, multidisciplinary collaboration processes, defined standards, open workflows and model-centred communication. They will be informed that collaborative working brings significant project benefits. BIM collaborative approach advantages are elaborated and trained such as: possibility for each professional to use the best software solutions for their specific discipline without any risk of incompatibility or loss of data; workflows integration; reduction of errors caused by lack of coordination and updating; complete accessibility to data contained in the BIM model; information sharing, verification, review and validation. Students should be able to apply the BIM collaborative approach on a simple example. Students get introduced to Revit Software. Students will be trained the principles and application of BIM workflow, as well as the accomplishment of a project among an interdisciplinary team.

Students will

- gain proficiency in working with BIM software tools commonly used in the industry (create, edit, and manage 3D models, generate drawings, perform clash detection, and extract data from BIM models);
- acquire competences in managing and integrating data within the BIM environment;
- learn how to collaborate effectively within multidisciplinary teams and coordinate information across different stakeholders in a BIM project;
- develop skills in creating comprehensive project documentation using BIM, including drawings, schedules, reports, and presentations.

Collaboration in BIM projects (P, L)

Concepts of Building Information Modelling: Introduction, terminology, reference standards, technical specifications and guidelines; BIM roles for architects, engineers, construction and facility management; BIM execution plan: workflows, information requirements, integrated project delivery, common data environment, modelling and visualization, management of incompatibilities; BIM tools and platforms: concepts of platform and tools, interoperability, IFC format.

Students will develop a design proposal for a pre-defined purpose (e.g. pavilion) as a team of architecture, structural engineer and management students to hands on train BIM collaborative approach

The course will start on 22nd of October. Unfortunately, we can only accommodate a limited number of participants. Therefore, please send an **enrolment request and an e-mail to lars.abrahamczyk@uni-weimar.de till 15th of October**. We will send the final admissions by 17th of October.

Leistungsnachweis

1 Group project presentation (oral) ”Collaboration in BIM projects” (60%) / **WiSe**

1 Group project report: „Collaboration in BIM projects” (40%) / **WiSe**

325230027 Robotic Tectonics III – Roboterbasierte Lehr- und Lernumgebung für automatisierte Bauprozesse

J. Willmann, L. Abrahamczyk, M. Braun, M. Haweyou, KuG Veranst. SWS: 2
Wissenschaftsmodul
Fr, wöch., 11:00 - 12:30, Raum: D-LAB (Geschwister-Scholl-Straße 13), 24.10.2025 - 06.02.2026

Beschreibung

Die Veranstaltung findet auf Englisch statt. Über die Sprachumschaltflagge (oben rechts) gelangen Sie zur englischsprachigen Beschreibung.

Bemerkung

Bitte beachten Sie die entsprechende Studienordnung.

Leistungsnachweis

Voraussetzungen für das Bestehen der Lehrveranstaltung sind a) die regelmäßige und aktive Teilnahme an den Sitzungen (mind. 80%); b) die Erarbeitung und Abhaltung eines eigenen Referats; und c) das Einreichen einer Hausarbeit zum Semesterende mit positiver Benotung

401011 Applied structural dynamics

A. Athanasiou Veranst. SWS: 2
Vorlesung
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D

Beschreibung

Appl. SD (winter semester): The students will be introduced to the theory of structural dynamics and apply such theory to solve problems occurring in engineering practice. In particular, the students shall: (i) learn how to formulate the dynamic equilibrium of idealised structural systems, (ii) implement analytical and numerical methods for dynamic response simulations under earthquake and wind excitation, and (iii) predict and evaluate the performance of single- and multi- story buildings in seismic and wind environments, excited in the linear and nonlinear range of response.

Course content:

free and forced vibrations, dynamic equilibrium, analytical and numerical solutions, modal analysis, response spectrum, vibration of buildings under earthquake and wind excitation, seismic response of linear and nonlinear systems, dynamic wind response simulation, comprehensive and realistic in-class examples.

Leistungsnachweis

1 midterm exam (written or oral) (30 min, 30%)**, 1 final written exam** ”Applied structural dynamics” (40 min, 40%)**, 25% assignments, 5% in class quizzes/activities** / **WiSe** + SuSe

401014-1 Structural Dynamics (Lecture)

T. Most Veranst. SWS: 2

Vorlesung

Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, * dates by arrangement

Beschreibung

Structural Dynamics: (50% of semester course time)

- SDOF systems:

- free vibrations, harmonic, impulse and general excitation for undamped and damped systems,
- Impulse response function, frequency response function, base excitation,
- Time step analysis: Duhamel integral, central difference and Newmark methods;

- MDOF systems: modal analysis, modal superposition, modal damping, Rayleigh damping, Frequency response functions

- Continuous systems

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: ”Structural dynamics” /

90 min (50%) / **WiSe** + SuSe

1 written report: ”Numerical dynamic analysis of MDOF systems”

(Examination requirement for ”Structural dynamics”) / **WiSe**

401014-2 Structural Dynamics (Exercise)

T. Most, R. Das Veranst. SWS: 1

Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group 1
1-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 206, Tutorium - Group 1
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group 2
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 104, Tutorium - Group 2
Di, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 103

Bemerkung

- Complementary to the lectures

401015-1 Finite element methods (Lecture)

S. Kollmannsberger, J. Wagner Veranst. SWS: 2
Vorlesung
Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, dates by arrangement

Beschreibung

Finite element methods: (50% of semester course time)

strong and weak form of equilibrium equations in structural mechanics, Ritz and Galerkin principles, shape functions for 1D, 2D, 3D elements, stiffness matrix, numerical integration, Characteristics of stiffness matrices, solution methods for linear equation systems, post-processing and error estimates, defects of displacements based formulation, mixed finite element approaches,

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: ”Finite element methods” /

90 min (50%) / **WiSe** + SuSe

401015-2 Finite element methods (Exercise)

S. Kollmannsberger, J. Lopez Zermeño, L. Nguyen Tuan Veranst. SWS: 1
Seminar
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium - Group 1
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium - Group 2
Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal B, Group 1

903006/01 Infrastructure planning in developing countries

E. Kraft, T. Haupt, I. Lange Veranst. SWS: 2
Integrierte Vorlesung
Mi, wöch., 09:15 - 10:45, Coudraystraße 11 C - Seminarraum/Hörsaal 001, Die Vorlesung am 05.11.2025 findet im R101 Goetheplatz 7/8 statt.

Beschreibung

The course increases the knowledge and understanding for differing cultural and economic circumstances or boundary conditions when planning new infrastructure solutions in an international context. Students will learn how to identify structural problems and adapt technical solutions to local settings. Special attention is directed on the ability to balance the economic feasibility versus the ecological necessity of a project when developing new infrastructural solutions. Altogether the course provides insight into environmental, economic as well as socio-cultural conditions and prerequisites in non-industrialized societies. Suitable technical solutions specifically developed for local requirements are being presented and investigated. Special focus is laid on:

- Planning processes,
- Waste amounts and composition,
- Waste management organization,

- Refinancing models,
- Socio-economic setting,
- Working in developing countries,
- Technical solutions for the collection, transport and treatment of waste streams,
- Innovative and/or low cost sanitation systems,
- Treatment and reuse of black, brown, yellow, grey and rainwater.

Leistungsnachweis

Written exam and voucher

904002 Geographical information systems (GIS) and building stock survey (Exercise/Project)

S. Beinersdorf, J. Schwarz, H. Maiwald Veranst. SWS: 3

Seminar

1-Gruppe Mo, wöch., 13:30 - 15:00, Marienstraße 7 B - Seminarraum 102, Group A
1-Gruppe Mo, wöch., 13:30 - 15:00, Coudraystraße 11 C - Pool-Raum 101, Group A
2-Gruppe Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal D, Group B+C
2-Gruppe Di, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Group B+C

Beschreibung

Training in:

Coordinate systems; global maps for the natural hazard phenomena; quality and availability of input data; layers for natural hazard related parameters (topography, geology, and subsoil); reproduction of historical events and associated parameters; layers for risk assessment and loss estimation procedures; link between layers and risk mapping procedures. In parallel, necessary foundations in scientific working are taught and trained.

Bemerkung

We will start at 21.10.2024 with the exercises.

Leistungsnachweis

1 written exam

”Geographical Information Systems (GIS) and building stock survey” / 90 min (100%) / **WiSe** + SuSe

1 written report

”Geographical Information Systems (GIS) and building stock survey” (Examination requirement) / **WiSe**