Vorlesungsverzeichnis

M.Sc. Natural hazards and risk in structural engineering

WiSe 2021/22

Stand 17.09.2021

M.Sc. Natural hazards and risk in structural engineering

Applied mathematics and stochastics for risk assessment

2301012-1 Applied mathematics (Lecture)

S. Bock, A. Legatiuk, K. Gürlebeck Veranst. SWS: 2
Vorlesung
Di, wöch., 17:00 - 18:30, Coudraystraße 13 B - Hörsaal 3, Digital (Main), ab 12.10.2021

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 in MAPLE will be studied. :

Leistungsnachweis

1 written exam

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

2301012-2 Stochastics for risk assessment (Lecture) / Mathematics for risk management (MBM)

T. Lahmer Veranst. SWS: 2
Vorlesung
1-Gruppe Fr, wöch., 07:30 - 09:00, Tutorium for NHRE (Group 1) and DE
2-Gruppe Fr, wöch., 07:30 - 09:00, Tutorium for NHRE (Group 2)
Di, wöch., 11:00 - 13:30, Coudraystraße 13 B - Hörsaal 3, Prof. Lahmer Lecture in combination with BBB (digital), ab 12.10.2021

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

2301012 Applied mathematics & Stochastics (Exercise)

T. Lahmer, N. Butler, Z. Jaouadi, A. Legatiuk, S. Marwitz Veranst. SWS: 2
Seminar
1-Gruppe Mo, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal A, Digital (Main), 11.10.2021 - 31.01.2022
2-Gruppe Mo, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal B, 11.10.2021 - 31.01.2022
4-Gruppe Mi, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2, Especially for NHRE 3rd and upper semesters!, ab 13.10.2021

Disaster management and mitigation strategies

2901005 Project- and Disaster Management

H. Bargstädt, B. Bode Veranst. SWS: 3
Integrierte Vorlesung
Fr, Einzel, 15:15 - 18:30, Marienstraße 13 C - Hörsaal A, 21.01.2022 - 21.01.2022
Sa, Einzel, 09:15 - 15:00, Marienstraße 13 C - Hörsaal A, 22.01.2022 - 22.01.2022
So, Einzel, 09:00 - 12:30, Marienstraße 13 C - Hörsaal A, 23.01.2022 - 23.01.2022
Fr, wöch., 11:00 - 12:30, Digital (BBB)

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 "Postwar cities"

Bemerkung

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

Part "Mitigation strategies" --> see lecture "Postwar cities"

Leistungsnachweis

1 written exam

”Project and disaster management ”/ 120 min

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

1 Presentation + presentation paper

”Urban Sociology” (50%) / **WiSe**

724415 Urban Sociology

H. Bargstädt, B. Bode, S. Beinersdorf Veranst. SWS: 2
Integrierte Vorlesung
Mo, wöch., 17:00 - 18:30, Coudraystraße 13 B - Hörsaal 3, Digital (BBB)

engl. Beschreibung/ Kurzkommentar

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

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

Leistungsnachweis

1 written exam (digitial)

”Project and disaster management ”/ 120 min

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

1 Project report (digital)

”Urban Sociology” (50%) / **WiSe**

Earthquake engineering and structural design

Finite element methods and structural dynamics

2401015 Finite element methods (Lecture)

T. Rabczuk
Vorlesung
Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, bis 01.12.2021
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, bis 02.12.2021

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: „Fundamentals of finite element methods”/ 90 min (50%)

2401015 Finite element methods (Exercise)

T. Rabczuk, M. Bianco, A. Habtemariam, F. Tartaglione Garcia Veranst. SWS: 1
Seminar
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Tutorium - Group A, bis 01.12.2021
1-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), bis 02.12.2021
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Tutorium - Group B, bis 01.12.2021
2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Group B (Group C + Group D), bis 02.12.2021
3-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Hörsaal 3, Tutorium - Group C, bis 30.11.2021
4-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Pool Fak. B 007, Tutorium - Group D, bis 30.11.2021

2401014 Structural Dynamics (Lecture)

V. Zabel Veranst. SWS: 2
Vorlesung
Di, wöch., 15:15 - 16:45, Coudraystraße 13 A - Hörsaal 2, bis 30.11.2021
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, bis 01.12.2021

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: „Fundamentals of structural dynamics”/ 90 min (50%)

2401014 Structural Dynamics (Exercise)

V. Zabel, F. Tartaglione Garcia Veranst. SWS: 1

Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, Tutorium - Group A, bis 30.11.2021
1-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), bis 02.12.2021
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group B, bis 30.11.2021
2-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D), bis 02.12.2021
3-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Tutorium - Group C, bis 01.12.2021
4-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group D, bis 01.12.2021

Bemerkung

- Complementary to the lectures

Geo- and hydrotechnical engineering

Geographical Information Systems (GIS) and building stock survey

2904002 Geographical information systems (GIS) and building stock survey (Lecture)

V. Rodehorst Veranst. SWS: 1

Integrierte Vorlesung

Mo, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal B, Digital via BBB, ab 11.10.2021

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).

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.

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 intermediate evaluation + **written report**

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

2904002 Geographical information systems (GIS) and building stock survey (Exercise/Project)

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

1-Gruppe Mo, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal B, Group A, ab 11.10.2021
2-Gruppe Di, wöch., 09:15 - 10:45, Coudraystraße 13 B - Hörsaal 3, Group B, ab 12.10.2021

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.

Leistungsnachweis

1 intermediate evaluation + **written report**

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

Life-lines engineering

2204019 Life-lines engineering (Lecture)

G. Morgenthal, S. Chawdhury, T. Abbas, I. Kavrakov Veranst. SWS: 4
Integrierte Vorlesung
Do, wöch., 13:30 - 16:45, Coudraystraße 13 A - Hörsaal 2, Seminarroom 1+2 Weimarhalle / Digital via BBB

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

2204019 Life-lines engineering (Exercise)

G. Morgenthal, S. Chawdhury, I. Kavrakov Veranst. SWS: 2
Seminar
1-Gruppe Do, wöch., 17:00 - 18:30, Coudraystraße 13 A - Hörsaal 2, Group 1 (Group A + Group B)
1-Gruppe Do, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 302, Group 1 (Group A + Group B)
2-Gruppe Do, wöch., 17:00 - 18:30, Coudraystraße 13 B - Hörsaal 3, Group 2 (Group C + Group D) LH D + Digital via BBB
2-Gruppe Do, wöch., 17:00 - 18:30, Coudraystraße 13 B - Pool Fak. B 007, Group 2 (Group C + Group D) LH D + Digital via BBB

Beschreibung
Design and construction of bridges in earthquake endangered regions, seismic design philosophies for bridges, specifics of seismic loads on bridges, possibilities and application of seisimic isolation, experimental results, consideration of a simply supported bridge with different mechanical characeristics on a real earthquake record

Leistungsnachweis
Klausur oder mündliche Prüfung

Primary hazards and risks

2202001 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 13 B - Pool Fak. B 007, Group 1 (A + B) - Regional ground motion, ab 19.10.2021
3-Gruppe Mo, wöch., 15:15 - 16:45, Marienstraße 7 B - Projektraum 301, Group B - Regional ground motion, ab 18.10.2021
4-Gruppe Do, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Group D - Regional ground motion, ab 21.10.2021
Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal B, Seismic monitoring

Beschreibung

Seismic Monitoring:

Description of seismic action; recording instruments, input parameters for seismic hazard assessment; EQ-Action for building design; Measurements for site response evaluation; 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; 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; site categorization and response studies.

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

2204017 Wind Engineering

G. Morgenthal, I. Kavrakov, T. Abbas, S. Beinersdorf Veranst. SWS: 2

Integrierte Vorlesung

Mo, Einzel, 09:00 - 16:45, Marienstraße 13 C - Hörsaal B, , 28.02.2022 - 28.02.2022
Di, Einzel, 09:00 - 16:45, Marienstraße 13 C - Hörsaal B, 01.03.2022 - 01.03.2022
Mi, Einzel, 09:00 - 16:45, Marienstraße 13 C - Hörsaal B, 02.03.2022 - 02.03.2022
Do, Einzel, 09:00 - 16:45, Marienstraße 13 C - Hörsaal B, 03.03.2022 - 03.03.2022
Fr, Einzel, 09:00 - 12:30, Marienstraße 13 C - Hörsaal B, 04.03.2022 - 04.03.2022

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

Structural engineering

2205012 Structural engineering – Standard systems (Lecture)

G. Morgenthal, S. Rau, S. Chawdhury, I. Kavrakov Veranst. SWS: 2
Vorlesung
Fr, wöch., 09:15 - 12:30, Marienstraße 13 C - Hörsaal D, 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

”Standard systems” / 90 min (50%) / **WiSe** + SuSe

”Advanced systems” / 90 min (50%) / **SuSe** + WiSe

2205012 Structural enginering – Standard systems (Exercise)

G. Morgenthal, S. Rau, C. Taube, S. Chawdhury, I. Kavrakov Veranst. SWS: 1
Seminar
1-Gruppe Fr, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B) dates by arrangement
2-Gruppe Fr, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D) dates by arrangement

Structural parameter survey and evaluation

Special Project

NHM17-50(Special Project (Introduction)

S. Beinersdorf
Projekt
Do, Einzel, 11:00 - 12:30, Digital via BBB Introduction to SP, 07.10.2021 - 07.10.2021

Beschreibung

Introduction to Special projects in **LH 6, C9A**

Elective compulsory modules

2401012 Applied Finite element methods (Lecture)

T. Rabczuk Veranst. SWS: 2
Vorlesung
Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, ab 08.12.2021

Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, ab 09.12.2021

2401012 Applied Finite element methods (Exercise)

T. Rabczuk, M. Bianco, A. Habtemariam, F. Tartaglione Garcia Veranst. SWS: 1

Seminar

1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Tutorium Group A, ab 08.12.2021
1-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), ab 09.12.2021
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Tutorium Group B, ab 08.12.2021
2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D), ab 09.12.2021
3-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Hörsaal 3, Tutorium Group C, ab 07.12.2021
4-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Pool Fak. B 007, Tutorium Group D, ab 07.12.2021

2401011 Applied Structural Dynamics (Lecture)

V. Zabel Veranst. SWS: 2

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 13 A - Hörsaal 2, ab 07.12.2021
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, ab 08.12.2021

Beschreibung

- Machinery induced vibrations
- Earthquake excitation
- Wind induced vibrations
- Human induced vibrations

2401011 Applied Structural Dynamics (Exercise)

V. Zabel, F. Tartaglione Garcia Veranst. SWS: 1

Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, Tutorium Group A, ab 07.12.2021
1-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), ab 09.12.2021
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium Group B, ab 07.12.2021
2-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D), ab 09.12.2021
3-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Tutorium Group C, ab 08.12.2021
4-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium Group D, ab 08.12.2021

Bemerkung

- Complementary to the lectures

2202011 Assessment of structural performance (under extreme loading conditions)

J. Schwarz, L. Abrahamczyk, S. Beinersdorf, H. Maiwald, P. Hasan, A. Uzair Veranst. SWS: 6

Vorlesung

Mo, wöch., 15:15 - 16:45, Coudraystraße 13 B - Hörsaal 3, Lecture
Di, wöch., 11:00 - 12:30, Coudraystraße 11 C - Seminarraum/Hörsaal 001, Exercise

Beschreibung

Students will be familiar with the existing building typologies, the methods of structural performance assessment and design rules for traditional and engineered building types. Examples of different small to large scale testing and the instrumentation requirements are elaborated to provide structure related parameters and characteristic force-displacement relationships in support of analytical studies and the re-interpretation of damage patterns. Students should be able to evaluate the quality of structural systems, to interpret the performance of masonry and steel structures under horizontal action, to derive appropriate models and to decide upon the applicability of equivalent or simplified ones. Students will be informed about on-going research projects and recent code developments which are linked to the course topics and options for further graduation (master thesis).

Bemerkung

Structural performance of traditional and engineered building types (L)

Examples of small and larger scale testing; facilities and technical equipment; demands on specimens and scaling requirements; application of equivalent forces and ground motion in pseudo-static and dynamic testing; load and displacement relationship for full-scale testing of structural elements and building configurations; prediction of capacity curves and material properties and parameters; design principles and structural solutions for traditional (masonry) and engineered (steel) type structures, basic rules for non-engineered buildings (with locally available materials).

Elaboration of structural models for performance assessment of existing buildings (P)

Search for typical building representatives of the target regions (home countries of the participants); experimental investigation of design and retrofitting strategies using small-scale structural models; testing of elements and interpretation of failure mechanisms, derivation of structural layout and simplified models of representative building types, damage prognosis and comparison with observed response; fragility functions; introduction in data processing for simulation tools, a.o.3MURI

Small Scale testing (E)

For the target masonry building of the project, a representative small scale model has to be developed following the scaling requirements as well the demands and limitations on specimens and size of testing platform. A real model for testing has to prepared using a set of small stone units and wooden elements. The model will be shaken using existing facilities. [Note: The realization and final testing depend on the pandemic situation.]

Leistungsnachweis

1 Project report

„Elaboration of structural models for performance assessment of existing buildings and their small-scale testing” (33%) / **WiSe**

1 written exam

„Assessment of structural performance (under extreme loading conditions)”/ 180 min (67%) / **WiSe** + SuSe

2202005 Risk projects and evaluation of structures

L. Abrahamczyk, J. Schwarz, S. Beinersdorf, A. Uzair Veranst. SWS: 5

Vorlesung

Do, wöch., 09:15 - 12:30, Coudraystraße 13 B - Hörsaal 3

Beschreibung

Training of student’s ability to apply methods and current state in natural hazard and risk assessment integrating research and practical applications to site- or structure-specific risk analysis and planning decisions.

Students will be able to apply modern software tools to transfer buildings into dynamic models and to evaluate the seismic response characteristics in dependence on design situation and performance directed concepts; they will be trained to identify failure mechanism and design defects, and to evaluate appropriateness of strengthening measures. Students will be familiar with different analysis methods, techniques and tools of empirical and analytical vulnerability assessment. Students are encouraged to contribute reports of regionally particular building types to World Housing Encyclopedia and NHRE database.

Bemerkung

Lessons from recent events and field missions; assessment of hazard phenomena; reinterpretation of observed response for different building types; recent developments in design and construction; performance assessment of masonry, steel and wooden structures as well as interaction effects between structure and soil, equipment and filling media; damage classification and fragility functions; building assessment criteria for strengthening; evaluation of applied strengthening and rehabilitation measures.

Training in:

Modelling and assessment of masonry structures applying equivalent frame approach; determination of characteristic building response parameters; determination of fragility function.

Voraussetzungen

B.Sc.

Seismic Monitoring / Earthquake Engineering

Leistungsnachweis

1 written exam

”Risk projects and evaluation of structures”

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

1 Project presentation (oral)

”Risk projects” (25%) / **WiSe**

Project reports (written short paper)

”Evaluation of structures” (25%) / **WiSe**

2205014 Design and interpretation of experiments: Experiments in Structural Engineering

M. Kraus, S. Mämpel Veranst. SWS: 2

Integrierte Vorlesung

Di, wöch., 13:30 - 15:00, Experiments in structural engineering

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”

2205014 Design and interpretation of experiments: Signal Processing, Design of Experiments and System Identification

T. Lahmer, F. Alkam, Z. Jaouadi Veranst. SWS: 2

Integrierte Vorlesung

1-Gruppe Di, gerade Wo, 17:00 - 18:30, Coudraystraße 13 A - Hörsaal 2, Signal Processing, Design of Experiments and System Identification (Exercise)
1-Gruppe Di, gerade Wo, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Signal Processing, Design of Experiments and System Identification (Exercise)
1-Gruppe Di, gerade Wo, 17:00 - 18:30, Coudraystraße 13 B - Pool Fak. B 007, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Coudraystraße 13 A - Hörsaal 2, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Coudraystraße 13 B - Pool Fak. B 007, Signal Processing, Design of Experiments and System Identification (Exercise)
Di, wöch., 15:15 - 16:45, Coudraystraße 13 B - Hörsaal 3, Signal Processing, Design of Experiments and System Identification

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”

2906016 Secondary Hazards and Risks (land-use, site studies)

G. Morgenthal, T. Wichtmann, G. Aselmeyer Veranst. SWS: 4
Integrierte Vorlesung
Mo, wöch., 13:30 - 15:00, Coudraystraße 13 B - Hörsaal 3, Digital (BBB)
Di, wöch., 09:15 - 10:45, Coudraystraße 11 C - Seminarraum/Hörsaal 001

Beschreibung

The objective of this module is focused on deepening the skills of the students to judge the risk of a landslide (secondary hazard) in a given sloping ground caused by a primary hazard (e.g. earthquake, heavy rainfall). The students learn advanced methods for the investigation and monitoring of possibly instable soil and rock masses. They deepen their knowledge with respect to different methods of slope stability analysis under static loading and seismic impact. The students are able to study slope stability by means of the finite element method. They know various methods of slope stabilization. They know and can apply basic methods of Geotechnical Earthquake Engineering. To fix the theoretical background the students have to apply the methods learned at given tasks within a project.

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 (including computer exercise with finite element program Plaxis); Seismic design of retaining structures; Ground response analysis; Stability of rock masses

Voraussetzungen

Geo- and hydrotechnical Engineering (Soil Mechanics)

Leistungsnachweis

1 Project report

”Secondary Hazards and Risks” (33%) / **WiSe**

1 written exam

„Secondary Hazards and Risks”/ 120 min (67%) / **WiSe** + SuSe

Elective Modules

Seit Wintersemester 2018/19 besteht an der Bauhaus-Universität Weimar ein zusätzliches Angebot an fächerübergreifenden Lehrveranstaltungen im Rahmen der Bauhaus.Module. **Studierende des NHRE können Bauhaus.Module aus dem Bereich Master belegen.** Inwiefern diese Module des **Wahlbereichs** ersetzen können, muss individuell mit der Fachstudienberatung geklärt werden. Das Angebot der Bauhaus.Module findet sich unterweimar.de/bauhausmodule.

Bemerkung:

– nur Masterkurse der BUW

– besonders engl. Kurse

Wunsch nach Einteilung der BM im bison nach Sprachen

2909020 Macroscopic Transport Modelling

C. Winkler, J. Uhlmann, U. Plank-Wiedenbeck, J. Bänsch Veranst. SWS: 4

Integrierte Vorlesung

Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Projektraum 302, 19.10.2021 - 01.02.2022
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Student Design Studio – SDS 303, 19.10.2021 - 01.02.2022

Beschreibung

Teil A: Grundlagen

Planerische Rahmenbedingungen, Raumstrukturdaten und Netzwerke, Methodik und Verfahren, Empirische Verkehrsdaten für Verkehrsmodellentwicklungen, Verkehrserzeugung, Verkehrsverteilung, Verkehrsmittelwahl, Verkehrsumlegung, Stärken und Schwächen unterschiedlicher Modellansätze, Kalibrierung und Validierung, Prognosen- und Szenarioentwicklung

Teil B: Modellierung

Praktische Umsetzung und Anwendung, Modellierung eines Verkehrsnetzes und der Verkehrsnachfrage mit PTV VISUM, Praktische Anwendung der Theorie und kritische Betrachtung von Modellergebnissen, Präsentation der Studierenden in Gruppen

engl. Beschreibung/ Kurzkommentar

Part A: Principles

Transport planning framework, Methodology and procedures, Land-Use Data and networks, Empirical Travel Data for model developments, Trip generation, Trip distribution, Mode choice, Traffic assignment, Methods and algorithms, Strengths and weaknesses of different model approaches, Calibration and validation, Forecasting and scenario calculations

Part B: Model Development

Practical implementation and application, Modelling transport network and travel demand using PTV VISUM, Application of learned methodological approach(es) and critical reflection of the model outputs, Student presentation (group work)

Bemerkung

Beleg; Prüfungsvoraussetzung: Belegabgabe

Lehrformat WiSe 2021/22: Vorlesung digital, Übung hybrid

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bestätigung der Professur Verkehrssystemplanung notwendig

Bewerbung bis 12.10.2021 ausschließlich per Mail an vsp@bauing.uni-weimar.de. Bitte kurz den fachlichen Hintergrund und die Motivation für die Kursteilnahme schildern.

Empfohlen: Vorkenntnisse in der Modellierung/ Simulation und Verkehrsplanung und-technik. **Sollten keine Vorkenntnisse im Bereich der Verkehrsplanung vorliegen muss der Kurs "Introduction to Mobility and Transport" parallel belegt werden!**

Leistungsnachweis

Teil A:

Klausur (120 Min), Englisch, 50%

Teil B:

Beleg und Präsentation, Englisch, 50%

Die Belegabgabe ist Vorraussetzung für die Klausurteilnahme

2909021 International Case Studies in Transportation

J. Uhlmann, M. Rünker, U. Plank-Wiedenbeck, P. Schmidt Veranst. SWS: 4
Vorlesung
Mo, Einzel, 17:00 - 18:30, Coudraystraße 11 C - Seminarraum/Hörsaal 001, 11.10.2021 - 11.10.2021
Mo, wöch., 17:00 - 18:30, Coudraystraße 11 C - Seminarraum/Hörsaal 001, 18.10.2021 - 31.01.2022
Mo, wöch., 19:00 - 20:30, Coudraystraße 11 C - Seminarraum/Hörsaal 001

Beschreibung

Teil A: Wie können wir nachhaltige Mobilität gestalten und unsere Städte lebenswerter machen? Diese Antwort wird durch Präsentationen von internationalen Best-Practice Lösungen beantwortet. Gastdozenten stellen Planungsprozesse aus dem internationalen Bereich mit Schwerpunkt Urbane Räume vor. In einem wöchentlichen Begleitseminar werden die Themen und ihre Übertragbarkeit diskutiert.

Teil B: Exkursion in eine Europäische Stadt (z.B. Fahrradstadt Kopenhagen, Hafen City Hamburg, DLR Berlin u.a.). Informationen werden noch bekanntgegeben.
Die Kosten für die Exkursion müssen von den Teilnehmern

Auf Grund der COVID-19-Pandemie wird im Wintersemester 2021/22 keine Exkursion angeboten.

Bemerkung

Ringvorlesung in Kooperation mit der Fachhochschule Erfurt, Institut Verkehr und Raum

Die Gastvorträge finden montags von 19:00-20:30 statt. Die Termine werden noch bekannt gegeben.

Das Seminar findet ab dem 18.10 wöchtentlich als Präsenzveranstaltung statt. Die Teilnehmendenzahl ist daher auf 15 begrenzt

Informationsveranstaltung am 11.10. um 17:00.

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bewerbung bis 13.10.2021 um 23:59 Uhr ausschließlich per EMail an vsp@bauing.uni-weimar.de (maximal eine Seite A4)

Number of participants limited to 15. Please apply until 13.10.2021 23:59 only via Email to vsp@bauing.uni-weimar.de (maximum one page A4)

Leistungsnachweis

Digitales Poster und Pitch mit mündlicher Prüfung „International Case Studies" / (100%) / WiSe

909033 Introduction to Mobility and Transport

U. Plank-Wiedenbeck, C. Walther, M. Wunsch, J. Uhlmann Veranst. SWS: 4

Integrierte Vorlesung
Do, wöch., 13:00 - 16:45

Beschreibung

Die Lehrveranstaltung besteht aus drei Teilen:

Part A: Introduction to Transport Studies (1,5 CP, Online-Video Vorlesungen)

Mobilitätsforschung, Verkehrsplanungsprozess, Grundlagen der Planungen für den motorisierten und nicht-motorisierten Individualverkehr, Öffentlicher Verkehr, Verkehrsintegration, Grundlagen der Verkehrsmodellierung, Verkehrspolitik und Verkehr und Klima

Part B: Transport Economics (3 CP, Online-Vorlesungen)

Kapitalwert, Annuität, Diskontsatz, Nutzen etc. als mikro-ökonomische Grundlagen für Bewertungsrechnungen. Vorstellung von Zielsystemen, Indikatoren und Wertsyntheseverfahren (Nutzen-Kosten-Analyse (NKA), Nutzwertanalyse (NWA), etc.) als Komponen¬ten von Bewertungsver¬fahren. Aufbereitung von Umlegungsergebnissen der Verkehrsmodelle als Input für Bewertungsverfahren (Ganglinien etc.). Berechnung von Indikatoren und Herleitung von Monetarisierungs¬ansätzen. Deutscher Bundesverkehrswegeplan 2030 (BVWP) und europäisches Bewertungsverfahren für Fußgänger- und Radverkehr mit vorbereiteten Praxisbeispielen

Part C: Project Data Science for Mobility and Transport (1,5 CP, Projektarbeit)

Application-oriented data science basics, sources and quality of mobility and traffic data, work with data science tools, data analysis with methods of artificial intelligence and machine learning, evaluation and discussion of results

Voraussetzungen

Bachelor

Leistungsnachweis

Beleg*/ Project work* ”Introduction to Transport Studies” Englisch/*English*, (25%), / **WiSe**

Klausur (Teilfachprüfung)*/ written exam* (Part-study subject exam)„ Advanced Transportation Planning and Socio-Economic Assessment”, Englisch/*English*, 60 min (50%) / **WiSe** + WHSoSe/*SuSe*

Beleg*/ Project work* ”Data Science for Mobility and Transport” Englisch/*English* , (25%), / **WiSe**

Prüfungen