Bauhaus-Universität Weimar

Vorlesungsverzeichnis

M.Sc. Natural hazards and risk in structural engineering (up to Intake 2016/2017)

Sommer 2019

Stand 12.11.2019

M.Sc. Natural hazards and risk in structural engineering (up to Intake 2016/2017)

401020 Modelling in the development process

C. Könke, N.N. Veranst. SWS: 2

Blockveranstaltung

Mo, Einzel, 07:30 - 11:00, Marienstraße 7 B - Seminarraum 102, 29.04.2019 - 29.04.2019
Mo, Einzel, 17:00 - 20:00, Marienstraße 7 B - Seminarraum 102, 29.04.2019 - 29.04.2019
Mo, Einzel, 07:30 - 11:00, Marienstraße 7 B - Seminarraum 102, 13.05.2019 - 13.05.2019
Mo, Einzel, 17:00 - 20:00, Marienstraße 7 B - Seminarraum 102, 13.05.2019 - 13.05.2019
Mo, Einzel, 07:30 - 11:00, Marienstraße 7 B - Seminarraum 102, 03.06.2019 - 03.06.2019
Mo, Einzel, 17:00 - 20:00, Marienstraße 7 B - Seminarraum 102, 03.06.2019 - 03.06.2019
Mo, Einzel, 07:30 - 11:00, Marienstraße 7 B - Seminarraum 102, 24.06.2019 - 24.06.2019
Mo, Einzel, 17:00 - 20:00, Marienstraße 7 B - Seminarraum 102, 24.06.2019 - 24.06.2019
Mo, Einzel, 07:30 - 11:00, Marienstraße 7 B - Seminarraum 102, Ersatztermin, 01.07.2019 - 01.07.2019
Mo, Einzel, 17:00 - 20:00, Marienstraße 7 B - Seminarraum 102, Ersatztermin, 01.07.2019 - 01.07.2019
Mo, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal D, Final examination, 15.07.2019 - 15.07.2019

engl. Beschreibung

Content:

In the modelling process, several development stages with increasing level of detail are used. According to these levels the appropriate models should be chosen:

- Descriptive models

- Schematic models

- Qualitative models

- Quantitative models

Several criteria for model selection and a variety of tools for modeling are demonstrated.

Target qualifications:

The students will be familiar with a procedure for the solution of tasks from engineering practice with the help of models from structural mechanics. This development and planning process serves as a guideline for modelling. The students will be trained to use modern CAD software (CATIA) and FEM Code (Abaqus, including pre- and post-processing).

Bemerkung

external lecturer: Dr.-Ing. Christian Guist – BMW Group

Teaching and learning forms: Lectures, exercises in computer pool, self-study, Demonstration exercises.

This module is comprised of: Modelling in the development process ”Modeling in the Development Process” (Block seminar, 2 SWS)

Voraussetzungen

Formal requirements for participation: ---

Recommended requirements for participation: Basic knowledge of mechanics and FEM

Leistungsnachweis

written exam

Earthquake engineering and structural design

202002 Earthquake engineering and structural design (L)

L. Abrahamczyk, J. Schwarz Veranst. SWS: 6

Vorlesung

1-Gruppe Di, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, NHRE - Group A, ab 09.04.2019
2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, NHRE - Group B, ab 11.04.2019
3-Gruppe Do, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, NHRE - Group C, ab 11.04.2019
4-Gruppe Do, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, NHRE - Group C, ab 11.04.2019
Di, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, Final examination, 16.07.2019 - 16.07.2019
Di, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal D, Final examination, 16.07.2019 - 16.07.2019
Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal A

Beschreibung

Students are trained and qualified in tasks of earthquake engineering, natural hazard and risk determining parameters. Students will be able to process input data, to realize design decision for structures of different building type and risk potential, to apply modern building codes and design concepts, to develop earthquake resistant structures and to evaluate structural design.

Earthquake engineering

Seismic Code development and generations; simplified analysis methods; design of structures and regularity criteria for earthquake resistance; performance and experience-based design concepts; rules for engineered buildings (R/C, steel, masonry) and non-engineered buildings; interaction effects between structure and soil, equipment and filling media; special and high risk structures

Structures in Earthquake Regions

Description of National code development; recent code situation; determination of seismic forces for an idealized RC frame system; comparison of different international code levels

Design of RC frames with masonry infill walls in earthquake regions: Application of modern software tools

Training of modelling and calculation with different software tools; interpretation of structural systems in terms of earthquake resistance design (ERD); design and analysis of structural systems for given and modified building layouts; comparison of the results with outcome of damage surveys. Tools: ETABS, SAP2000

Voraussetzungen

recomended module "Primary Hazards and Risks" NHRE

Leistungsnachweis

written exam

Project report + Project presentation

Geo- and hydrotechnical engineering

906014 Geotechnical Engineering

T. Wichtmann Veranst. SWS: 3

Vorlesung

Di, Einzel, 13:30 - 16:45, Coudraystraße 13 A - Hörsaal 2, 02.04.2019 - 02.04.2019
Di, wöch., 13:30 - 16:45, Coudraystraße 9 A - Hörsaal 6, ab 09.04.2019
Di, Einzel, 09:00 - 11:00, Coudraystraße 9 A - Hörsaal 6, Final examination, 23.07.2019 - 23.07.2019
Di, Einzel, 09:00 - 11:00, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202, Final examination, 23.07.2019 - 23.07.2019

Beschreibung

Classification and identification of soils; Description of soil state; Water in the soil; Hydraulic conductivity and seepage flow; Distribution of vertical stress in the soil; Stress-strain relationships; Settlement analysis; Consolidation theory; Shear strength; Earth pressure; Basics of Soil Dynamics (wave propagation, laboratory and field testing, soil-structure interaction under dynamic loading); Soil Liquefaction (phenomenon, consequences, estimation of liquefaction risk, prevention)

Leistungsnachweis

Written Exam - 90 Min.

Disastermanagement and mitigation strategies

Elective compulsory modules

205007 Modelling of steel structures and numerical simulation

M. Kraus, S. Mämpel, B. Wittor Veranst. SWS: 4

Vorlesung

1-Gruppe Mo, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301
2-Gruppe Mo, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302
Mi, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal D, Final examination, 31.07.2019 - 31.07.2019
Mo, wöch., 13:30 - 15:00, Coudraystraße 13 A - Hörsaal 2
Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C

engl. Beschreibung/ Kurzkommentar

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

Leistungsnachweis

1 Project report ”Modelling of steel structures and numerical simulation” (0%) / SuSe

1 written exam „Modelling of steel structures and numerical simulation”/ 120 min (100%) / SuSe + WiSe

301013 Advanced Modelling – Calculation/CAE

K. Gürlebeck, D. Legatiuk Veranst. SWS: 4

Vorlesung

Mo, Einzel, 13:00 - 15:00, Coudraystraße 13 A - Hörsaal 2, 29.07.2019 - 29.07.2019
Di, wöch., 09:15 - 12:30, Coudraystraße 13 B - Seminarraum 210, Final examination

Beschreibung

Scientifically orientated education in mathematical modelling and computer science in view of a complex interdisciplinary and networked field of work and research, modelling and simulation. Students will have experience in Computer Aided Engineering (CAE) by establishing a problem specific model on the basis of a mathematical formulation, an applicable solution technique, design of efficient data structures and software implementation.

Numerical and analytical solution of partial differential equations, series expansions, integral representations, finite difference methods, description of heat flow, diffusion, wave propagation and elastostatic problems. The topics are discussed theoretically and then implemented. Convergence, stability and error analysis of finite difference

methods (FDM). Modelling of steady and unsteady heat conduction problems, wave propagation and vibrations and problems from linear thermo-elasticity in 2D and 3D. After considering the mathematical basis, the students will work on individual projects passing all levels of work (engineering model, mathematical model, numerical model, computer model, simulation, evaluation). The solution methods will be implemented by help of MAPLE or MATLAB.

Bemerkung

This lecture replaces "Advanced Analysis". It is therefore not possible to receive credits for both courses.

Die Veranstaltung ersetzt "Advanced Analysis" und kann daher nicht gemeinsam mit dieser Veranstaltung angerechnet werden.

Leistungsnachweis

1 exam (written or oral)

303001 Advanced Building Information Modelling

C. Koch, T. Behnke, J. Wagner Veranst. SWS: 4

Vorlesung

Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal C, 03.04.2019 - 08.05.2019
Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, lab, ab 04.04.2019
Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 302, lab, ab 04.04.2019
Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, lab, ab 05.04.2019
Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, lab, ab 05.04.2019
Mi, Einzel, 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, 15.05.2019 - 15.05.2019
Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal C, ab 22.05.2019
Do, wöch., 09:15 - 10:45, lab, 23.05.2019 - 11.07.2019
Di, Einzel, 09:00 - 11:00, Coudraystraße 9 A - Hörsaal 6, exam, 16.07.2019 - 16.07.2019

engl. Beschreibung/ Kurzkommentar

Advanced Building Information Modelling

Content: Advanced geometric and parametric modelling, Interoperability and collaboration concepts (IFC, IDM, BEP), Advanced use cases (e.g. clash detection, as-built model-ing), BIM programming (incl. visual programming)

Target qualifications: This module introduces advanced concepts of Building Information Modelling (BIM) to provide students with advanced knowledge in order to understand, analyze and discuss scientific research approaches related to BIM. Within the frame of the mod-ule project (coursework) the students will choose a topic from a pre-defined list or come up with their own topic. Based on that they will do detailed research, imple-ment a representative concept in a software prototype and discuss findings and limi-tations. Also the students acquire skills of scientific working and presentation.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of Computer-Aided Design, BIM concepts, and object-oriented programming

Leistungsnachweis

written report, presentation

303002 Simulation Methods in Engineering

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

Vorlesung

Fr, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, lecture, ab 05.04.2019
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, lab (7mal), ab 05.04.2019
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302, lab (7mal), ab 05.04.2019
Mo, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, lab, ab 08.04.2019
Mo, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, lab, ab 08.04.2019
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Student Design Studio – SDS 303, lab, 24.05.2019 - 12.07.2019

engl. Beschreibung/ Kurzkommentar

Simulation Methods in Engineering

Content:

- System analysis and modelling
- System dynamics
- Discrete event simulation
- Multi-agent simulation
- Input data and stochastic simulation
- Simulation based optimization
- Introduction to the software AnyLogic

Target qualifications:

This module provides students with comprehensive knowledge about computer based simulation concepts to address practical challenges in engineering. Modern simulation and optimization software is introduced within tutorials. The module project (coursework) offers an opportunity to students to work in groups on current problems in the context of civil and environmental engineering (e.g. production logistics, pedestrian simulation, pollutant dispersion). Using object-oriented simula-tion software the students will analyze, model and simulate different engineering systems. The programming is carried out using Java. Also the students acquire team working and presentation skills.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of programming

Leistungsnachweis

Short group report, group presentation, written exam

401007 Structural Engineering Models

C. Könke Veranst. SWS: 4

Integrierte Vorlesung

Di, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 205, ab 02.04.2019
Di, Einzel, 11:00 - 13:00, Marienstraße 13 C - Hörsaal A, exam, 30.07.2019 - 30.07.2019
Do, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 102

Beschreibung

Student will be able to build an abstract model for structural engineering problem and to assess its restriction and quality. The student will be able to perform dimen-sion reduction in structural engineering using concepts from structural mechanics. They will be capable of classify different types of civil engineering structures and to distinguish different principal load transfer processes. The student can classify line-ar/nonlinear problems and time variant/ invariant problems in structural engineering.

Fundamental equations in structural mechanics for 1D, 2D and 3D structures, equi-librium equation, kinematic relation, constitute law, Method to establish the govern-ing differential equations, Differences between geometric / physical linear and non-linear problems, Classification of different types of structures: truss, beam, plate, shell problems

Voraussetzungen

basic course in structural mechanics

basic course in applied mathematics

Leistungsnachweis

written test

Requirements for exam registration: 2 home works accepted

451002+45 Introduction to Optimization / Optimization in Applications

T. Lahmer Veranst. SWS: 4

Vorlesung

Fr, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, Final examination, 19.07.2019 - 19.07.2019
Fr, Einzel, 09:00 - 11:00, Coudraystraße 13 A - Hörsaal 2, Final examination, 19.07.2019 - 19.07.2019
Mo, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D
Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301
Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 302

Beschreibung

Introduction to Optimization (451002 - 3ECTS):

Definitions, Classification of Optimization Problems, Linear Problems, Simplex Method, Duality, Optimization on Graphs Nonlinear Problems: Constrained and unconstrained continuous problems, descent methods and variants

Optimization in Applications (451006 - 3 ECTS):

This course treats topics concerned with the combination of optimization methods and (numerical) models. Typical problems, where such combinations arise, are Calibration of Models, Inverse Problems; (Robust) Structural Optimization (including Shape and Topologyoptimization); Design of Experiments

Bemerkung

The course can be regarded as a continuation of „Introduction to Optimization“, however a visit of that course is not mandatory.

Leistungsnachweis

1 written or oral exam (depending on the number of participants)
„Introduction to Optimization”/ (50%)

1 written or oral exam (depending on the number of participants)
„Optimization in Applications”/ (50%)