

Vorlesungsverzeichnis

English-taught courses of the Faculty

Sommer 2020

Stand 12.11.2020

English-taught courses of the Faculty

3

English-taught courses of the Faculty

202002 Earthquake engineering and structural design (L + E + P)

J. Schwarz, L. Abrahamczyk, S. Beinersdorf

Veranst. SWS: 6

Vorlesung

1-Gruppe Di, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, NHRE - Group A
 2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, NHRE - Group B
 3-Gruppe Do, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, NHRE - Group C
 4-Gruppe Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, NHRE - Group C
 Di, Einzel, 13:00 - 14:00, Marienstraße 13 C - Hörsaal C, Inspection of examinations, 21.07.2020 - 21.07.2020
 Do, Einzel, 13:30 - 16:45, Marienstraße 7 B - Seminarraum 205, 23.07.2020 - 23.07.2020
 Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal D

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

recommended module "Primary Hazards and Risks" NHRE

Leistungsnachweis

1 written exam

"Earthquake engineering" / 180 min (67%) / **SuSe** + WiSe

1 Project report + Project presentation

"Structures in Earthquake Regions/Design of RC frames" /
 (33%) / **SuSe**

202003 Geo- and hydrotechnical engineering - Part: "Flood hazard and vulnerability assessment" (L + E)

H. Maiwald

Veranst. SWS: 3

Vorlesung

Fr, Einzel, 13:00 - 14:30, Marienstraße 7 B - Seminarraum 205, Meeting Students, 11.09.2020 - 11.09.2020

Mi, wöch., 09:15 - 10:45

Do, wöch., 11:00 - 12:30

Beschreibung

The students should be able to apply the strategies and methods to arbitrary engineering problems in the given fields. To fix the theoretical background the student has to apply the methods independently at given tasks during several projects.

Flood Hazard and Vulnerability Assessment

Flood Management; Fundamentals of flood defence; Management of low-lying areas; Design of river dikes, channels and dams; Design concepts for the defence of structural objects and buildings; Forecasting, management and maintenance in flood defence; Hydrology, hydraulic calculations, flood routing; Characteristics of tsunami action, forces and loads on structures; Structural damage and loss prediction, damage scenarios; Re-interpretation of recent events.

Bemerkung

Vorlesungen in englischer Sprache "Flood Management"

Leistungsnachweis**1 written exam**

"Flood Hazard and Vulnerability Assessment" / 90 min (50%)

/ SuSe + WiSe

202004	Multi-hazard and risk assessment (L + E)
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F. Cotton, J. Schwarz, S. Beinersdorf, N. Hadidian Moghaddam

Veranst. SWS: 4

Vorlesung

Mo, wöch., 15:15 - 18:30, Marienstraße 13 C - Hörsaal D

Beschreibung

The students will be familiar with the probability of natural hazard and risk determining parameters. They will be able to recognize procedures of single and multi hazard assessment and to process input data and to apply tools to study areas. Students will be introduced in further advanced geotechnologies and existing or on-going research as well as global projects conducted by GFZ.

Hazard Assessment and Applications

Primary input and output parameters for EQ (and other natural) hazard; Earthquake statistics and occurrence probability; Methodology of seismic hazard assessment; Seismicity models; Examples of seismic hazard and risk studies; Synopses of natural hazards; procedures and developments in multi-hazard assessment; Case studies of multi-hazard, vulnerability and risk considerations.

Workshop

"Natural Hazards and Advanced Geotechnologies"

Compilation of EQ hazard-related data

Treatment of long term seismicity data files; elaboration of earthquake data to get harmonized input for PSHA; earthquake catalogues (for the countries of the participants and adjacent regions); data pre-processing; Hazard Description for the Project regions

Excursion to GeoResearchCenter Potsdam

Bemerkung

In this course 28 students can take part. **It is compulsory for the DAAD-scholarship holders of NHRE intake 2019.**

If you are interested to take part in the course, please write a **proposal** why you are interested and what are the major problems in your country related to multi-hazard that you identified yourself. Please **submit this to silke.beinersdorf@uni-weimar.de until April 1st, 2020**. We will inform you about the decision until April 3rd, 2020.

Due to the Corona Pandemia the deadline will be postponed to **April 27th, 2020**. We will inform you about the decision **until May 4th, 2020**. At the moment all excursions are cancelled - the same is valid for the excursion to Potsdam. We will reorganize the course, depending on the forthcoming developments and will inform the participants as soon we have more information.

As soon as you are accepted, you will be enrolled to the moodle-room!

Voraussetzungen

recommended module "Primary Hazards and Risks" (NHRE)

completion of the module "Geographical information systems (GIS) and building stock survey" (NHRE) or basic knowledge of GIS-Systems is also recommended

Leistungsnachweis

1 written exam

"Multi-Hazard and risk assessment" / 90 min

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

2 Project reports

(25% each) / **SuSe**

Due to the recent development and that we have to skip the excursion:

This summer semester 2020 there will be no exam, instead 2 project reports (Azure II (50%), SYMULTHAN (50%)).

204018 Structural parameter survey and evaluation (L + E + P)

G. Morgenthal, V. Rodehorst, R. Illge, S. Rau, T. Gebhardt Verant. SWS: 4.5
Vorlesung

1-Gruppe Fr, Einzel, 13:30 - 16:45, Coudraystraße 11 C - Pool-Raum 101, 19.06.2020 - 19.06.2020
1-Gruppe Fr, Einzel, 13:30 - 16:45, Coudraystraße 11 C - Pool-Raum 101, 26.06.2020 - 26.06.2020
2-Gruppe Fr, Einzel, 13:30 - 16:45, Coudraystraße 13 B - Pool Fak. B 007, 19.06.2020 - 19.06.2020
2-Gruppe Fr, Einzel, 13:30 - 16:45, Coudraystraße 13 B - Pool Fak. B 007, 26.06.2020 - 26.06.2020
Fr, Einzel, 13:30 - 16:45, Coudraystraße 11 C - Pool-Raum 101, 12.06.2020 - 12.06.2020
Mi, Einzel, 17:00 - 18:30, 01.07.2020 - 01.07.2020
Fr, Einzel, 09:15 - 12:30, Marienstraße 7 B - Projektraum 301, 03.07.2020 - 03.07.2020
Fr, Einzel, 13:30 - 16:45, Coudraystraße 11 C - Pool-Raum 101, 03.07.2020 - 03.07.2020

Fr, Einzel, 09:15 - 12:30, 10.07.2020 - 10.07.2020

Do, Einzel, 13:00 - 16:00, Final examination The exam will take place in the "Weimarhalle" - Main building. Further and more detailed information will be available before the exam period., 13.08.2020 - 13.08.2020

Do, wöch., 09:15 - 10:45

Fr, unger. Wo, 09:15 - 12:30

Fr, wöch., 13:30 - 16:45

Beschreibung

The students will be familiar with methods to determine properties of structural systems by means of modern measurement techniques. They will be familiar with the concepts, the application and the limitations of these techniques. They understand the data obtained and the methods to condition, analyse and interpret the data to extract information about structures and structural members and components. They will be able to apply the concepts to develop measurement setups and analysis procedures to problems encountered in structural engineering.

Signal Analysis

Trigonometric polynomials (TP); amplitude-phase and complex representation; approximation of arbitrary periodic functions by TP using method of least squares, calculation of Fourier coefficients and error estimation; Fourier series. Discussion of spectra and Fourier transform and its basic properties; Convolution and its properties and applications; random variables and central limit theorem; applications of Fourier transforms such as filtering of signals and solving differential equations

Sensor-based Monitoring and System Analysis

Types and principles of sensors; important sensor properties; data acquisition techniques; spectral and stochastic analysis of sensor data; properties of structural systems important in experimental testing and structural health monitoring; relevant limit states; structural analysis, modelling and model calibration; applications to static and dynamic response, load determination, physically nonlinear structural behaviour and optimization of sensor system setups

Geo-spatial Monitoring

Preparation and planning of three-dimensional measurement tasks; application of tacheometry, satellite-based positioning (GNSS), terrestrial laser scanning and photogrammetry for monitoring; image-based sensor orientation and surface reconstruction; spatial transformations, georeferencing, distance measures, pointcloud registration and geometric deformation analyses

Voraussetzungen

Primary hazards and risks

Applied mathematics

Leistungsnachweis

1 written exam

"Structural parameter survey and evaluation" / 120 min

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

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

M. Kraus, S. Mämpel, B. Wittor

Veranst. SWS: 4

Vorlesung

1-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301

1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301

2-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302

2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302

Mi, Einzel, 09:00 - 11:00, Final examination The exam will take place in the "Weimarhalle" - Main building. Further and more detailed information will be available before the exam period., 12.08.2020 - 12.08.2020
 Mo, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B
 Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal B

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

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**

205013 Structural engineering - Advanced systems (L)

M. Kraus, B. Wittor, S. Mämpel

Veranst. SWS: 3

Vorlesung

Mo, Einzel, 13:00 - 14:30, Final examination The exam will take place in the "Weimarhalle" - Main building. Further and more detailed information will be available before the exam period., 10.08.2020 - 10.08.2020
 Mo, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal D
 Di, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal B

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 and post-tensioned concrete structures as well as steel and steel-concrete composite structures.

Structural Engineering – Advanced systems (summer semester):

Design of steel and steel-concrete composite structures; Post-tensioned concrete structures – design and detailing; Design of steel connections and detailing

Voraussetzungen

B.Sc.

Leistungsnachweis

2 written exams

"Standard systems" / 90 min (50%) / **WiSe + SuSe** --> WiSe!

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

2907009 Scientific Working in Computational Engineering

K. Smarsly, M. Mirboland, S. Ibañez Sánchez, J. Wagner

Seminar

Do, Einzel, 13:00 - 15:00, Coudraystraße 7 - Videokonferenzraum 115, 07.05.2020 - 07.05.2020

Beschreibung

In this course, which addresses master students (of all faculties), important concepts and methods of scientific working in the context of practical applications of computing in civil engineering will be taught.

Since scientific writing is of particular importance in the course, a scientific paper will be developed, which is a prerequisite of the final examination.

The topic of this semester is "implementation and validation of a shake table for structural health monitoring and control".

The students will construct a low-cost shake table, able to simulate earthquake events on scaled structures.

In the lab, the students will use wireless sensor networks and embedded computing to develop an algorithm for simulating earthquake events. Further information related to the course may be found here:

<http://www.uni-weimar.de/cce/teaching/scientific-working-in-computational-engineering/>

Please submit your enrolment request **until May 8, 2020 at 12:00** to the following email address:

mahsa.mirboland@uni-weimar.de.

Due to the limited capacity, only few students can participate in this course. Upon the deadline stated above, students whose enrolment request is approved will be automatically enrolled to the Moodle room and will be provided with further information.

Bemerkung

Course on moodle: [Scientific Working in Computational Engineering - SoSe2020](#).

Voraussetzungen

Interest in scientific working and in applications of computational engineering.

Leistungsnachweis

Presentation, ongoing assessment, scientific paper, oral examination.

2911003 Future Workspace**H. Bargstädt, T. Vogl, B. Bode**

Veranst. SWS: 2

Integrierte Vorlesung

Beschreibung

Introduction:

The changing working world has many implications for all areas of life. Resulting from challenges like "demographic change", "war of talent", "Gen Y" or "aging force", companies have slowly recognized the necessity of adapting their office work places to the changing needs of their workforce. Regarding office work and office design, mobility, flexibility and work-life integration are relevant demands. For corporate real estate managers, workplace managers and workplace project leaders, the question arises which dimensions, parameters and success factors have to be taken into account when designing and implementing new working environments.

Learning Outcomes:

The students:

- acquire understanding of goals, trends, methods and processes of future workspace concepts
- experience the dimensions that must be taken into consideration when designing new workspace concepts
- learn to plan a standard office property for different future workspace concepts - theory and design of rooms and furniture that enable new types of work
- get to know the practical value of theory and models in applying them on problems of future workspace
- achieve understanding of the relationship between office environment, motivation and performance
- gain knowledge about the significance of leadership and learn methods how to steer through change management processes
- obtain the ability to apply gained theoretical knowledge and skills on interdisciplinary team work, formulate concepts and strategies to prepare and present well-founded decisions

Termine (Online-Seminare):

29.05.2020 (13:30 – 15:00)

05.06.2020 (13:30 – 15:00)

16.06.2020 (13:30 – 15:00)

23.06.2020 (13:30 – 15:00)

30.06.2020 (13:30 – 15:00)

07.07.2020 (13:30 – 15:00)

14.07.2020 (13:30 – 15:00)

Bemerkung

- 29.05.2020 Introduction (with all further details concerning the course; attendance is mandatory for taking part in the course)
- Flipped Classroom: Interactive lectures in which multiple external experts will present different topics with high practical relevance. Topics are:

29.05.2020 - Introduction & the history and changes of workplaces

05.06.2020 - Different office types and existing rules in Germany

16.06.2020 - Health and occupational psychology

23.06.2020 - Leadership and change management for workspaces

30.06.2020 - Technologies for a future workspace

07.07.2020 - Planning and development of workplace concepts

14.07.2020 - Presentation, evaluation and discussion

Leistungsnachweis

Total: max. 21 students

Group size: 3 students

Grading: Essay (2000 Words for single students; 6000 Words for groups). The grading will consist of your submitted essay (75%) and the presentation of your results (25%)

301013 Advanced modelling - calculation/CAE (L + E)

K. Gürlebeck, D. Legatiuk

Veranst. SWS: 4

Vorlesung

Di, wöch., 09:15 - 12:30, Coudraystraße 13 B - Seminarraum 210

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 Project report + Presentation

"Advanced Modelling – Calculation/CAE" (100%) / **SuSe**

301015 Interpolation with solutions of partial differential equations

K. Gürlebeck, S. Bock

Veranst. SWS: 10

Projekt

Beschreibung

Modern measuring methods, such as terrestrial laser scanning techniques or photogrammetric methods, enable the high-precision detection of deformed component surfaces by using a large number of spatial measuring points. This results in the problem of reconstructing the displacement field and the stresses in the interior of the component on the basis of the discrete measured values on the surface. To this end, the project aims to develop multivariate interpolation methods with solutions of partial differential equations (Laplace equation, Lamé-Navier equation). Furthermore, these methods are to be implemented prototypically and evaluated for simple domains.

Voraussetzungen

- Successful completion of the modules
 - Applied Mathematics & Stochastics
 - Advanced Modelling – Calculation / CAE Good
- knowledge of programming, especially the implementation of mathematical algorithms
- Experienced in the use of mathematical calculation software (Matlab, Octave, Maple o.a.)

302010 Development and validation of an algorithm to analyze schlieren images

C. Völker, V. Rodehorst
Projekt

Veranst. SWS: 10

Beschreibung

Schlieren imaging system is a flow visualizing technique. It is used to visualize density variation in transparent media. Schlieren imaging capitalizes the refraction of light. It makes small density gradients (e.g. weak gradients of refractive index found in indoor air) visible. For this project, the schlieren imaging system at the Department of Building Physics will be used. The setup consists of four elements, (1) single concave spherical mirror, (2) LED light source, (3) knife-edge and (4) a digital camera. The setup will be used to capture schlieren images. Large time-sequence of these images would be analyzed using digital cross-correlation algorithm to quantify the velocity, temperature, density gradient, refractive index, etc. of the test object.

Voraussetzungen

- Successful completion of Image Processing and Computer Vision.
- Simulation Methods in Engineering (additional)

303001 Advanced Building Information Modelling

C. Koch, T. Behnke, J. Wagner
Vorlesung

Veranst. SWS: 4

engl. Beschreibung

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

engl. Beschreibung

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 simulation 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 requirements for participation: Basic knowledge of programming

Leistungsnachweis

Short group report, group presentation, written exam

303010 Virtual Mechanics Lab

C. Koch, J. Krischler

Veranst. SWS: 10

Projekt

Beschreibung

AR and VR offer excellent opportunities for integration into university teaching for engineers because they address human image processing. Image processing supports the human mind in forming a mental model, i.e. in forming a deep understanding of the subject matter. A good learning scenario must include fixed learning goals that are to be achieved by completing the AR/VR app. The learning scenario must be implemented in a visually appealing way and in consideration of psychological concepts. Implementation requires not only an understanding of the concepts to be implemented, but also the ability to implement them in the respective programs.

Voraussetzungen

- Knowledge in Unity (optional)
- Knowledge in programming (Python or C#)
- Knowledge in visual scripting (e.g. Dynamo, Grasshopper) (optional)
- Advanced knowledge in mechanics

303011 Collaborative BIM Platform

C. Koch, M. Artus

Veranst. SWS: 10

Projekt

Beschreibung

The whole process of construction is based on a building information model. Multiple actors with different jobs and hence different rights, views and documents work on a single project. We want to merge the model and related documents in a single system for teaching purposes. Basic open software already exists. To implement and test an advanced overlay and communication is the goal of the project.

Voraussetzungen

- programming knowledge (object-oriented modeling and programming or similar)
- knowledge in Building Information Modeling (Advanced BIM or similar)
- Web technologies (REST, JSON, Server, Client, ...)

303012 Virtual Bridge Inspection

C. Koch, M. Artus

Veranst. SWS: 10

Projekt

Beschreibung

It is possible to capture current bridge condition via unmanned aerial systems. However, it is still necessary to assess the data by an engineer. A combination of both, on site inspection by drones and assessment in office by an engineer, we want you to implement and validate a virtual bridge inspection environment. First, loading the bridge data into unity. After that, the engineer shall be able to add damages to the bridge and finally export the data again.

Voraussetzungen

- programming knowledge (object-oriented modeling and programming or similar)
- knowledge in Building Information Modeling (Advanced BIM or similar)
- Optional: Knowledge in Unity and C#

401007 Structural Engineering Models

C. Könke

Veranst. SWS: 4

Integrierte Vorlesung

Fr, Einzel, 13:00 - 14:30, Coudraystraße 9 A - Hörsaal 6, Examination, 14.08.2020 - 14.08.2020

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 dimension 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, equilibrium equation, kinematic relation, constitute law, Method to establish the governing 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 (L)

T. Lahmer

Veranst. SWS: 3

Vorlesung

1-Gruppe Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301

2-Gruppe Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 302

Mo, wöch., 09:15 - 10:45

Beschreibung

Introduction to Optimization (451002):

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):

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

This course can be combined with [Stochastic Simulation Techniques and Structural Reliability \(L\)](#) to form a 6 CP module named Stochastic Simulation and Optimization.

Leistungsnachweis

1 written or oral exam (depending on the number of participants)

"Introduction to Optimization" / (50%) / **WiSe** + SuSe

1 written or oral exam (depending on the number of participants)

"Optimization in Applications" / (50%) / **SuSe** + WiSe

901716 Implementation and validation of a shake table for structural health monitoring and control

K. Smarsly, S. Ibañez Sánchez

Veranst. SWS: 10

Projekt

Beschreibung

Design of civil infrastructure involve assumptions of material characteristics, assumption of loading conditions, and assumptions of structural behavior. However, some uncertainties regarding structural behavior can be reduced by using scaled models. In the case of earthquake engineering, knowing the structural behavior under seismic events allow engineers to improve models and produce more accurate designs. In this context, shake tables are used for scaling and simulating earthquakes in scaled models. However, shake tables are usually expensive and difficult to

operate. The proposed project is centered around shake tables. The main objective of this project is to produce a low-cost shake table able to simulate earthquake events for scaled structures. The implementation of the shake table involves several steps: - Elaborate a literature review regarding low-costs shaking tables - Summarize the scaling process of earthquake movements - Elaborate a budget of the materials needed for creating a shaking table - Create the shaking table - Program the shaking table for reproducing scaled earthquakes based on input text files with earthquake records The outcome of the project will be a low-cost shake table able to reproduce scaled earthquakes for any scaled structure. A real-time evaluation of the produce earthquake should be accomplished by measuring the movement of the shake table using accelerometers and deviations of the movement should automatically corrected by the shake table. In parallel to the special project, attendance to the "Scientific working in computational engineering" lecture is compulsory. The basics concepts required for working and documenting scientific works will be obtained during the lecture. Integrated lecturesIntegrated

Voraussetzungen

- Programming skills
- Basics of earthquake engineering
- Basic knowledge on scientific writing

906014 Geo- and hydrotechnical engineering - Part: "Geotechnical Engineering" (L + E)

T. Wichtmann, G. Morgenthal, C. Rodríguez Lugo, P.

Veranst. SWS: 3

Staubach

Vorlesung

Di, wöch., 15:15 - 16:45

Fr, gerade Wo, 09:15 - 12:30

Beschreibung

The objective of this module is focused on deepening the basics of soils mechanics, the fundamentals of analysis in applications for static and dynamic analysis as well as the basics of soil-structure interaction analysis. The students should be able to apply the strategies and methods to arbitrary engineering problems in the given fields. To fix the theoretical background the student has to apply the methods independently at given tasks during several projects.

Geotechnical Engineering

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

1 written exam

"Geotechnical Engineering" / 90 min (50%) / **SuSe** + WiSe