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M.Sc. Natural hazards and risk in structural engineering

Sommer 2017

Stand 26.09.2017

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**M.Sc. Natural hazards and risk in structural engineering****Wahlpflichtmodul I****Wahlpflichtmodul II****Wahlpflichtmodul III****Earthquake engineering and structural design****2340008 Earthquake Engineering****J. Schwarz**

Veranst. SWS: 6

Vorlesung

1-Gruppe Do, Einzel, 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, 22.06.2017 - 22.06.2017

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

2-Gruppe Do, Einzel, 17:00 - 18:30, Marienstraße 7 B - Projektraum 302, 22.06.2017 - 22.06.2017

2-Gruppe Do, wöch., 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Group B

Do, wöch., 13:30 - 16:45, Marienstraße 13 C - Hörsaal C, ab 06.04.2017

Di, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal B, Examination, 18.07.2017 - 18.07.2017

**Kommentar**

Methodologies of hazard and risk assessment, description of seismic action; design principles; building codes; rules for engineered (RC, steel, masonry) and non-engineered buildings; lessons from recent earthquakes; damage analysis and loss estimation (earthquake scenarios), computer exercises on data processing and analysis of RC frame structures, GIS-Tools and application to study areas

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**Experimental structural evaluation and rehabilitation****2350002 Re-Examination "Experimental structural evaluation and rehabilitation"****M. Kraus, T. Lahmer, J. Schwarz**

Prüfung

Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 27.07.2017 - 27.07.2017

**Finite element methods****Structural dynamics****2110002 Re-Examination "Structural dynamics"****V. Zabel**

Prüfung

Di, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 01.08.2017 - 01.08.2017

Di, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 206, Re-Examination, 01.08.2017 - 01.08.2017

**Geo- and hydrotechnical engineering**

**2200002 Soil Mechanics****T. Wichtmann**

Veranst. SWS: 4

Vorlesung

Di, Einzel, 13:00 - 15:00, Coudraystraße 13 B - Seminarraum 208, Examination, 25.07.2017 - 25.07.2017

Di, Einzel, 13:00 - 15:00, Coudraystraße 13 B - Seminarraum 210, Examination, 25.07.2017 - 25.07.2017

Di, Einzel, 13:00 - 15:00, Coudraystraße 11 C - Seminarraum 101, Examination, 25.07.2017 - 25.07.2017

Di, Einzel, 13:00 - 15:00, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202, Examination, 25.07.2017 - 25.07.2017

Di, wöch., 13:30 - 16:45, Coudraystraße 9 A - Hörsaal 6

**Kommentar**

Problematic Soils: Type of soils, minerals, natural soils, expansive soils, collapsible soils, physical behaviour, physico-chemical behaviour, structure, fabric, saturated soils, unsaturated soils, volume-mass relationships, shrinkage behaviour, consolidation behaviour, compaction, effective stress, stress state variables, constitutive relations, shear strength, measurement of positive pore water pressure, negative pore water pressure (laboratory, field), soil-water characteristic curves, saturated and unsaturated hydraulic conductivity, saturated and unsaturated shear strength, volume change behaviour of problematic soils, earth pressure theory, bearing capacity, slope stability, constitutive modelling, analysis and design of structures on problematic soils. Geotechnical Earthquake Engineering: Artificial and natural earthquake loads (different scales) and their change (magnitude and frequencies) are described when crossing sediment layers. Furthermore the effects of these earthquakes on geotechnical and building constructions as well as geo-seismic effects (liquefaction, landslides, and settlements) are analysed. We use the special site effects for the determination of site dependent response spectra and the microzonation of affected areas. For all site response analyses the description of the soil properties and the realistic soil parameters will be needed. That means the pre-failure and failure characteristics of the soil, i.e. the stiffness and damping for all rates of strain or the liquefaction potential. For these purposes experimental methods will be discussed just as recent aspects of the description of soil parameter in the modern soil mechanics. Practical exercises on the field vibration measurements and their evaluation will be performed. Design principles for foundations and buildings in earthquake affected regions are treated, further modelling and methods of analysis for special geotechnical structures under seismic loads taking into account effects of soil-structure interaction.

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**2420006 Flood Management****H. Hack, H. Maiwald**

Veranst. SWS: 2

Vorlesung

1-Gruppe Mi, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 205, Group A

2-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 205, Group B

Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal C

**Bemerkung**

Vorlesungen in englischer Sprache "Flood Management"

**Kommentar**

Risikomanagement im Hochwasserschutz; hydrologische Bemessungsgrundlagen; hydraulische Berechnungen; technischer Hochwasserschutz; Hochwasserschutz durch Überschwemmungsflächen; Hochwasservorsorge.

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**Geographical Information Systems (GIS) and building stock survey****Hazard projects and advanced geotechnologies**

**2340006 Hazard projects and advanced geotechnologies****J. Schwarz**

Veranst. SWS: 4

Projekt

1-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, Group A  
 2-Gruppe Mi, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, Group B  
 Mo, Einzel, 09:15 - 10:45, Marienstraße 13 C - Hörsaal C, 08.05.2017 - 08.05.2017  
 Mo, Einzel, 11:00 - 12:30, Marienstraße 13 C - Hörsaal C, 08.05.2017 - 08.05.2017  
 Mi, Einzel, 15:15 - 18:30, Marienstraße 13 C - Hörsaal C, 10.05.2017 - 10.05.2017  
 Do, Einzel, 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, 11.05.2017 - 11.05.2017  
 Di, Einzel, 09:15 - 12:30, Coudraystraße 13 B - Hörsaal 3, 16.05.2017 - 16.05.2017  
 Do, Einzel, 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, 08.06.2017 - 08.06.2017  
 Do, Einzel, 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, 06.07.2017 - 06.07.2017  
 Fr, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, Examination, 28.07.2017 - 28.07.2017  
 Mo, wöch., 15:15 - 18:30, Marienstraße 13 C - Hörsaal C

**Bemerkung**

Die Durchführung der Lehrveranstaltung ist abhängig von der Anzahl der Interessenten. Interessenten wenden sich betreffs Terminabstimmung bitte an die für die Lehrveranstaltung verantwortliche Professur. Die Veranstaltungen finden im Comp. lab Luna Pool Marienstraße 7 statt.

**Leistungsnachweis**

Projekt und Präsentation

**Life-lines engineering****2310013 Life-lines engineering (Exercise)****G. Morgenthal**

Veranst. SWS: 2

Seminar

1-Gruppe Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Group A  
 1-Gruppe Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, Group A  
 2-Gruppe Fr, wöch., 15:15 - 16:45, Marienstraße 7 B - Projektraum 301, Group B  
 2-Gruppe Fr, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 205, Group B

**Kommentar**

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

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**2310013 Life-lines engineering (Lecture)****G. Morgenthal**

Veranst. SWS: 4

Integrierte Vorlesung

Fr, Einzel, 09:15 - 12:30, 19.05.2017 - 19.05.2017  
 Do, Einzel, 17:00 - 18:30, Marienstraße 13 C - Hörsaal A, 06.07.2017 - 06.07.2017  
 Do, Einzel, 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, 13.07.2017 - 13.07.2017  
 Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 105, Examination, 20.07.2017 - 20.07.2017  
 Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 106, Examination, 20.07.2017 - 20.07.2017  
 Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 205, Examination, 20.07.2017 - 20.07.2017  
 Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 206, Examination, 20.07.2017 - 20.07.2017  
 Fr, wöch., 09:15 - 12:30, Marienstraße 13 C - Hörsaal B

**Kommentar**

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

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**Primary hazards and risks****2200008 Re-Examination "Wind risk mitigation"****J. Schwarz**

Prüfung

Fr, Einzel, 11:30 - 13:00, Marienstraße 7 B - Seminarraum 205, 21.07.2017 - 21.07.2017

**2340007 Re-Examination "Seismic monitoring"****J. Schwarz**

Prüfung

Fr, Einzel, 08:30 - 11:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 21.07.2017 - 21.07.2017

**Disastermanagement and mitigation strategies****2901005 Re-Examination "Project and Disaster management"****H. Bargstädt**

Prüfung

Di, Einzel, 13:00 - 14:30, Marienstraße 7 B - Seminarraum 206, 01.08.2017 - 01.08.2017

**Stochastics and risk assessment****2500008 Re-Examination "Mathematical simulation"****T. Lahmer**

Prüfung

Mo, Einzel, 13:00 - 15:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 31.07.2017 - 31.07.2017

**2500009 Re-Examination "Signal analysis"****R. Illge**

Prüfung

Mi, Einzel, 10:00 - 11:00, Coudraystraße 13 A - Seminarraum 115, Re-Examination, 26.07.2017 - 26.07.2017

**Structural engineering**

**2310012 Re-Examination "Structural engineering"**

**G. Morgenthal**

Prüfung

Do, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 03.08.2017 - 03.08.2017

**Elective compulsory modules**

**2100001 Experimental Structural Dynamics and building monitoring (Project)**

**V. Zabel**

Veranst. SWS: 4

Projekt

Di, wöch., 07:30 - 12:30, Marienstraße 7 B - Projektraum 301

**Bemerkung**

14 students NHRE only

**Kommentar**

The course conveys skills that are necessary for an experimental analysis of the dynamic properties of a structure. This includes the theory of modal models and frequency response functions, theoretical background of signal processing and modal parameter extraction techniques. The major aspects concerning dynamic measurements such as excitation, types of sensors and their application as well as time and frequency functions are discussed. Practical exercises using modern measurement systems are part of the course. The students will also be introduced to the development of virtual instruments using the graphical programming environment LabVIEW for both data acquisition and signal analysis.

**Voraussetzungen**

Structural dynamics

**Leistungsnachweis**

Project report, presentation

Excursion from 11.05 to 15.05.2015 to University of Thessaloniki

**2204015 Model Validation and Simulation - "Project Wind Engineering"**

**G. Morgenthal**

Veranst. SWS: 4

Projekt

Mi, wöch., 13:30 - 16:45, Marienstraße 7 B - Seminarraum 205

**2204020 Digital As-built and Operations Modelling for City Quarters**

**G. Morgenthal, E. Tauscher, J. Taraben**

Veranst. SWS: 4

Projekt

Di, wöch., 13:30 - 16:45

**Kommentar**

Ziel des Projekts ist die Erarbeitung von Methoden zur Integration generischer Daten in BIM-Modellen offenen Formats. Dabei sollen beispielsweise Sensordaten oder Bilder in Modelle unterschiedlicher Skalierung eingebunden werden. Schwerpunkte:

- Entwicklung von automatisierten Analysevorgängen für unterschiedliche Datentypen
- Untersuchung zur graphischen Darstellung der hinterlegten Daten im Modell
- beispielhafte Implementierung und ausführliche Dokumentation der erarbeiteten Ansätze

### 2205007 Modelling of Steel structures and Numerical simulation

**M. Kraus, S. Mämpel, B. Wittor**

Veranst. SWS: 4

Vorlesung

Di, unger. Wo, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, ab 11.04.2017

Mi, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal A, Examination, 02.08.2017 - 02.08.2017

Mo, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6

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

Mo, wöch., 13:30 - 15:00, Coudraystraße 13 A - Hörsaal 2

#### 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

### 2350007 Re-Examination "Nonlinear analysis of structures ..."

**G. Morgenthal, H. Timmler**

Prüfung

Fr, Einzel, 09:00 - 11:00, Marienstraße 7 B - Seminarraum 205, Re-Examination, 04.08.2017 - 04.08.2017

### 2451007 Stochastic Simulation Techniques and Structural Reliability

**T. Lahmer**

Veranst. SWS: 4

Integrierte Vorlesung

Mo, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 106

Di, gerade Wo, 13:30 - 15:00, Marienstraße 7 B - Projektraum 301

#### Bemerkung

The lecture consists of weekly lectures by Prof. Tom Lahmer (Bauhaus University Weimar) throughout the semester and an intensive practical training (Blockkurs) on applications by Dr. Thomas Most (DYNARDO, Weimar). Please indicate your interest in the course via an E-Mail to Mrs. Terber (marlies.terber@uni-weimar.de) by briefly citing the title of the lecture and providing your name until **April 7th 2015** as this will make the organization of rooms, course material, etc. much easier.

The dates when the blocks will take place will be announced by the middle of April.

#### Kommentar

Soils, rocks and materials like concrete are in the natural state among the most variable of all engineering materials. Engineers need to deal with this variability and make decisions in situations of little data, i.e. under high uncertainties. The course aims in providing the students with techniques state of the art in risk assessment (structural reliability) and stochastic simulation.



The course topics comprise

- (a very brief review) of probability theory
- discrete and continuous random processes and fields
- estimation of statistical parameters
- stochastic simulation techniques (Monte Carlo Samplings)
- reliability-based design
- sensitivity analysis
- structural safety
- Risk assessment and stochastic modeling in practice

The lecture consists of weekly lectures by Prof. Tom Lahmer (Bauhaus University Weimar) throughout the semester and an intensive practical training (Blockkurs) on applications by Dr. Thomas Most (DYNARDO, Weimar)

#### Voraussetzungen

Basic knowledge in probability theory

#### Leistungsnachweis

Klausur oder mündliche Prüfung

### 2500010 Advanced Modeling - Calculation

**K. Gürlebeck, D. Legatiuk**

Veranst. SWS: 6

Vorlesung

Mo, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301

Mo, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 205

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

#### Bemerkung

Ex.ad.req.: Project report

#### Kommentar

Scientifically orientated education in mathematics and computer science in view of a complex interdisciplinary and networked field of work and research, modeling and numerical simulation.

Numerical and analytical solution of partial differential equations, finite difference methods, numerical description of heat flow, wave propagation and elastostatic problems by finite difference methods tools: Maple, MATLAB, Java

#### Voraussetzungen

Advanced Training Course

#### Leistungsnachweis

1 exam (written or oral)