

## **Vorlesungsverzeichnis**

M.Sc. Natural hazards and risk in structural engineering

Sommer 2013

Stand 08.10.2014

<b>M.Sc. Natural hazards and risk in structural engineering</b> .....	<b>3</b>
<b>Wahlpflichtmodul I</b> .....	<b>3</b>
<b>Wahlpflichtmodul II</b> .....	<b>3</b>
<b>Wahlpflichtmodul III</b> .....	<b>3</b>
<b>Earthquake engineering and structural design</b> .....	<b>3</b>
<b>Experimental structural evaluation and rehabilitation</b> .....	<b>3</b>
<b>Finite element methods and structural dynamics</b> .....	<b>3</b>
<b>Geo- and hydrotechnical engineering</b> .....	<b>4</b>
<b>Geographical Information Systems (GIS) and building stock survey</b> .....	<b>5</b>
<b>Hazard projects and advanced geotechnologies</b> .....	<b>5</b>
<b>Life-lines engineering</b> .....	<b>5</b>
<b>Primary hazards and risks</b> .....	<b>5</b>
<b>Risk projects and evaluation of structures</b> .....	<b>6</b>
<b>Stochastics and risk assessment</b> .....	<b>6</b>
<b>Structural engineering</b> .....	<b>6</b>
<b>Elective compulsory modules</b> .....	<b>6</b>

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

Veranst. SWS: 6

Vorlesung

Do, wöch., 15:15 - 16:45, Marienstraße 7 B - Projektraum 301, ab 30.05.2013

Do, Einzel, 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, 06.06.2013 - 06.06.2013

Do, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal C, ab 13.06.2013

Do, wöch., 11:00 - 12:30, Marienstraße 7 B - Seminarraum 205

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

Do, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal C, bis 30.05.2013

Do, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 205

**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

**Examination "Earthquake engineering and structural design"****J. Schwarz, L. Abrahamczyk**

Prüfung

Di, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal C, 16.07.2013 - 16.07.2013

**Experimental structural evaluation and rehabilitation****Finite element methods and structural dynamics****Finite element methods****T. Rabczuk**

Veranst. SWS: 4

Integrierte Vorlesung

Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, 23.05.2013 - 13.06.2013

Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, ab 27.06.2013

Mi, wöch., 11:00 - 12:30, Marienstraße 7 B - Seminarraum 205

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

Do, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, bis 09.05.2013

**Kommentar**

Gemischte Finite Elemente Modelle, lineare FE-Analyse in der Strukturmechanik, geometrisch und physikalisch nichtlineare Effekte; Iterative Lösungen von nichtlinearen Gleichungssystemen, Fehlerindikatoren und adaptive FE-Verfahren.

Mixed finite element models; non-linear finite element analysis in solid mechanics (teometrically and physicalle non-linear methods); solution of equilibrium uquations; error estimates and adaptive finite element methods

**Leistungsnachweis**

Klausur oder mündliche Prüfung

**Geo- and hydrotechnical engineering**

**Examination "Flood management" (Modul: Geo- and hydrotechnical engineering)**

**J. Schwarz, H. Maiwald**

Prüfung

Di, Einzel, 13:00 - 14:30, Marienstraße 13 C - Hörsaal C, 23.07.2013 - 23.07.2013

**Examination "Soil mechanics" (Modul: Geo- and hydrotechnical engineering)**

**K. Witt, F. Wuttke**

Prüfung

Di, Einzel, 09:00 - 12:00, Coudraystraße 11 C - Seminarraum 101, 23.07.2013 - 23.07.2013

Di, Einzel, 09:00 - 12:00, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202, 23.07.2013 - 23.07.2013

**Flood Management**

**H. Hack**

Veranst. SWS: 2

Vorlesung

Fr, Einzel, 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, 05.04.2013 - 05.04.2013

Fr, Einzel, 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, 12.04.2013 - 12.04.2013

Fr, Einzel, 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, 19.04.2013 - 19.04.2013

Fr, Einzel, 13:30 - 15:00, Marienstraße 7 B - Seminarraum 205, 26.04.2013 - 26.04.2013

Mi, Einzel, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, 22.05.2013 - 22.05.2013

Mi, wöch., 15:15 - 16:45, Marienstraße 7 B - Seminarraum 205

**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

**Soil Mechanics**

**K. Witt, F. Wuttke**

Veranst. SWS: 4

Vorlesung

Di, wöch., 13:30 - 16:45, Coudraystraße 11 C - Seminarraum/Hörsaal 001

#### 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 there 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

## Geographical Information Systems (GIS) and building stock survey

### Hazard projects and advanced geotechnologies

#### Examination "Hazard projects and advanced geotechnologies"

#### J. Schwarz

Prüfung

Fr, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal C, 26.07.2013 - 26.07.2013

#### Hazard projects and advanced geotechnologies

#### J. Schwarz

Projekt

Mo, wöch., 15:15 - 18:30, Marienstraße 7 B - Seminarraum 205

Mo, wöch., 15:15 - 18:30, Marienstraße 7 B - Projektraum 301

Veranst. SWS: 4

#### 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

### Primary hazards and risks

**Examination "Primary hazards and risks"**

**J. Schwarz**

Prüfung

Fr, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal C, 19.07.2013 - 19.07.2013

**Risk projects and evaluation of structures**

**Stochastics and risk assessment**

**Examination "Stochastics and Risk Assessment - Mathematical simulation"**

**R. Illge, K. Müller**

Prüfung

Mi, Einzel, 13:00 - 15:00, Marienstraße 7 B - Seminarraum 205, 24.07.2013 - 24.07.2013

**Structural engineering**

**Examination "Structural engineering"**

**G. Morgenthal**

Prüfung

Di, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 205, 30.07.2013 - 30.07.2013

**Elective compulsory modules**

**Advanced Modeling - Calculation**

**K. Gürlebeck, D. Legatiuk**

Veranst. SWS: 6

Vorlesung

Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, ab 10.04.2013

Di, wöch., 09:15 - 12:30, Marienstraße 7 B - Seminarraum 205

**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)

**Examination "Advanced modelling - Calculation"****K. Gürlebeck**

Prüfung

Do, Einzel, 09:00 - 12:00, Coudraystraße 13 B - Seminarraum 210, 25.07.2013 - 25.07.2013

**Examination "Modelling of structures and numerical simulation"****F. Werner**

Prüfung

Mo, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal B, 29.07.2013 - 29.07.2013

**Examination "Secondary hazards and risks" (land-use, site studies)****K. Witt, F. Wuttke**

Prüfung

Mi, Einzel, 09:00 - 12:00, Coudraystraße 11 C - Seminarraum (geologische Sammlung) 202, 17.07.2013 - 17.07.2013

**Experimental Structural Dynamics****V. Zabel**

Projekt

Mo, wöch., 09:15 - 12:30, Marienstraße 7 B - Projektraum 301

Veranst. SWS: 4

**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