Vorlesungsverzeichnis

M.Sc. Digital Engineering (ab PV 2023)

WiSe 2025/26

Stand 23.02.2026

M.Sc. Digital Engineering (ab PV 2023)

Faculty Welcome for Master's Students Digital Engineering
Monday, 13th October 2025, 10 a.m., Bauhausstraße 11, seminar room H

Project fair
Monday, 13th October 2025, 5 p.m., Steubenstraße 6, Maurice-Halbwachs-Auditorium

Fundamentals

Algorithms and Datastructures

Applied Mathematics and Stochastics

301012-1 Applied mathematics (Lecture)

B. Rüffer, N. Gorban Veranst. SWS: 2
Vorlesung
Mo, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal D

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 will be studied.

Leistungsnachweis

1 written exam

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

301012-2 Applied mathematics (Exercise)

B. Rüffer, N. Gorban Veranst. SWS: 1
Seminar
1-Gruppe Do, gerade Wo, 15:15 - 16:45, Coudraystraße 13 B - Seminarraum 210, Group 1
2-Gruppe Do, unger. Wo, 15:15 - 16:45, Marienstraße 13 C - Hörsaal D, Group 2

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 will be studied.

Leistungsnachweis

1 written exam

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

301012-3 Stochastics for risk assessment (Lecture) / Mathematics for risk management (MBM)

T. Lahmer, Z. Jaouadi, R. Das, N. Hazrati Veranst. SWS: 2
Vorlesung
Di, wöch., 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2

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

301012-4 Stochastics for risk assessment / Mathematics for risk management (MBM) (Exercise)

T. Lahmer, Z. Jaouadi, R. Das, N. Hazrati Veranst. SWS: 1
Seminar
1-Gruppe Do, unger. Wo, 15:15 - 16:45, Coudraystraße 13 B - Seminarraum 210, Exercise for NHRE (Group 1) and DE
1-Gruppe Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium for NHRE (Group 1) and DE
2-Gruppe Do, gerade Wo, 15:15 - 16:45, Marienstraße 13 C - Hörsaal D, Exercise for NHRE (Group 2)
2-Gruppe Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 206, Tutorium for NHRE (Group 2) and DE

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

Introduction to Mechanics

420160001 Introduction to Mechanics

T. Rabczuk, L. Nguyen Tuan Veranst. SWS: 4
Vorlesung

Do, wöch., 13:30 - 15:00, Marienstraße 7 B - Seminarraum 103, Lecture
Fr, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 206, Lab class

Beschreibung

Einführung in die Mechanik

1. Einführung in die Statik:
1.1 Kräfte und Momente
1.2 Auflagerkräfte statisch bestimmter Systeme
1.3 Schnittkräfte in Fachwerken und Balken
2. Einführung in die Elastostatik
2.1 Spannungszustand
2.2 Verzerrungszustand
2.3 Berechnung von Spannungen und Verschiebungen unter axialer und Biegebeanspruchung
2.4 Prinzip der virtuellen Arbeit

engl. Beschreibung/ Kurzkommentar

1. Introduction to statics:
1.1 Forces and moments
1.2 Reaction forces of statically determinate systems
1.3 Internal actions in pin-jointed frames and beams
2. Introduction to elastostatics
2.1 Stresses
2.2 Strains
2.3 Stresses and displacements under axial and bending loading.
2.4 Principle of Virtual Work

Leistungsnachweis

Schriftliche Klausur, 150 Minuten

Mathematics for Data Science

Object-oriented Modeling and Programming in Engineering

303005 Object-oriented Modeling and Programming in Engineering

C. Koch, M. Artus Veranst. SWS: 4
Vorlesung
1-Gruppe Di, wöch., 15:15 - 16:45, Marienstraße 7 B - Projektraum 301, ExerciseNHRE
3-Gruppe Fr, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, ExerciseDEM
4-Gruppe Fr, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, ExerciseDEM
Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 B - Hörsaal 3, 17.10.2025 - 17.10.2025
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, lecture

Beschreibung

Objektorientierte Modellierung und Programmierung für Ingenieure

In diesem Modul wird fundamentales Wissen vermittelt, um objektorientierte Softwarelösungen für Ingenieuraufgaben zu konzipieren und zu implementieren. Dies beinhaltet Fähigkeiten zur Analyse von Ingenieurproblemen, um entsprechende objektorientierte Modelle zu erzeugen und geeignete Algorithmen auszuwählen. Die verwendete Programmiersprache ist Java. Da die Basiskonzepte allgemeingültig beschrieben werden, werden die Studierenden in die Lage versetzt, auch andere modernen Programmiersprachen zu einzusetzen.

Inhalte:

- Kontrollstrukturen (alternatives, loops, sequences)
- Grundlegende Datenstrukturen und Algorithmen
- Prinzipien der objektorientierten Softwareentwicklung (Datenkapselung, Vererbung, Polymorphie)
- Unified Modeling Language als Werkzeug für Softwareentwurf und –dokumentation
- Entwicklung grafischer Nutzerschnittstellen mithilfe des Model-View-Controller-Entwurfsmusters

engl. Beschreibung/ Kurzkommentar

Object-oriented Modeling and Programming in Engineering

This module covers the basic knowledge needed to develop and implement object-oriented software solutions for engineering problems. This includes the ability to analyse an engineering problem, so that corresponding object-oriented models can be created and suitable algorithms can be selected. The programming language used in this module is Java. However, the since fundamental concepts are described in general, students will be able to program in other modern programming languages.

Content:

- Essential programming constructs (alternatives, loops, sequences)
- Fundamental data structures and algorithms
- Principles of object oriented software development (encapsulation, inheritance and polymorphism)
- The Unified Modeling Language as a tool for software design and documentation

Development of graphical user interfaces using the Model-View-Controller pattern

Leistungsnachweis

schriftliche Klausur

1 written exam

”Object-oriented Modeling and Programming in Engineering”

120min (100%) / **WiSe** + SuSe

Software Engineering

Statistics

Structural Engineering Models

Engineering Methods

Advanced Building Information Modeling

Analysis and Design of Concrete Structures

204034 Analysis and Design of Concrete Structures

G. Morgenthal, S. Chawdhury, G. Tondo Veranst. SWS: 4
Integrierte Vorlesung

Fr, wöch., 09:15 - 12:30, LectureRoom LH B M13C* dates by arrangementTime schedule will be announced by the responsible lecturers. Lecture shares time slot with lecture Structural engineering / Wind Engineering.
Fr, wöch., 13:30 - 16:45, ExerciseRoom H BH11 / Audimax St6 (see the announcements by the lecturers)* dates by arrangementTime schedule will be announced by the responsible lecturers. Exercise shares time slot with lecture Structural engineering / Wind Engineering.

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 as well as steel and steel-concrete composite structures.

Content: History of structures; building materials; structural form and structural behaviour; actions on structures; structural reliability and codes of practice; mechanical modelling of structures; design of reinforced concrete structures

Bemerkung

This module is comprised of:

”Analysis and Design of Reinforced Concrete Structures” (Lecture, 2 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Exercise, 1 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Project, 1 SWS)

Voraussetzungen

B.Sc.

Leistungsnachweis

Written exam (60%),

Project (40%)

Complex Dynamics

Computer Models for Physical Processes - from observation to simulation

Deep Learning in Computional Mechanics

425250018 Deep Learning in Computational Mechanics

S. Kollmannsberger, L. Herrmann
Vorlesung
Do, wöch., 13:30 - 15:15, Coudraystraße 13 B - Hörsaal 3, Vorlesung, ab 16.10.2025
Do, wöch., 15:15 - 16:45, Coudraystraße 13 B - Hörsaal 3, Übung, ab 16.10.2025

Beschreibung

Grundlegende Konzepte des maschinellen Lernens; Neuronale Netze; Physics-informed neural networks (PINNs), PINN-Variationen (Deep-Energy-Methode, Variations-PINNs, schwache adversarische Netze) & Erweiterungen; Dimensionalitätsreduktion; Modelle reduzierter Ordnung; Sparse Identification of Non-linear Dynamic Systems (SINDy); Clustering; Materialmodellierung mit neuronalen Netzen (physikalisch erweiterte neuronale Netze);

Generative künstliche Intelligenz in der Computermechanik (Autoencoder, generative adversarial networks (GANs), Diffusionsmodelle & Transformatoren); Inverse Probleme wie zerstörungsfreie Prüfung, Topologieoptimierung oder Modellfindung; Diskussion und Einblick in aktuelle Literatur.

Voraussetzungen

Fundamental programming knowledge, Linear Algebra at Bachelor Level

Leistungsnachweis

schriftliche Prüfung

Design and Interpretation of Experiments

205014-1 Design and interpretation of experiments: Signal Processing, Design of Experiments and System Identification

T. Lahmer, Z. Jaouadi, R. Das Veranst. SWS: 2

Integrierte Vorlesung

1-Gruppe Mi, unger. Wo, 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, Exercise
2-Gruppe Mi, gerade Wo, 09:15 - 10:45, Marienstraße 7 B - Projektraum 301, Exercise
3-Gruppe Mi, unger. Wo, 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, Exercise
4-Gruppe Mi, gerade Wo, 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, Exercise
Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal C, Signal Processing, Design of Experiments and System Identification, 14.10.2025 - 02.12.2025
Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal C, Signal Processing, Design of Experiments and System Identification, 09.12.2025 - 03.02.2026

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”

205014-2 Design and interpretation of experiments: Experiments in Structural Engineering

M. Kraus, S. Ibañez Sánchez Veranst. SWS: 2

Integrierte Vorlesung

Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal C, Experiments in structural engineering, 14.10.2025 - 02.12.2025
Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal C, Experiments in structural engineering, 09.12.2025 - 03.02.2026

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”

Experimental Structural Dynamics

Finite Element Methods

401015-1 Finite element methods (Lecture)

S. Kollmannsberger, J. Wagner Veranst. SWS: 2

Vorlesung

Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, dates by arrangement

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: ”Finite element methods” /

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

401015-2 Finite element methods (Exercise)

S. Kollmannsberger, J. Lopez Zermeño, L. Nguyen Tuan Veranst. SWS: 1
Seminar
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium - Group 1
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 205, Tutorium - Group 2
Di, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal B, Group 1

Indoor Environmental Modeling

Introduction to Mobility and Transport

909021 International Case Studies in Transportation

M. Rünker, T. Feddersen, U. Plank-Wiedenbeck, J. Uhlmann Veranst. SWS: 4
Vorlesung
Fr, Einzel, 09:15 - 16:45, Infotermin / Information event Schwanseestr. 13, Raum/room 2.02, 10.10.2025 - 10.10.2025
Fr, Einzel, 09:15 - 16:45, Schwanseestr. 13, Raum/room 2.02, 17.10.2025 - 17.10.2025
Fr, Einzel, 09:15 - 16:45, Schwanseestr. 13, Raum/room 2.02, 21.11.2025 - 21.11.2025
Fr, Einzel, 09:15 - 16:45, Schwanseestr. 13, Raum/room 2.02, 19.12.2025 - 19.12.2025
Fr, Einzel, 09:15 - 16:45, Schwanseestr. 13, Raum/room 2.02, 09.01.2026 - 09.01.2026
Fr, Einzel, 09:15 - 16:45, Prüfung / examSchwanseestr. 13, Raum/room 2.02, 16.01.2026 - 16.01.2026

Beschreibung

Wie gehen wir mit Herausforderungen im Bereich Mobilität und Verkehr um, z. B. mit den Auswirkungen auf die Klimakrise, mit Problemen des zunehmenden Gegensatzes zwischen ländlichen und städtischen Gebieten oder mit Fragen der Migration und räumlichen Beschränkungen? Wir glauben, dass dies nur durch die Zusammenführung von Fachwissen aus verschiedenen akademischen und praktischen Bereichen erreicht werden kann. Das Seminar stellt daher Positionen aus einer ausgeprägt interdisziplinären Position vor, die Verkehrs- und Stadtplanung mit Medienwissenschaft, Medienkunst, Journalismus und Sozialwissenschaft verbindet. Wir arbeiten in unseren Sitzungen mit Text-, Video-, Audiomaterial und erschließen uns dabei ganz unvoreingenommen Themen aus den Bereichen Mobilität und Verkehr. Die ausgewählten Beispiele bieten Perspektive, die über den europäischen Kontext hinausgehen.

Der Kurs ist in zwei Teile gegliedert: Zunächst werden die Studierenden gebeten, an einem Online-Angebot teilzunehmen, das eine Einführung in die Grundlagen der Verkehrsplanung bietet. Anschließend arbeiten wir in einem intermedialen Seminar im Plenum sowie in Gruppen. Eine Vorbereitung auf die jeweiligen Sitzungen wird vorausgesetzt.

Bemerkung

Das Seminar findet als Blockveranstaltung an den oben aufgeführten Terminen statt.
Der Einführungskurs zur nachhaltigen Verkehrsplanung findet online statt (self-paced).
Der Kurs ist auf 15 Teilnehmende begrenzt.

Informationsveranstaltung am 10.10.2025 um 9:00 Uhr in der Schwanseestr. 13, Raum 2.02
Einsendeschluss für das Motivationsschreiben: 12.10.2025
Die Zusage für den Kurs wird am 14.10.2025 verschickt.

Voraussetzungen

Bitte beachten Sie, dass eine kurze Bewerbung mit Darstellung Ihrer Motivation und Ihres akademischen Hintergrunds erforderlich ist. Die Modalitäten werden auf der Informationsveranstaltung näher erläutert.

Leistungsnachweis

Mündliche Prüfung in Form einer Präsentation ODER eines Essays

Macroscopic Transport Modelling

2909020 Macroscopic Transport Modelling

K. McFarland, L. Thiebes, U. Plank-Wiedenbeck, J. Uhlmann Veranst. SWS: 4
Integrierte Vorlesung
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Projektraum 302
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - PC-Pool Luna-red

Beschreibung

Part A: Principles in Transport Modelling
We will consider the transport modelling framework, incl. methodologies, procedures, data-requirements (e.g. land-use-data, behavioral data, opertional and network data). The standard 4-step modelling approach and related methods and algorithms will be discussed.
Part B: Transport Model Development
We get known both sides of transport modelling - demand side (passenger) and supply side (e.g. network, transport modes). Modelling from infrastructure modelling, traffic generation, traffic destinations, mode choice and route choice calculation methods are considered
Part C: Transport Model Quality
The value of a transport model is determined by its quality. Quality evaluation is based on model validation and calibration. Which are suitable empirical data (e.g. meaning of traffic counts) and how can they be used for quality evaluation?
Part D: Transport Model Application
We discuss the meaning of transport models for other disciplines like transport planning. Within selected use cases model setup and configuration are considered according to different planning tasks.
Part E: Practical Exercises
Practical exercises on transport modelling are provided in parallel to the lectures. Within these guided exercixes macroscopic transport modelling software (PTV Visum) will be appllied. Application of learned methodological approach(es) and critical reflection of the model outputs.Perspectives in transport modelling. Student presentation.

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bestätigung der Professur Verkehrssystemplanung notwendig

Bewerbung bis 14.10.2025 ausschließlich per Mail an vsp@bauing.uni-weimar.de. Bitte kurz den fachlichen Hintergrund und die Motivation für die Kursteilnahme schildern.

Notwendig: Vorkenntnisse in der Modellierung/ Simulation und Verkehrsplanung und-technik. **Sollten keine Vorkenntnisse im Bereich der Verkehrsplanung vorliegen muss zuerst der Kurs "International Case Studies in Transportation" belegt werden.**

Leistungsnachweis

Part 1: based on section E

Project work and presentation, english, 50%

IMPORTANT: Submission of the project is a prerequsite for participation in exam.

Part 2: based on sections A, B, C, D:

Written exam (120 Min), english, 50%

Mechanics of Engineering Materials

424260000 Mechanics of Engineering Materials

L. Göbel Veranst. SWS: 4

Integrierte Vorlesung

Mo, wöch., 13:30 - 15:00, Marienstraße 7 B - Seminarraum 106, 13.10.2025 - 02.02.2026
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 105, 14.10.2025 - 03.02.2026

Beschreibung

Essential contents comprise: Structure of materials, basic concepts of computational mechanics (stresses, strains, tensor algebra), elasticity, plasticity and failure (stress-strain diagrams, plasticity theory, hardness), fracture mechanics, viscoelasticity, creep, rheology.

Bemerkung

Please be sure to register in the corresponding Moodle room for the course. All organizational announcements and online events are made via this platform. The learning material is also made available there.

Voraussetzungen

Mandatory requirements: none

Recommended requirements: Building materials science, technical mechanics

Leistungsnachweis

Written exam (180 minutes)

Microscopic Traffic Simulation

Modelling of Steel Structures and Numerical Simulation

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

M. Kraus, S. Ibañez Sánchez, S. Chowdhury Veranst. SWS: 4

Vorlesung

Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 22.10.2025 - 22.10.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 12.11.2025 - 12.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 26.11.2025 - 26.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 10.12.2025 - 10.12.2025
Di, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Lecture, ab 06.01.2026
Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Exercise, ab 07.01.2026

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

Voraussetzungen

B.Sc.

Mechanics

Leistungsnachweis

1 Project report

”Modelling of steel structures and numerical simulation” (0%) / **WiSe**

1 written exam

”Modelling of steel structures and numerical simulation”/ 120 min (100%) / **WiSe** + SuSe

Optimization

Simulation Methods in Engineering

Spatial Information Systems (GIS)

439100 Raumbezogene Informationssysteme/ Spatial information systems (GIS)

T. Gebhardt, V. Rodehorst Veranst. SWS: 4

Integrierte Vorlesung

Fr, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal B, Übungen, ab 24.10.2025
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, Vorlesungen

Beschreibung

Die Vorlesung vermittelt vertiefte Grundlagen raumbezogener Informationssysteme, wie z.B. die Aufnahme, Organisation, Analyse und Präsentation raumbezogener Daten. Die Themen umfassen geographische Daten und frei verfügbare Ressourcen, Referenzsysteme und Kartennetzentwürfe, Geo-Datenbanken und effiziente Datenstrukturen, geometrische und topologische Datenanalyse, kartographische Generalisierung und Visualisierung sowie GIS im Planungskontext.

Bemerkung

Für die Selbsteinschreibung in den zugehörigen MOODLE-Lernraum (Hyperlink siehe oben!) lautet das Passwort: spatial2025

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und des Projektes mit abschließender Klausur

Stochastic Simulation Techniques and Structural Reliability

Structural Dynamics

401011 Applied structural dynamics

A. Athanasiou Veranst. SWS: 2

Vorlesung

Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D

Beschreibung

Appl. SD (winter semester): The students will be introduced to the theory of structural dynamics and apply such theory to solve problems occurring in engineering practice. In particular, the students shall: (i) learn how to formulate the dynamic equilibrium of idealised structural systems, (ii) implement analytical and numerical methods for dynamic response simulations under earthquake and wind excitation, and (iii) predict and evaluate the performance of single- and multi- story buildings in seismic and wind environments, excited in the linear and nonlinear range of response.

Course content:

free and forced vibrations, dynamic equilibrium, analytical and numerical solutions, modal analysis, response spectrum, vibration of buildings under earthquake and wind excitation, seismic response of linear and nonlinear systems, dynamic wind response simulation, comprehensive and realistic in-class examples.

Leistungsnachweis

1 midterm exam (written or oral) (30 min, 30%)**, 1 final written exam** ”Applied structural dynamics” (40 min, 40%)**, 25% assignments, 5% in class quizzes/activities** / **WiSe** + SuSe

401014-1 Structural Dynamics (Lecture)

T. Most Veranst. SWS: 2

Vorlesung

Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, * dates by arrangement

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: ”Structural dynamics” /

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

1 written report: ”Numerical dynamic analysis of MDOF systems”

(Examination requirement for ”Structural dynamics”) / **WiSe**

401014-2 Structural Dynamics (Exercise)

T. Most, R. Das Veranst. SWS: 1
Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group 1
1-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 206, Tutorium - Group 1
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group 2
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Seminarraum 104, Tutorium - Group 2
Di, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Projektraum 301
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 103

Bemerkung

- Complementary to the lectures

Computer Science Methods

423150021 Deep Learning for Computer Vision

V. Rodehorst, J. Eick, A. Frolov, D. Tschirschwitz Veranst. SWS: 4
Integrierte Vorlesung

Fr, wöch., 15:15 - 16:45, Bauhausstraße 11 - N 004, Lecture/ Lab class, ab 17.10.2025
Mo, wöch., 17:00 - 18:30, Bauhausstraße 11 - N 004, Lecture/ Lab class, 20.10.2025 - 24.11.2025
Mo, wöch., 17:00 - 18:30, Bauhausstraße 9a - Linux-Pool, DBL, 1.OG, LINUX-Pool, DBL, Bh9a, 1. OG, ab 01.12.2025

Beschreibung

In diesem Kurs werden die Prinzipien, Techniken und Anwendungen des tiefgehenden Lernens in Computer Vision behandelt. Die Teilnehmer lernen, wie man neuronale Netze für die Bildklassifizierung, Objekterkennung, semantische Segmentierung und andere Computer-Vision-Aufgaben entwickelt, trainiert und validiert. Es werden auch Techniken zur Verbesserung der Leistung von Deep-Learning-Modellen und Veranschaulichungen behandelt, um Anhaltspunkte für die weitere Modellentwicklung zu erhalten. Am Ende des Kurses werden die Studierenden in der Lage sein, Deep-Learning-Techniken anzuwenden, um reale Probleme in verschiedenen Bereichen zu lösen.

Voraussetzungen

Image Analysis and Object Recognition

Leistungsnachweis

Erfolgreiche Teilnahme an den Laborübungen.

Gewichtung der Note: 100% schriftliche Klausur

Computer Graphics: Fundamentals of Imaging

Formal Methods for Software Engineering

422250037 Formal Methods for Software Engineering

J. Ringert, .. Soaibuzzaman Veranst. SWS: 4

Vorlesung

Di, wöch., 09:15 - 10:45, Bauhausstraße 11 - R 015, Lecture, ab 14.10.2025
Fr, wöch., 11:00 - 12:30, Bauhausstraße 11 - R 015, Lecture/ Lab class, ab 17.10.2025

Beschreibung

Formal methods are rigorous techniques for the mathematical analysis of software and hardware systems. This course introduces aspects of formal methods with applications to software engineering problems.

The topics covered in the course include:

- Introduction to Formal Methods
- Formal methods tools, e.g.,
  - SMT solvers on the example of Z3
  - Relational models and the Alloy Analyzer
  - Model Checking using SMV
- Applications of formal methods in practice

After completion students will be able to

- Model problems in different formalisms
- Analyze software models using formal method tools
- Evaluate formal methods for software engineering problems

Leistungsnachweis

Participation in exercises

Marked homework project including a presentation

Generative Software Engineering

Image Analysis and Object Recognition

Introdcution to Machine Learning and Data Mining

4439110 Introduction to Machine Learning

B. Stein, J. Bevendorff, M. Kanadan Veranst. SWS: 4

Vorlesung

Do, wöch., 09:15 - 10:45, Bauhausstraße 11 - N 004, Lecture , ab 23.10.2025
Do, wöch., 09:15 - 10:45, Bauhausstraße 11 - R 014, Lecture , ab 23.10.2025
Do, gerade Wo, 11:00 - 12:30, Bauhausstraße 11 - N 004, Lab class, ab 30.10.2025
Do, gerade Wo, 11:00 - 12:30, Bauhausstraße 11 - R 014, Lab class, ab 30.10.2025

Beschreibung

In this course students will learn to understand machine learning as a guided search in a space of possible hypotheses. The mathematical means to formulate a particular hypothesis class determines the learning paradigm, the discriminative power of a hypothesis, and the complexity of the learning process.

The lecture covers hypothesis spaces, model bias, regression for classification, logistic regression, effectiveness computation, loss function derivation, gradient descent, regularization, neural networks, decision trees, impurity functions, Bayesian learning. The lecture introduces concepts, algorithms, and theoretical backgrounds.

The accompanying lab treats both theoretical and applied tasks to deepen the understanding and hands-on experience of the field. Team work (2-3 students) is appreciated.

Leistungsnachweis

Klausur

Photogrammetric Computer Vision

4256303 Photogrammetric Computer Vision

V. Rodehorst, M. Kaisheva Veranst. SWS: 4
Vorlesung
Mo, wöch., 09:15 - 10:45, Bauhausstraße 11 - N 004, Lecture, ab 20.10.2025
Mo, unger. Wo, 11:00 - 12:30, Bauhausstraße 11 - N 004, Lab class, ab 20.10.2025

Beschreibung

Die Vorlesung gibt eine Einführung in die Grundlagen der Sensor-Orientierung und 3D-Rekonstruktion. Das Ziel ist ein Verständnis der Prinzipien, Methoden und Anwendungen der bildbasierten Vermessung. Behandelt werden unter anderem die algebraische projektive Geometrie, Abbildungsgeometrie, Kalibrierung, Orientierungsverfahren, Stereo-Bildzuordnung und weitere Verfahren zur Oberflächenrekonstruktion.

Voraussetzungen

Einführung in die Informatik, Grundlagen Programmiersprachen

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und des Projektes mit abschließender Klausur

Search Algorithms

Visualization

Project

425210000 Building Language Models

B. Stein, M. Gohsen, M. Wiegmann Veranst. SWS: 10
Projekt

Beschreibung

Implement several language models from different generations from scratch using the same training texts. Build a website to provide a prefix, select the model and its parameters, and see the differences in the generation.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

425210003 Digital Twin Framework for Buildings and Structures

M. Artus, C. Koch, J. Ringert, B. Burse Veranst. SWS: 10
Projekt

Beschreibung

Buildings and civil engineering structures are unique. Creating a digital twin for them takes much time because of the requirements specific to each building. Reducing the time for creating Digital Twins for these assets, it would be helpful to have a framework that takes care about generating software for embedded systems, data storage, communication and visualization. This project can make use of several software developed in prior projects.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Basic Knowledge in Programming, Software Engineering

425210004 From Text to Image

B. Stein, T. Gollub, S. Ruth Veranst. SWS: 10
Projekt

Beschreibung

The project deals with the problem of automatically assessing the characteristics of images that refer to a particular text. For example, we want to assess which of the main objects mentioned in the text are present in the images. Or how aspects, that are left open in the text, are visualized in the images.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

425210005 Gaussian Splatting for Mobile Mixed Reality Devices

B. Fröhlich, A. Kreskowski, G. Rendle Veranst. SWS: 10
Projekt

Beschreibung

Novel-view synthesis techniques based on Neural Radiance Fields [Mildenhall et al. 2020], Plenoxels [Fridovich-Keil et al. 2022], or, most recently and best known, 3D Gaussian Splatting [Kerbl et al. 2023, Liu et al. 2024] enable the visually high-fidelity representation of surfaces that are hard or even almost impossible to reconstruct using classic photogrammetric approaches. Examples of such surfaces include fur, vegetation, transparent or translucent objects and thin structures in general. The novel-view synthesis approaches perform faithful interpolation of existing color information contained in a set of high-quality input images. Novel views can be rendered in real-time, provided one has access to reasonable powerful graphics hardware.

In a previous project, we explored the Gaussian Splatting literature and optimized an existing Unity-based rendering plugin for efficient rendering of Gaussian-based scenes on desktop graphics hardware. We also identified several challenges in rendering these models on mobile devices.

In this project, we aim to build on these insights and optimize Gaussian Splatting algorithms for mobile mixed reality (MR) devices such as the Meta Quest 3 or other mobile devices such as tablets. We will research, implement, and evaluate promising techniques in areas like visibility culling, output-sensitive rendering, data compression, and hybrid representations. Our goal is to fully leverage mobile hardware for real-time rendering at appropriate quality levels.

In addition to the challenge of efficiently rendering on low-power MR hardware, we want to address related research questions with part of the project team, such as how to interact with scene elements consisting of hundreds of thousands of unstructured Gaussian-based primitives or how to convincingly blend Gaussian-Splatting-based scenes with camera streams obtained by mixed-reality devices.

If you are experienced or interested in real-time computer graphics and/or topics in the field of mixed reality, we would be excited to welcome you to our project!

We will provide you with a Quest 3 for the duration of the project and will address the challenges of rendering photorealistic real-world datasets on low-power MR hardware.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Solid software programming skills in C++ and a successfully completed computer graphics course or equivalent qualifications. Experience with GPGPU programming or algorithm design is helpful, but not required.

Leistungsnachweis

Active participation during the project meetings; design, implementation and evaluation of algorithms designed throughout the project; intermediate and final project presentations; final project report.

425210006 Hot Topics in Computer Vision WiSe25/26

V. Rodehorst, J. Eick, A. Frolov, M. Kaisheva Veranst. SWS: 10
Projekt

Beschreibung

Die Teilnehmer werden an ein aktuelles forschungs- oder industrierelevantes Thema herangeführt. Es ist nicht beabsichtigt einen festgelegten Bereich in voller Breite zu explorieren. Stattdessen werden die Teilnehmer mit der vollen Komplexität eines begrenzten Themas konfrontiert und die Eigeninitiative gefördert. Es ermöglicht einen Einblick in die Forschungs- und Entwicklungsprojekte des Fachgebiets.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Vorlesungen „Photogrammetric Computer Vision” oder „Image Analysis and Object Recongnition” wünschenswert. Gute Programmierkenntnisse (z.B. C/C++, MATLAB/Octave, Python, OpenCL/CUDA)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

425210008 Next-Generation Development of the Args.me Argument Search Engine

B. Stein, K. Heinrich, M. Kanadan Veranst. SWS: 10
Projekt

Beschreibung

In this project, we enhance args.me, an argument search engine, by expanding its features and improving performance. We develop a unified user interface that incorporates advanced retrieval algorithms, considers user preferences, leverages argumentative snippets, and integrates dialogical argumentation capabilities.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

425210009 Optimierung von Stundenplänen

A. Jakoby Veranst. SWS: 10
Projekt

Bemerkung

Time and place will be announced at the project fair.

425210011 Software Engineering for Autonomous Vehicles 3

J. Ringert, .. Soaibuzzaman Veranst. SWS: 10
Projekt

Beschreibung

We will develop software to control autonomous vehicles. The physical vehicle will be equipped with a range of sensors, e.g., LiDAR, cameras, gyroscopes, and distance sensors. We will use industry strength software platforms like the Robot Operating System (ROS2).

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Digital Engineering students must have completed their foundations.

Leistungsnachweis

Projektbericht und Ergebnisse in Form von Software.

425210012 SPHINCS and Friends: Modern Hash-Based Signatures

S. Lucks, J. Leuther Veranst. SWS: 10
Projekt

Beschreibung

Hash-based signature algorithms are promising candidates for securing communication in the age of quantum computers. SPHINCS+ is an example of such a stateless signature algorithm that gained popularity from the recent „Post-Quantum Cryptography Standardisation Competition". A major downside of hash-based signature algorithms like SPHINCS+ is the size of the signature itself, which is magnitudes larger than what other algorithms provide. However, there are recent alternatives to SPHINCS+ that are being developed to reduce the downsides while still maintaining the benefits of the hash-based approach. For example, two such variants are Giza and Manticore. In this project, you will work with experts on this subject to get familiar with these alternatives. Your task is to analyse them cryptographically and to implement prototypes of these algorithms.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

- Course: Introduction to Modern Cryptography (or equivalent)
- Interest in Scientific Work
- Ability to self-organize

Leistungsnachweis

Zwischenpräsentationen, Abschlusspräsentation, Abschlussbericht

425210014 Visuelle Analyse von Fragebögen

B. Fröhlich, D. Kiesel, I. López García Veranst. SWS: 10
Projekt

Beschreibung

Fragebögen sind eines der am häufigsten genutzten Mittel um Daten zu erheben, sei es für eine Wahrnehmungsstudie, eine Meinungsumfrage oder die sozialwissenschaftliche Feldforschung. Die Auswertung dieser Fragebögen nutzt meist statistische Standardverfahren, die jede Frage gesondert betrachten. Zusammenhänge zwischen Antworten oder Verbindungen zu orthogonalen Informationen wie beispielsweise der Demographie der Teilnehmenden werden dabei oft vernachlässigt.

Im Rahmen dieses studentischen Projektes werden wir verschiedene Visualisierungen und Interaktionen entwickeln, die verschiedene Fragetypen – etwa Einfachauswahl, Mehrfachauswahl, Bewertungsskala oder Freitext – darstellen, Zusammenhänge zwischen Antworten und Demographie aufdecken und damit die Analyse von Fragebogendaten deutlich erleichtern können.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Programming skills in Javascript and D3.js. A completed Visualization course.

Leistungsnachweis

active participation during the project meetings; presentation of literature; design, implementation and evaluation of different visualization and interaction designs; intermediate and final project presentation; final report.

425210025 Numerische Modellierung von Luftverteilungs- und Lüftungsstrategien

H. Alsaad Veranst. SWS: 10
Projekt

Beschreibung

A lot of research was done in the past about the importance of good indoor climate for health and well-being. Indoor air quality as well as thermal comfort are impacted by mechanical ventilation. Several different mechanisms for mechanical ventilation are known, such as forced convection, natural convection, or Coanda effect. The goal is to obtain a validated numerical model of several different mechanical ventilation systems within the CFD software ANSYS Fluent. The model must be validated using experimental data gathered inside the climate chamber of the department of Building Physics. For this, the chamber shall be equipped representing an office setup with a workstation and a thermal manikin. The experimental data is used to find the most appropriate calculation model for the simulations.

Tasks:

- Literature research
- Measurements in the climate chamber of the department of building physics
- Setup of the numerical model in ANSYS Fluent incl. geometry & mesh generation
- Validation of the numerical model
- Simulation of different ventilation systems
- Analysis of the indoor air quality and thermal comfort

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Knowledge of the fundamentals of computational fluid dynamics and indoor environmental modeling is recommended.

Leistungsnachweis

Written scientific group report and oral presentation

425210026 Umfangreicher Digitaler Zwilling des Fassadenbegrünungssystems VertiKKA

H. Alsaad, T. Paskert Veranst. SWS: 10
Projekt

Beschreibung

Recently, digitalization technologies have become more important for enhancing tasks such as monitoring and product process planning. Large amounts of data are analyzed and made available for simulation and optimization. Creating a digital twin, these processes can be united. The novel living wall system VertiKKA, located at the campus in Coudraystraße, combines vertical greening, grey-water filtering, and energy production via photovoltaic-modules. It impacts the surrounding environment in complex ways, and underlies seasonal and meteorological impacts. Data is generated with a manifold of ready-installed sensors. These preconditions result in the necessity of a representation for visualization, simulation, and optimization.

The aim is to create a concept of a digital twin, which represents the VertiKKA geometrically, as well as by means of physical data. Using the game engine Unity, the model shall be created and first attempts for data transfer shall be probed. This requires a capable software environment. Additionally, the available data shall be processed to be used for simulations and to predict potential issues, or optimize settings.

Tasks:

- Literature research
- Creation of a software concept capable for data transfer and updating the digital twin
- Generation of the digital twin (e.g. using Unity)
- Implementation of defining properties of VertiKKA, such as plant properties, exposure to sun or wind, or heat transfer coefficient of the wall
- Integration of actors, such as the watering system, or PV-module control system

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Background in 3D modeling and coding recommended.

Leistungsnachweis

Written scientific group report and oral presentation

425210027 Generative Modelierung mit CAD

S. Kollmannsberger, L. Herrmann Veranst. SWS: 10
Projekt

Beschreibung

This project will explore the possibilities of generative CAD modeling. The following steps are envisioned but may be changed upon mutual agreement with the supervisors

1. Comprehensive literature study highlighting approaches of Generative CAD modeling
2. Evaluation of existing approaches with freely available code (such as e.g. https://github.com/ChrisWu1997/DeepCAD)
3. Suggestions for integration of side conditions such as mechanical stiffnesses
4. Implementation

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Successful completion of the second semester of the Masters' Program Digital Engineering.

Leistungsnachweis

Final presentation, code, and technical report.

425210028 Hybrid Numerical Modelling: Finite Element and Material Point Coupling within numgeo

P. Staubach, C. Rodríguez Lugo Veranst. SWS: 10
Projekt

Beschreibung

While the Finite Element Method (FEM) has proven efficient for simulating various civil engineering problems, its results are usually limited to small deformation problems. Alternatives for modelling large deformations exist in different forms, with the most common being remeshing techniques and coupling between particle methods and finite element methods. Particle methods allow for both small and large deformations; in particular, the Material Point Method (MPM) shares similarities with FEM.

In soil mechanics, large deformations often found after material failure, leading to a complex material response that is difficult to capture with conventional FEM alone. Typical examples include the deformations of soil during landslides and other mass movements, as well as those encountered with soil penetration during testing or sampling, pile driving, and deep compaction; among others. Accurate numerical models for such scenarios demand methods capable of tracking both small and large deformations during and after failure.

Both a finite element program (*numgeo*) and an MPM program have been developed at the Chair of Geotechnics at Bauhaus-Universität Weimar. The aim of this project is to combine both methods into a standalone implementation based on the *numgeo* framework. The conceptual part of the theoretical coupling between methods has been developed by the supervisors using isogeometric formulations. This concept has been validated in Python and it needs to be effectively implemented into the *numgeo* framework using modern Fortran.

The objectives of the project are:

1) The efficient implementation of isogeometric shape functions of the B-spline type within *numgeo*.

2) Implementing numerical integration at arbitrary material point locations within *numgeo.*

3) The generation of the necessary datasets to effectively and efficiently enable MPM integration for simple 1D and 2D models within *numgeo.*

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Project Report

425210029 Optimierung geotechnischer Finite-Elemente-Simulationen: Parallelisierung und KI-gestützte Erweiterung von numgeo

P. Staubach Veranst. SWS: 10
Projekt

Beschreibung

The Finite Element Method (FEM) is a widely adopted numerical technique in civil and geotechnical engineering for modelling the geometry and mechanical behaviour of structures and subsurface materials subjected to various

types of loads. The FEM program *numgeo* (www.numgeo.de), developed by the Chair of Geotechnics at Bauhaus-Universität Weimar, is an open-access tool used by thousands of engineers and researchers worldwide.

One prominent application of numgeo is the modelling of offshore wind turbine foundations. Current FEM-based predictions typically involve the simulation of millions of load cycles, such as those generated by sea waves or the rotation of wind turbine rotors, which are transmitted from the superstructure to the supporting soil. The interaction between soil and structure is therefore accounted for through these simulations, with the largest models requiring several hours of computational time to complete.

numgeo is written in modern Fortran, a language still widely used for performance-oriented scientific computing, though no longer commonly taught in standard curricula. The program currently supports shared-memory parallelisation via OpenMP, enabling efficient use of multi-core CPUs for specific computational routines. However, other components of the code still execute serially, presenting opportunities for further optimisation.

This project has two main objectives (to be worked on by 2 students). The first is to explore and implement advanced parallelisation strategies to improve computational performance. This includes enhancing existing OpenMP capabilities, integrating GPU acceleration via OpenACC and potentially rewriting performance-critical components using CUDA for direct execution on NVIDIA GPUs.

The second objective is to improve the user interface and workflow through the integration of open-source AI tools. The goal is to link *numgeo* with existing mesh generation tools and develop a dedicated pre-processor that allows intuitive model setup. The AI component should be trained and optimised to enable users to define key features of the intended numerical model (such as geometry, boundary conditions, material properties, and loading scenarios) through natural language input or a guided interface. It should then automatically generate a consistent and solvable finite element model that can be directly processed and computed by numgeo. This not only reduces manual pre-processing effort but also broadens accessibility for less-experienced users. Such integration has the potential to significantly accelerate the modelling workflow, improve reproducibility, and foster the use of advanced simulation techniques in geotechnical practice.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Project Report

425210030 Spannungsberechnung auf Basis von CT-Scans

S. Kollmannsberger, M. Christmann Veranst. SWS: 10
Projekt

Beschreibung

The special project addresses the following four aspects:

FFT method [single]:

The first student will be given an existing implementation of the FTT method and corresponding literature. The student will then

- Carry out a literature review
- analyze the computational complexity of the method analytically and for practical examples.
- analyze pros and cons of the method
- propose, rewrite and implement remedies

Finite Cell Method (FCM) with Moment Fitting [single]**:**

The second student will be given an existing implementation of the moment fitting method for a 2D finite element case and corresponding literature. The student will then

- Carry out a short literature review
- Analyze the computational complexity of the method analytically
- Understand and implement the moment fitting method in FCM and analyze the computational complexity

Pre-Integration [single]**:**

The third student will work on implementing a pre-integration technique. Additionally, the student will prepare a given FEM framework for a meaningful comparison of the homogenization methods of student one and two. The tasks include:

- Carry out a short literature review
- Analyze the computational complexity of the method analytically
- Implement the pre-integration method and analyze its computational complexity
- Prepare an interface to include the methods of student one and two.

[team]:

The three students will then jointly compare their results on benchmark examples in a written report and present their findings in a final presentation. The modified codes must be handed in along with the technical report.

Bemerkung

Time and place will be announced at the project fair.

Voraussetzungen

Background Computational Mechanics

Programming knowledge (either C++ or Python)

Leistungsnachweis

Final presentation, code, and technical report.

425210031 Beyond Maps - Immersive Exploration of Heat, Air, Sound and Motion

K. Brehm, L. Thiebes, T. Zöppig, B. Fröhlich, U. Plank-Wiedenbeck, J. Uhlmann
Projekt

Beschreibung

The quality of life in urban areas is largely determined by urban planning and the urban transport network. Road traffic has a significant impact on urban mobility, air quality, noise pollution, and the microclimate in an urban context. Currently, results from simulations of traffic, air pollutants, noise, and microclimate are often presented in engineering practice in the form of lengthy texts, tables, and complex diagrams or maps. The presentation of environmental simulations in virtual reality (VR) offers innovative ways to visualise this information. Moreover, social virtual environments (SVE) allow multiple users to join a shared immersive workspace to collaborate on urban planning problems and evaluate how different designs would affect the environmental qualities of a ”liveable city”. One highly relevant use case is citizen participation, to empower laypeople to understand the complexities of urban development projects in their community and meaningfully engage in the decision-making process.

In this interdisciplinary project, students from engineering and computer science will work together to develop a concept for such an SVE based on the real-world planning scenario of the Weimar ”Bahnhofsquartier”. You will design an application prototype that supports users in their exploration and understanding this complex planning scenario by visualising validated simulation data of relevant environmental effects. Users will be able to compare and evaluate alternative planning variants, interactively discover the effects of design parameters on environmental qualities, and work together to discuss and form opinions about the planning problem.

Each student will contribute skills from their field of study to the development of the prototype:

- The team will collaborate across disciplines to develop the concept for the prototype and to create the necessary interface between Unity3D and the simulation program to visualise the analysis data in Unity3D.

- Students who focus on the simulation implementation will gain experience in new domains like Urban Micro-Climate and expand their experience in already known domains like Geospatial Modelling with QGSI, Computational Fluid Dynamics with ANSYS or Microscopic Traffic Simulation with PTV.

Students who focus on the VR development will apply and deepen their knowledge about multi-user VR development in Unity3D and C#. You will explore advanced multi-user interaction concepts, such as experimenting with ego-/ exocentric and multiple views on the spatial data and interaction with simulation parameters.

Voraussetzungen

Alle Teilnehmenden sollten Freude an der Arbeit in einer interdisziplinären Gruppe haben und sich auf Englisch unterhalten können.

Darüber hinaus sollten Sie neugierig auf die Projektthemen sein:

- Interaktionsdesign für Virtual Reality sowie Mixed Reality
- Umweltsimulation, Verkehr und Stadtplanung

Bevor Sie sich für dieses Projekt anmelden, stellen Sie bitte sicher, dass Sie die folgenden Kursvoraussetzungen erfüllen:

Für Studierende, die an der VR-Implementierung interessiert sind: Erfolgreicher Abschluss von *Introduction to Virtual Reality* oder vergleichbare Vorerfahrung ist erforderlich.

Für Studierende, die an der Implementierung der Umweltsimulation interessiert sind: Erfolgreicher Abschluss von entweder *Microscopic Traffic Simulation* oder *Geo-Spatial Information Systems* ist erforderlich.

425210032 Parallel Acceleration and Performance Optimization of Python Modules in Particle-Based Numerical Modelling

C. Rodríguez Lugo Veranst. SWS: 10
Projekt

Beschreibung

Numerical modelling is a tool widely used in different fields of engineering and physics to predict the response of matter subjected to different conditions. Particle-based methods are a branch of numerical modelling techniques that allow the simulation of the response of granular materials, such as soils, subjected to wide ranges of deformation. Such simulations serve as predictions of the soil behaviour under specific conditions for civil engineering analyses.

This project investigates different techniques aimed at the acceleration and optimization of computational routines developed as part of the implementation of a particle-based method. In particular, the Material Point Method (MPM) has been implemented into a Python program developed for geotechnical and soil simulation. MPM simplifies a solid as a collection of material points or particles and uses a background mesh for the solution of the system, similar to the finite element approach.

Students will work with standalone Python scripts extracted from the full MPM program. The focus of the project lies on the optimization and benchmarking of low-level numerical operations, with the aim of improving computational efficiency. Possible developments of the standalone Python scripts include:

- Computation of Shape Functions at Material Points

Optimize how shape functions and their gradients are computed, as well as the connectivity between material points and the background mesh.

- Cell-Level Matrix/Vector Computation

Improve the performance of routines responsible for calculating cell-level quantities, including stiffness matrices and load vectors.

- Global (System) Assembly

Enhance the global assembly of matrices and vectors using contributions from the individual cells.

The project includes a literature review focused on available techniques for parallelisation in Python, particularly those that are free and easily available to employ. Students are expected to assess and compare different approaches such as Numba and multiprocessing, among others; based on quantitative performance parameters. These parameters may include real time, speedup ratios, and scalability metrics, evaluated using standard Python tools and basic profiling utilities.

Bemerkung

Time and place will be announced at the project fair.

425210042 Good Dog! – Teaching new Tricks to Spot the Robot

C. Koch, R. Helbing Veranst. SWS: 10
Projekt

Beschreibung

Explore the potential and limitations of the Boston Dynamics Spot robot in this project. While impressive, Spot's standard configuration presents opportunities for enhancement. Currently, its autonomy depends critically on QR codes, its features are spread across different applications, and collected data isn't readily processed for analysis. This can lead to inefficient, manual workflows and usability issues due to missing features or integration gaps, particularly noticeable in industries like construction.

The goal of this project is to expand Spot's usability and practical capabilities. You'll dive into testing its standard functions with various payloads, identifying challenges and improvement opportunities using basic workflow scenarios. You will examine existing Python examples and then engage in hands-on development, adapting these examples and using trial and error to create a more streamlined, minimal workflow. This project offers a chance to directly address current limitations and make Spot a more integrated and efficient tool.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

1) Project Report

2) Intermediate Presentation

3) Final Presentation

Elective Modules

204034 Analysis and Design of Concrete Structures

G. Morgenthal, S. Chawdhury, G. Tondo Veranst. SWS: 4

Integrierte Vorlesung

Fr, wöch., 09:15 - 12:30, LectureRoom LH B M13C* dates by arrangementTime schedule will be announced by the responsible lecturers. Lecture shares time slot with lecture Structural engineering / Wind Engineering.
Fr, wöch., 13:30 - 16:45, ExerciseRoom H BH11 / Audimax St6 (see the announcements by the lecturers)* dates by arrangementTime schedule will be announced by the responsible lecturers. Exercise shares time slot with lecture Structural engineering / Wind Engineering.

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 as well as steel and steel-concrete composite structures.

Content: History of structures; building materials; structural form and structural behaviour; actions on structures; structural reliability and codes of practice; mechanical modelling of structures; design of reinforced concrete structures

Bemerkung

This module is comprised of:

”Analysis and Design of Reinforced Concrete Structures” (Lecture, 2 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Exercise, 1 SWS)

”Analysis and Design of Reinforced Concrete Structures” (Project, 1 SWS)

Voraussetzungen

B.Sc.

Leistungsnachweis

Written exam (60%),

Project (40%)

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

M. Kraus, S. Ibañez Sánchez, S. Chowdhury Veranst. SWS: 4

Vorlesung

Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 22.10.2025 - 22.10.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 12.11.2025 - 12.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 26.11.2025 - 26.11.2025
Mi, Einzel, 17:45 - 19:15, Marienstraße 13 C - Hörsaal B, Exercise, 10.12.2025 - 10.12.2025
Di, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Lecture, ab 06.01.2026
Mi, wöch., 17:00 - 18:30, Marienstraße 7 B - Seminarraum 105, Exercise, ab 07.01.2026

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

Voraussetzungen

B.Sc.

Mechanics

Leistungsnachweis

1 Project report

”Modelling of steel structures and numerical simulation” (0%) / **WiSe**

1 written exam

”Modelling of steel structures and numerical simulation”/ 120 min (100%) / **WiSe** + SuSe

418260002 Security Engineering

S. Lucks, J. Leuther Veranst. SWS: 3

Vorlesung

Mo, wöch., 15:15 - 16:45, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Lecture, ab 13.10.2025
Do, gerade Wo, 15:15 - 16:45, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Lab class, ab 16.10.2025

Beschreibung

Die Entwicklung sicherer und vertraulicher Systeme ist eine Herausforderung für System-Architekten als auch für Software-Entwickler. Die IT-Sicherheit wird durch das immer größer werdende Bewusstsein in der Politik und den Massenmedien zu einem stetig wachsenden und wichtigen Aspekt in der IT-Industrie.

In dieser Vorlesung wird die Programmiersprache Ada'05 (bzw. Ada'12) eingeführt, welche heutzutage als geeignete Sprache für die Implementierung sicherer und vertraulicher Systeme betrachtet wird. Desweiteren werden Methoden aus dem Feld des Software-Engineering präsentiert, welche es ermöglichen, Software-Systeme sicher, vertraulich und benutzbar zu gestalten.

engl. Beschreibung/ Kurzkommentar

Security Engineering

The development of safe and reliable systems is a challenging task for both system architects and software developer.
Due to the raising awareness of the politics and mass media, IT-security is becoming an increasingly important aspect of the IT industry.

The course introduces the programming language Ada'05,which is considered particularly suitable for implementing secure and reliable systems. In addition, methods from the field of software engineering are presented, which serve the safety, reliability and maintainability of software systems.

Leistungsnachweis

Mündliche Prüfung
Beleg als Voraussetzung zur Prüfungszulassung.

423150021 Deep Learning for Computer Vision

V. Rodehorst, J. Eick, A. Frolov, D. Tschirschwitz Veranst. SWS: 4

Integrierte Vorlesung

Fr, wöch., 15:15 - 16:45, Bauhausstraße 11 - N 004, Lecture/ Lab class, ab 17.10.2025
Mo, wöch., 17:00 - 18:30, Bauhausstraße 11 - N 004, Lecture/ Lab class, 20.10.2025 - 24.11.2025
Mo, wöch., 17:00 - 18:30, Bauhausstraße 9a - Linux-Pool, DBL, 1.OG, LINUX-Pool, DBL, Bh9a, 1. OG, ab 01.12.2025

Beschreibung

In diesem Kurs werden die Prinzipien, Techniken und Anwendungen des tiefgehenden Lernens in Computer Vision behandelt. Die Teilnehmer lernen, wie man neuronale Netze für die Bildklassifizierung, Objekterkennung, semantische Segmentierung und andere Computer-Vision-Aufgaben entwickelt, trainiert und validiert. Es werden auch Techniken zur Verbesserung der Leistung von Deep-Learning-Modellen und Veranschaulichungen behandelt, um Anhaltspunkte für die weitere Modellentwicklung zu erhalten. Am Ende des Kurses werden die Studierenden in der Lage sein, Deep-Learning-Techniken anzuwenden, um reale Probleme in verschiedenen Bereichen zu lösen.

Voraussetzungen

Image Analysis and Object Recognition

Leistungsnachweis

Erfolgreiche Teilnahme an den Laborübungen.

Gewichtung der Note: 100% schriftliche Klausur

424260000 Mechanics of Engineering Materials

L. Göbel Veranst. SWS: 4

Integrierte Vorlesung

Mo, wöch., 13:30 - 15:00, Marienstraße 7 B - Seminarraum 106, 13.10.2025 - 02.02.2026
Di, wöch., 09:15 - 10:45, Marienstraße 7 B - Seminarraum 105, 14.10.2025 - 03.02.2026

Beschreibung

Essential contents comprise: Structure of materials, basic concepts of computational mechanics (stresses, strains, tensor algebra), elasticity, plasticity and failure (stress-strain diagrams, plasticity theory, hardness), fracture mechanics, viscoelasticity, creep, rheology.

Bemerkung

Please be sure to register in the corresponding Moodle room for the course. All organizational announcements and online events are made via this platform. The learning material is also made available there.

Voraussetzungen

Mandatory requirements: none

Recommended requirements: Building materials science, technical mechanics

Leistungsnachweis

Written exam (180 minutes)

425250018 Deep Learning in Computational Mechanics

S. Kollmannsberger, L. Herrmann
Vorlesung
Do, wöch., 13:30 - 15:15, Coudraystraße 13 B - Hörsaal 3, Vorlesung, ab 16.10.2025
Do, wöch., 15:15 - 16:45, Coudraystraße 13 B - Hörsaal 3, Übung, ab 16.10.2025

Beschreibung

Grundlegende Konzepte des maschinellen Lernens; Neuronale Netze; Physics-informed neural networks (PINNs), PINN-Variationen (Deep-Energy-Methode, Variations-PINNs, schwache adversarische Netze) & Erweiterungen; Dimensionalitätsreduktion; Modelle reduzierter Ordnung; Sparse Identification of Non-linear Dynamic Systems (SINDy); Clustering; Materialmodellierung mit neuronalen Netzen (physikalisch erweiterte neuronale Netze); Generative künstliche Intelligenz in der Computermechanik (Autoencoder, generative adversarial networks (GANs), Diffusionsmodelle & Transformatoren); Inverse Probleme wie zerstörungsfreie Prüfung, Topologieoptimierung oder Modellfindung; Diskussion und Einblick in aktuelle Literatur.

Voraussetzungen

Fundamental programming knowledge, Linear Algebra at Bachelor Level

Leistungsnachweis

schriftliche Prüfung

4526501 Academic English Part One

G. Atkinson Veranst. SWS: 2
Kurs
Mi, wöch., 15:15 - 16:45, Consultations, R.N212, B11 (indiv.appointments)
Mi, wöch., 17:00 - 18:30, Bauhausstraße 11 - R 015, Academic English Part I+II (alternating)

Beschreibung

This is the first part of a two-part course which aims to improve your ability to express yourself clearly in written English and to develop a suitably coherent academic writing style. Part One concentrates mainly on structure in writing academic articles, essays and reports. We begin by examining the structure of individual paragraphs and move on to extended texts of various types (e.g. process essays, cause/effect, comparison/contrast, etc.). Particular attention is paid to connectives, i.e. transitional phrases and constructions which help you link ideas and paragraphs in a logical, systematic way.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time particpants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part Two and those who need to repeat Academic English Part One,** must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de**.**

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE I Registration.

Leistungsnachweis

continuous assessment

4526502 Academic English Part Two

G. Atkinson Veranst. SWS: 2
Kurs
Mi, wöch., 15:15 - 16:45, Consultations, R.N212, B11 (indiv.appointments)
Mi, wöch., 17:00 - 18:30, Bauhausstraße 11 - R 015, Academic English Part I+II alternating

Beschreibung

Part Two of the Academic English course concentrates on improving and refining aspects of academic writing style. It includes sections on clause and sentence structure, punctuation rules and how to incorporate quotations, statistics and footnotes into academic texts.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time particpants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part One and those who need to repeat Academic English Part Two,** must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de**.**

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE II Registration.

Leistungsnachweis

continuous assessment

Exams

205007 Modelling of steel structures and numerical simulation (Exam)

M. Kraus
Prüfung
Mi, Einzel, 09:00 - 11:00, Marienstraße 7 B - Seminarraum 205, Re-examination, 04.03.2026 - 04.03.2026

Bemerkung

Re-examination

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

205014 Design and interpretation of experiments (Exam)

M. Kraus, T. Lahmer
Prüfung
Do, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal D, Final exam, 05.03.2026 - 05.03.2026

Leistungsnachweis

1 written exam / 120 min / **WiSe** + SuSe including

”Experiments in Structural Engineering” and

”Signal Processing, Design of Experiments and System Identification”

256303 Exam: Photogrammetric Computer Vision

V. Rodehorst
Prüfung
Mo, Einzel, 13:30 - 15:30, Steubenstraße 6, Haus F - Maurice-Halbwachs-Auditorium, 16.02.2026 - 16.02.2026
Mo, Einzel, 13:30 - 15:30, Marienstraße 13 C - Hörsaal A, 16.02.2026 - 16.02.2026

301012 Applied mathematics and stochastics for risk assessment (Exam)

T. Lahmer, B. Rüffer, N. Gorban
Prüfung
Mo, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal B, Final exam, 23.02.2026 - 23.02.2026
Mo, Einzel, 13:00 - 16:00, Marienstraße 13 C - Hörsaal D, Final exam, 23.02.2026 - 23.02.2026

Leistungsnachweis

1 written exam

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

303001 Re-examination: Advanced building information modeling

C. Koch Veranst. SWS: 4
Prüfung
Di, Einzel, 13:00 - 15:00, Marienstraße 13 C - Hörsaal B, 03.03.2026 - 03.03.2026

Leistungsnachweis

1 written exam + 1 group project report + 1 presentation: ”Advanced building information modelling”

120 min exam (50%) / WiSe + **SuSe;**

written report (35%) + presentation (15%) / **SuSe**

303005 Object-oriented Modeling and Programming in Engineering (Exam)

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

Prüfung
Fr, Einzel, 13:00 - 15:00, 06.03.2026 - 06.03.2026

Leistungsnachweis

1 written exam "Object-oriented Modeling and Programming in Engineering" 120min (100%) / **WiSe** + SuSe

336010 resit exam: Image Analysis and Object Recognition

V. Rodehorst
Prüfung
Fr, Einzel, 09:00 - 11:00, Bauhausstraße 11 - R 015, 27.02.2026 - 27.02.2026
Fr, Einzel, 09:00 - 11:00, Bauhausstraße 11 - R 014, 27.02.2026 - 27.02.2026

345600 resit exam: Computer Graphics II: Computer Animation

C. Wüthrich
Prüfung

401011 Applied Structural Dynamics (Exam)

A. Athanasiou
Prüfung
Mi, Einzel, 11:00 - 12:00, Marienstraße 7 B - Seminarraum 205, Final exam, 18.02.2026 - 18.02.2026
Mi, Einzel, 11:00 - 12:00, Marienstraße 7 B - Seminarraum 206, Final exam, 18.02.2026 - 18.02.2026
Mi, Einzel, 11:00 - 12:00, Marienstraße 7 B - Seminarraum 101, Final exam, 18.02.2026 - 18.02.2026

Leistungsnachweis

1 midterm exam (written or oral) (30 min, 30%)**,**

1 final written exam ”Applied structural dynamics” (40 min, 40%)**,**

25% assignments, 5% in class quizzes/activities / **WiSe** + SuSe

401012 Re-Examination: Applied Finite element methods

S. Kollmannsberger
Prüfung
Fr, Einzel, 11:00 - 12:30, Marienstraße 7 B - Seminarraum 205, Re-examination, 27.02.2026 - 27.02.2026

Leistungsnachweis

1 written exam: ”Applied finite element methods” / 90 min (50%) / WiSe + **SuSe**

401014 Structural Dynamics (Exam)

T. Most
Prüfung
Mi, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 205, Final exam, 18.02.2026 - 18.02.2026

Mi, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 206, Final exam, 18.02.2026 - 18.02.2026
Mi, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 101, Final exam, 18.02.2026 - 18.02.2026
Mi, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 102, Final exam, 18.02.2026 - 18.02.2026

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: "Structural dynamics" / 90 min (50%) / **WiSe** + SuSe

401015 Finite element methods (Exam)

S. Kollmannsberger
Prüfung
Fr, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal B, Final exam, 27.02.2026 - 27.02.2026
Fr, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal D, Final exam, 27.02.2026 - 27.02.2026

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: "Finite element methods" / 90 min (50%) / **WiSe** + SuSe

417290000 resit exam: Software Engineering

J. Ringert
Prüfung
Mo, Einzel, 09:00 - 11:00, Bauhausstraße 11 - N 004, 02.03.2026 - 02.03.2026

420160000 Resit Exam: Introduction to Natural Language Processing

B. Stein
Prüfung
Di, Einzel, 14:00 - 15:30, Bauhausstraße 11 - R 015, 24.02.2026 - 24.02.2026

422150031 resit exam: Generative Software Engineering

J. Ringert
Prüfung
Mo, Einzel, 09:00 - 11:00, Bauhausstraße 11 - R 015, 23.02.2026 - 23.02.2026

422250037 Exam: Formal Methods for Software Engineering

J. Ringert
Prüfung

Leistungsnachweis

project presentation

423150021 Exam: Deep Learning for Computer Vision

V. Rodehorst
Prüfung
Do, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal D, 19.02.2026 - 19.02.2026

424260000 Prüfung: Mechanics of Engineering Materials

L. Göbel
Prüfung
Di, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 101, 24.02.2026 - 24.02.2026
Di, Einzel, 09:00 - 12:00, Marienstraße 7 B - Seminarraum 102, 24.02.2026 - 24.02.2026

425250018 Exam: Deep Learning in Computational Mechanics

S. Kollmannsberger
Prüfung
Mi, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, 25.02.2026 - 25.02.2026

439100 Prüfung: Raumbezogene Informationssysteme/ Spatial information systems

T. Gebhardt, V. Rodehorst
Prüfung
Di, Einzel, 13:00 - 15:00, Marienstraße 13 C - Hörsaal A, 17.02.2026 - 17.02.2026
Di, Einzel, 13:00 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, 17.02.2026 - 17.02.2026
Di, Einzel, 13:00 - 15:00, Marienstraße 13 C - Hörsaal C, 17.02.2026 - 17.02.2026

439110 Exam: Introduction to Machine Learning

B. Stein
Prüfung
Do, Einzel, 09:00 - 11:00, LH A+B, M13C, 26.02.2026 - 26.02.2026

451002 Re-examination: Introduction to Optimization

T. Lahmer
Prüfung
Fr, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 205, Re-examination, 20.02.2026 - 20.02.2026

Bemerkung

Re-examination

Leistungsnachweis

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

”Introduction to Optimization” (3 credits) / **SuSe** + WiSe

451007 Re-Examination: Stochastic Simulation Techniques and Structural Reliability

T. Lahmer
Prüfung
Do, Einzel, 09:00 - 10:30, Marienstraße 7 B - Seminarraum 205, Re-examination, 26.02.2026 - 26.02.2026

Leistungsnachweis

1 written or oral exam (3 credits) / **SuSe** + WiSe

1 project (3 credits) / **SuSe** + WiSe

909020 Prüfung: Macroscopic Transport Modelling

U. Plank-Wiedenbeck
Prüfung
Fr, Einzel, 13:00 - 15:00, Coudraystraße 13 B - Seminarraum 210, 27.02.2026 - 27.02.2026

909021 Exam: International Case Studies in Transportation

U. Plank-Wiedenbeck
Prüfung
Fr, Einzel, individual appointmentsSchwanseestr. 13, Raum/room 2.02, 16.01.2026 - 16.01.2026

Beschreibung

Oral Exams

909035 Prüfung: Microscopic traffic simulation

U. Plank-Wiedenbeck
Prüfung
Do, Einzel, 13:00 - 14:00, Coudraystraße 13 B - Seminarraum 208, 05.03.2026 - 05.03.2026

Exam: Analysis and Design of Concrete Structures

G. Morgenthal
Prüfung
Di, Einzel, submission deadline: project report, 31.03.2026 - 31.03.2026

Beschreibung

project report + presentation

Exam: Introduction to Mechanics

T. Rabczuk
Prüfung
Mo, Einzel, 13:00 - 15:00, Bauhausstraße 11 - R 015, 02.03.2026 - 02.03.2026

resit exam: Mathematics for Data Science

B. Rüffer
Prüfung

Beschreibung

Oral exams, individual appointments.Dates are assigned by the Secretariat of the Chair of Applied Mathematics