Vorlesungsverzeichnis

M.Sc. Digital Engineering

Winter 2021/22

Stand 23.05.2022

M.Sc. Digital Engineering

Faculty Welcome for Master's Students Digital Engineering
Monday, 11th October 2021, 1 p.m., room 15, Bauhausstr. 11

Project fair
Monday, 11th October 2021, 5 p.m. via Moodle. Open from 11th October 2021.

4256402 Oberseminar Rendering, Visualisierung und Virtual Reality

B. Fröhlich Veranst. SWS: 2
Seminar
Do, wöch., 10:30 - 12:00, Online bzw. nach Vereinbarung, ab 14.10.2021

Beschreibung

Vorträge zu aktuellen Dissertationen und Veröffentlichungen sowie laufenden Master- und Bachelorarbeiten zu den Themen Rendering, Visualisierung und Interaktion werden im Rahmen des Seminars präsentiert und diskutiert.

Bemerkung

Für diese Veranstaltung werden keine ECTS-Punkte vergeben.

Fundamentals (F)

Advanced Numerical Mathematics

Algorithms and Datastructures

Applied Mathematics and Stochastics

2301012-1 Applied mathematics (Lecture)

S. Bock, A. Legatiuk, K. Gürlebeck Veranst. SWS: 2
Vorlesung
Di, wöch., 17:00 - 18:30, Coudraystraße 13 B - Hörsaal 3, Digital (Main), ab 12.10.2021

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 in MAPLE will be studied. :

Leistungsnachweis

1 written exam

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

2301012-2 Stochastics for risk assessment (Lecture) / Mathematics for risk management (MBM)

T. Lahmer Veranst. SWS: 2

Vorlesung

1-Gruppe Fr, wöch., 07:30 - 09:00, Coudraystraße 13 B - Seminarraum 208, Tutorium for NHRE (Group 1) and DE
2-Gruppe Fr, wöch., 07:30 - 09:00, Coudraystraße 11 A - Seminarraum 214, Tutorium for NHRE (Group 2)
Di, wöch., 11:00 - 13:30, Coudraystraße 13 B - Seminarraum 210, Prof. Lahmer Lecture in combination with BBB (digital) If LH 3 is complete, please use this room for hybrid lectures as well., ab 12.10.2021
Di, wöch., 11:00 - 13:30, Coudraystraße 13 A - Hörsaal 2, Prof. Lahmer Lecture in combination with BBB (digital), ab 12.10.2021

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

301012-1 Applied mathematics (Exam)

K. Gürlebeck, A. Legatiuk

Prüfung

Di, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, Final exam, 22.02.2022 - 22.02.2022
Di, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal B, Final exam, 22.02.2022 - 22.02.2022

Leistungsnachweis

1 written exam

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

2301012 Applied mathematics & Stochastics (Exercise)

T. Lahmer, N. Butler, Z. Jaouadi, A. Legatiuk, S. Marwitz Veranst. SWS: 2

Seminar

1-Gruppe Mo, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal A, Digital (Main), 11.10.2021 - 31.01.2022
2-Gruppe Mo, wöch., 17:00 - 18:30, Marienstraße 13 C - Hörsaal B, 11.10.2021 - 31.01.2022

Introduction to Mechanics

420160001 Introduction to Mechanics

T. Rabczuk, S. Torres Achicanoy Veranst. SWS: 4

Vorlesung
Do, wöch., 13:30 - 15:00, Online (Moodle), ab 14.10.2021
Di, wöch., 09:15 - 10:45, Coudraystraße 13 B - Seminarraum 210, Exercise, ab 19.10.2021
Fr, Einzel, 10:00 - 12:00, Coudraystraße 11 C - Seminarraum/Hörsaal 001, written exam, 18.02.2022 - 18.02.2022

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

Nonlinear Continuum Mechanics

Object-oriented Modeling and Programming in Engineering

303005 Object-oriented Modeling and Programming in Engineering

C. Koch, M. Artus Veranst. SWS: 4
Vorlesung
Mo, wöch., 15:15 - 16:45, Lecture (online) Moodle Link:, ab 18.10.2021
Fr, wöch., 09:15 - 10:45, Lab class (online) Moodle Link:, ab 22.10.2021

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

Software Engineering

Statistics

Structural Dynamics

2401014 Structural Dynamics (Lecture)

V. Zabel Veranst. SWS: 2

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 13 A - Hörsaal 2, bis 30.11.2021
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, bis 01.12.2021

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: „Fundamentals of structural dynamics”/ 90 min (50%)

2401014 Structural Dynamics (Exercise)

V. Zabel, A. Habtemariam Veranst. SWS: 1

Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Pool Fak. B 007, Tutorium - Group A, bis 30.11.2021
1-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), bis 02.12.2021
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group B, bis 30.11.2021
2-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D), bis 02.12.2021
3-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Tutorium - Group C, bis 01.12.2021
4-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium - Group D, bis 01.12.2021

Bemerkung

- Complementary to the lectures

401014 Structural Dynamics (Exam)

V. Zabel

Prüfung

Mi, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal B, Final exam, 16.02.2022 - 16.02.2022
Mi, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal C, Final exam, 16.02.2022 - 16.02.2022

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: „Fundamentals of structural dynamics”/ 90 min (50%)

2401011 Applied Structural Dynamics (Lecture)

V. Zabel Veranst. SWS: 2

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 13 A - Hörsaal 2, Digtial until further notice!, ab 07.12.2021
Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, Digtial until further notice!, ab 08.12.2021

Beschreibung

- Machinery induced vibrations
- Earthquake excitation
- Wind induced vibrations

- Human induced vibrations

2401011 Applied Structural Dynamics (Exercise)

V. Zabel, F. Tartaglione Garcia Veranst. SWS: 1

Seminar

1-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, Tutorium Group A, ab 07.12.2021
1-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B) Digtial until further notice!, ab 09.12.2021
2-Gruppe Di, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium Group B, ab 07.12.2021
2-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D) Digtial until further notice!, ab 09.12.2021
3-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Tutorium Group C, ab 08.12.2021
4-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Tutorium Group D, ab 08.12.2021

Bemerkung

- Complementary to the lectures

401011 Applied Structural Dynamics (Exam)

V. Zabel

Prüfung

Mi, Einzel, 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, Final exam, 16.02.2022 - 16.02.2022

Structural Engineering Models

401007 Structural Engineering Models

C. Könke, F. Tartaglione Garcia, C. Zacharias Veranst. SWS: 4

Integrierte Vorlesung

Mi, Einzel, 09:00 - 11:00, exam, HS B, M 13C (along with "Computer Models for Physical Processes"), 23.02.2022 - 23.02.2022

Beschreibung

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

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

Voraussetzungen

basic course in structural mechanics

basic course in applied mathematics

Leistungsnachweis

written test, 120 min duration

Modelling (M)

4- und 5D-Building Information Modeling (BIM)

Advanced Building Information Modeling

Advanced Modelling - Calculation

Collaborative Data Management

Computer models for physical processes - from observation to simulation

420250037 Computer Models for Physical Processes - from observation to simulation

C. Könke, A. Habtemariam Veranst. SWS: 4

Vorlesung

Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, 12.11.2021 - 12.11.2021
Fr, Einzel, 13:30 - 15:00, Marienstraße 13 C - Hörsaal A, 12.11.2021 - 12.11.2021
Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, 19.11.2021 - 19.11.2021
Fr, wöch., 11:00 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, 26.11.2021 - 03.12.2021
Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, 10.12.2021 - 10.12.2021
Fr, Einzel, 13:30 - 15:00, Marienstraße 13 C - Hörsaal A, 10.12.2021 - 10.12.2021
Fr, Einzel, 11:00 - 13:30, Coudraystraße 13 A - Hörsaal 2, 17.12.2021 - 17.12.2021
Fr, Einzel, 13:30 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, 17.12.2021 - 17.12.2021
Fr, wöch., 11:00 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, 07.01.2022 - 28.01.2022
Fr, Einzel, 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, 04.02.2022 - 04.02.2022
Fr, Einzel, 13:30 - 15:00, Marienstraße 13 C - Hörsaal A, 04.02.2022 - 04.02.2022
Mi, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal B, written exam, 23.02.2022 - 23.02.2022

Beschreibung

Mechanical formulation of physical problem via energy principles or conservation laws. Strong and weak formulation of the physical form. Finite difference solution of ordinary and partial differential equations. Finite element solution of the weak form of a physical problem statement (heat flow problem or structural mechanics). Error estimates for numerical solution techniques, Zienkiewicz/Zhu and Babushka/Rheinboldt approach

Voraussetzungen

Applied Mathematics, Fundamental Mechanics

Leistungsnachweis

written test, 120 min duration

Introduction to Optimization

Macroscopic Transport Modelling

2909020 Macroscopic Transport Modelling

C. Winkler, J. Uhlmann, U. Plank-Wiedenbeck, J. Bänsch Veranst. SWS: 4

Integrierte Vorlesung
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Projektraum 302, 19.10.2021 - 01.02.2022

Beschreibung

Teil A: Grundlagen

Planerische Rahmenbedingungen, Raumstrukturdaten und Netzwerke, Methodik und Verfahren, Empirische Verkehrsdaten für Verkehrsmodellentwicklungen, Verkehrserzeugung, Verkehrsverteilung, Verkehrsmittelwahl, Verkehrsumlegung, Stärken und Schwächen unterschiedlicher Modellansätze, Kalibrierung und Validierung, Prognosen- und Szenarioentwicklung

Teil B: Modellierung

Praktische Umsetzung und Anwendung, Modellierung eines Verkehrsnetzes und der Verkehrsnachfrage mit PTV VISUM, Praktische Anwendung der Theorie und kritische Betrachtung von Modellergebnissen, Präsentation der Studierenden in Gruppen

engl. Beschreibung/ Kurzkommentar

Part A: Principles

Transport planning framework, Methodology and procedures, Land-Use Data and networks, Empirical Travel Data for model developments, Trip generation, Trip distribution, Mode choice, Traffic assignment, Methods and algorithms, Strengths and weaknesses of different model approaches, Calibration and validation, Forecasting and scenario calculations

Part B: Model Development

Practical implementation and application, Modelling transport network and travel demand using PTV VISUM, Application of learned methodological approach(es) and critical reflection of the model outputs, Student presentation (group work)

Bemerkung

Beleg; Prüfungsvoraussetzung: Belegabgabe

Lehrformat WiSe 2021/22: Vorlesung digital, Übung hybrid

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bestätigung der Professur Verkehrssystemplanung notwendig

Bewerbung bis 12.10.2021 ausschließlich per Mail an vsp@bauing.uni-weimar.de. Bitte kurz den fachlichen Hintergrund und die Motivation für die Kursteilnahme schildern.

Empfohlen: Vorkenntnisse in der Modellierung/ Simulation und Verkehrsplanung und-technik. **Sollten keine Vorkenntnisse im Bereich der Verkehrsplanung vorliegen muss der Kurs "Introduction to Mobility and Transport" parallel belegt werden!**

Leistungsnachweis

Teil A:

Klausur (120 Min), Englisch, 50%

Teil B:

Beleg und Präsentation, Englisch, 50%

Die Belegabgabe ist Vorraussetzung für die Klausurteilnahme

Modelling in the development process

Optimization in Applications

Raumbezogene Informationssysteme/ Spatial information systems (GIS)

904003 / 4439100 Raumbezogene Informationssysteme/ Spatial information systems (GIS)

T. Gebhardt, V. Rodehorst Veranst. SWS: 3
Integrierte Vorlesung
Do, gerade Wo, 15:15 - 16:45, Übung online (interactive) , ab 21.10.2021
Mi, wöch., 09:15 - 16:45, Vorlesung online (recorded)

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: **spatial21**

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen mit abschließender Klausur (4,5 credits)

Ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1,5 credits

Simulation and Validation (SaV)

Design and Interpretation of Experiments / Signal Processing

205014 Design and interpretation of experiments (Exam)

M. Kraus, T. Lahmer, F. Alkam, Z. Jaouadi, S. Mämpel
Prüfung
Do, Einzel, 13:00 - 15:00, Marienstraße 13 C - Hörsaal D, Final exam, 03.03.2022 - 03.03.2022

Leistungsnachweis

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

”Experiments in Structural Engineering” and

”Signal Processing, Design of Experiments and System Identification”

2205014 Design and interpretation of experiments: Signal Processing, Design of Experiments and System Identification

T. Lahmer, F. Alkam, Z. Jaouadi Veranst. SWS: 2

Integrierte Vorlesung

1-Gruppe Di, gerade Wo, 17:00 - 18:30, Coudraystraße 13 A - Hörsaal 2, Signal Processing, Design of Experiments and System Identification (Exercise)
1-Gruppe Di, gerade Wo, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Signal Processing, Design of Experiments and System Identification (Exercise)
1-Gruppe Di, gerade Wo, 17:00 - 18:30, Coudraystraße 13 B - Pool Fak. B 007, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Coudraystraße 13 A - Hörsaal 2, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Marienstraße 7 B - Projektraum 301, Signal Processing, Design of Experiments and System Identification (Exercise)
2-Gruppe Di, unger. Wo, 17:00 - 18:30, Coudraystraße 13 B - Pool Fak. B 007, Signal Processing, Design of Experiments and System Identification (Exercise)
Di, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Signal Processing, Design of Experiments and System Identification

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

Extended Finite Elements and Mesh Free Methods

Finite Element Methods (FEM)

2401012 Applied Finite element methods (Exercise)

T. Rabczuk, M. Bianco, A. Habtemariam, J. Lopez Zermeño, F. Tartaglione Garcia Veranst. SWS: 1

Seminar

1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Tutorium Group A, ab 08.12.2021
1-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), ab 09.12.2021
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Tutorium Group B, ab 08.12.2021
2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Group 2 (Group C + Group D), ab 09.12.2021
3-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Hörsaal 3, Tutorium Group C, ab 07.12.2021
4-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Pool Fak. B 007, Tutorium Group D, ab 07.12.2021

2401012 Applied Finite element methods (Lecture)

T. Rabczuk, C. Könke Veranst. SWS: 2
Vorlesung
Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, ab 08.12.2021
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, ab 09.12.2021

2401015 Finite element methods (Exercise)

T. Rabczuk, M. Bianco, A. Habtemariam, J. Lopez Zermeño, F. Tartaglione Garcia Veranst. SWS: 1
Seminar
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Tutorium - Group A, bis 01.12.2021
1-Gruppe Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, Group 1 (Group A + Group B), bis 02.12.2021
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal D, Tutorium - Group B, bis 01.12.2021
2-Gruppe Do, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal C, Group B (Group C + Group D), bis 02.12.2021
3-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 B - Hörsaal 3, Tutorium - Group C, bis 30.11.2021
4-Gruppe Di, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, Tutorium - Group D, bis 30.11.2021

2401015 Finite element methods (Lecture)

T. Rabczuk
Vorlesung
Mi, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, bis 01.12.2021
Do, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal D, bis 02.12.2021

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: „Fundamentals of finite element methods”/ 90 min (50%)

401012 Applied Finite element methods (Exam)

T. Rabczuk
Prüfung

Fr, Einzel, 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, Final exam, 25.02.2022 - 25.02.2022

401015 Finite element methods (Exam)

T. Rabczuk
Prüfung
Fr, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal B, Final exam, 25.02.2022 - 25.02.2022
Fr, Einzel, 09:00 - 10:30, Marienstraße 13 C - Hörsaal C, Final exam, 25.02.2022 - 25.02.2022

Voraussetzungen

Bachelor Civil Engineering

Leistungsnachweis

1 written exam: „Fundamentals of finite element methods”/ 90 min (50%)

Fundamentals of structural health monitoring (SHM) and intelligent structural systems

Linear FEM

Modelling of Steel Structures and Numerical Simulation

Nonlinear FEM

Process modelling and simulation in logistics and construction

Simulation Methods in Engineering

Stochastic Simulation Techniques and Structural Reliability

Structural Health Monitoring

Visualization and Data Science (VaDS)

Image Analysis and Object Recognition

Introduction to Machine Learning

4439110 Introduction to Machine Learning

B. Stein, J. Bevendorff, M. Völske Veranst. SWS: 4
Vorlesung
Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, Lecture , ab 21.10.2021
Do, wöch., 11:00 - 13:00, Marienstraße 13 C - Hörsaal A, Lab class dates: 28. Oktober 2021 11. November 2021 25. November 2021 9. Dezember 2021 6. Januar 2022 20. Januar 2022 3. Februar 2022, ab 28.10.2021
Mo, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal B, written exam, 21.02.2022 - 21.02.2022

Beschreibung

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. Aside from foundations of supervised learning also an introduction to unsupervised learning is given. The lecture introduces concepts, algorithms, and theoretical backgrounds. The accompanying lab treats both theoretical and applied tasks to deepen the understanding of the field. Team work (2-3 students) is appreciated.

Leistungsnachweis

Klausur

Mobile Information Systems

Photogrammetric Computer Vision

4256303 Photogrammetric Computer Vision

V. Rodehorst, M. Kaisheva Veranst. SWS: 3

Vorlesung

Mo, wöch., 11:00 - 12:30, Lecture - online (recorded) Moodle-Link: https://moodle.uni-weimar.de/course/view.php?id=35823
Registration for this online course starts Oct, 08th 2021, ab 11.10.2021
Mo, wöch., 13:30 - 15:00, Übung - online (interaktiv) , ab 18.10.2021
Mo, Einzel, 10:00 - 12:00, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 07.02.2022 - 07.02.2022

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.

Bemerkung

Voraussetzungen

Einführung in die Informatik, Grundlagen Programmiersprachen

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und Klausur; 4,5 ECTS, ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1.5 ECTS (6 ECTS)

Real-time Rendering

Search Algorithms

Search-Based Software Engineering

Software Product Line Engineering

Visualization

Elective Modules

2909020 Macroscopic Transport Modelling

C. Winkler, J. Uhlmann, U. Plank-Wiedenbeck, J. Bänsch Veranst. SWS: 4
Integrierte Vorlesung
Di, wöch., 11:00 - 15:00, Marienstraße 7 B - Projektraum 302, 19.10.2021 - 01.02.2022

Beschreibung

Teil A: Grundlagen

Planerische Rahmenbedingungen, Raumstrukturdaten und Netzwerke, Methodik und Verfahren, Empirische Verkehrsdaten für Verkehrsmodellentwicklungen, Verkehrserzeugung, Verkehrsverteilung, Verkehrsmittelwahl, Verkehrsumlegung, Stärken und Schwächen unterschiedlicher Modellansätze, Kalibrierung und Validierung, Prognosen- und Szenarioentwicklung

Teil B: Modellierung

Praktische Umsetzung und Anwendung, Modellierung eines Verkehrsnetzes und der Verkehrsnachfrage mit PTV VISUM, Praktische Anwendung der Theorie und kritische Betrachtung von Modellergebnissen, Präsentation der Studierenden in Gruppen

engl. Beschreibung/ Kurzkommentar

Part A: Principles

Transport planning framework, Methodology and procedures, Land-Use Data and networks, Empirical Travel Data for model developments, Trip generation, Trip distribution, Mode choice, Traffic assignment, Methods and algorithms, Strengths and weaknesses of different model approaches, Calibration and validation, Forecasting and scenario calculations

Part B: Model Development

Practical implementation and application, Modelling transport network and travel demand using PTV VISUM, Application of learned methodological approach(es) and critical reflection of the model outputs, Student presentation (group work)

Bemerkung

Beleg; Prüfungsvoraussetzung: Belegabgabe

Lehrformat WiSe 2021/22: Vorlesung digital, Übung hybrid

Voraussetzungen

Teilnehmeranzahl auf 15 begrenzt. Bestätigung der Professur Verkehrssystemplanung notwendig

Bewerbung bis 12.10.2021 ausschließlich per Mail an vsp@bauing.uni-weimar.de. Bitte kurz den fachlichen Hintergrund und die Motivation für die Kursteilnahme schildern.

Empfohlen: Vorkenntnisse in der Modellierung/ Simulation und Verkehrsplanung und-technik. **Sollten keine Vorkenntnisse im Bereich der Verkehrsplanung vorliegen muss der Kurs "Introduction to Mobility and Transport" parallel belegt werden!**

Leistungsnachweis

Teil A:

Klausur (120 Min), Englisch, 50%

Teil B:

Beleg und Präsentation, Englisch, 50%

Die Belegabgabe ist Vorraussetzung für die Klausurteilnahme

401007 Structural Engineering Models

C. Könke, F. Tartaglione Garcia, C. Zacharias Veranst. SWS: 4
Integrierte Vorlesung
Mi, Einzel, 09:00 - 11:00, exam, HS B, M 13C (along with "Computer Models for Physical Processes"), 23.02.2022 - 23.02.2022

Beschreibung

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

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

Voraussetzungen

basic course in structural mechanics

basic course in applied mathematics

Leistungsnachweis

written test, 120 min duration

421250017 Robust and Leakage-Resilient Modes of Operation for Block Ciphers

S. Lucks, J. Boßert, N. Lang Veranst. SWS: 2
Seminar

Beschreibung

Once you have a block cipher, you need a "mode of operation" to employ the block cipher for anything "useful", such as 1
• modes for encryption, e.g., the counter mode,
• modes for authentication, e.g., variants of the CBC-MAC,
• and authenticated encryption modes, e.g., the Galois-Counter Mode (GCM) or the offset-code-book (OCB) mode.
Most of the modes have been proven secure -- and yet,
there are attacks against these modes. The proofs are always based on a certain set of assumptions, such as a "nonce" never being used a second time,
or the decryption of an invalid ciphertext never been compromised. Thus, "non-standard attacks" or "misuse scenarios", where the adversary may exploit a seemingly

innocent but actually flawed implementation of the mode, allow the adversary to bypass the proven security claims. Moreover, typical proofs consider adversaries to learn
inputs and outputs of the mode (except for the secret key), but not any internal data. Another way to bypass proven security claims and to attack a mode is to gather
"side-channel" information about internal data, e.g., by measuring the response time in a cryptographic protocol, or by measuring the power consumption of a device running
the operation. The seminar is about
• nonstandard attacks,
• side-channel attacks,
• "robust" modes to withstand nonstandard attacks,
• and "leakage-resilient" modes for resistance to side-channel attacks.

engl. Beschreibung/ Kurzkommentar

Das Seminar beschäftigt sich mit Betriebsarten für Blockchiffren, und der Sicherheit dieser Betriebsarten gegen nicht-standard und Seitenkanal Angriffe.

Voraussetzungen

Introduction to Modern Cryptography, or equivalent

Leistungsnachweis

Mündliche Präsentation zu einem Thema, Teilnahme an Diskussion zu den präsentierten Themen, schriftliche Zusammenfassung der Kernaussagen aus der eigenen mündlichen Präsentation

4526501 Academic English Part One

G. Atkinson Veranst. SWS: 2

Kurs

Di, wöch., 17:00 - 18:30, Online (Moodle) , ab 02.11.2021

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.

**This writing course will basically run as an online correspondence course using the university's Moodle platform. In addition, occasional consultations for groups of up to 10 students are offered in order to discuss written work. These will take place on pre-arranged Tuesdays at 17.00 and may take place either face-to-face
or using Big Blue Button.**

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., 17:00 - 18:30, ab 03.11.2021

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.

This writing course will basically run as an online correspondence course using the university's Moodle platform. In addition, occasional consultations for groups of up to 10 students are offered in order to discuss written work. These will take place on pre-arranged Wednesdays at 17.00 and may take place either face-toface or using Big Blue Button.

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

Project

421210002 Extraction of main content and metadata from web crawls

B. Stein, J. Bevendorff, E. Körner, M. Wolska Veranst. SWS: 10
Projekt

Beschreibung

Extraktion von Main-Content und Metadaten aus Web-Crawls

In this project, we will extract author and meta information from websites on a web-scale (Big Data). We will use approaches from natural language processing to extract and analyze content from social media sources (e.g. novelupdates) to create benchmarking datasets for authorship analytics (e.g., profiling and verification).

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421210003 FL BaSe - Formal-Language Based Security WiSe21/22

S. Lucks, J. Boßert, N. Lang Veranst. SWS: 10
Projekt

Beschreibung

Wenn binäre Daten als Byte-Strom verschickt werden, braucht man eine „Datenserialisierungssprache" (DSL).
Im Unterschied zu menschenlesbaren Sprachen gibt es viele DSLs, die Daten variabler Länge als Längenpräfix-Sprachen implementieren. Das Ziel des Projektes besteht darin, eine Erweiterung der EBNF (der „extended Backus-Naur Form") einzuführen, und einen Prototyp für einen Parser- Generator für derartige Sprachen zu implementieren.

Bemerkung

time and place: t.b.a.

Voraussetzungen

Discrete Mathematics
Formal Languages
Solid programming skills

Leistungsnachweis

Zwischenpräsentation, Abschlusspräsentation, Abschlussbericht

421210004 Hot Topics in Computer Vision WiSe21/22

V. Rodehorst, C. Benz, P. Debus, J. Eick, M. Kaisheva
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

Ort und Zeit werden zur Projektbörse bekanntgegeben.

Voraussetzungen

Gute Programmierkenntnisse (z.B. C/C++, MATLAB, OpenCL)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

421210006 In Dialog with the Virtual Museum

B. Stein, M. Gohsen, J. Kiesel Veranst. SWS: 10
Projekt

Beschreibung

Though current "smart" assistants like Alexa, Siri, or Google Assistant are very limited in their capabilities, they foreshadow a time in which we can talk to "the Web" like we do to a human. One of the current challenges for such assistants is, after they identified the relevant bits of information, to formulate answers as a human would. This project will focus on tackling this challenge for a specific situation, namely while visiting a virtual museum. In this project, which is part of a largeer collaboration to make this museum "reality," the participants will research on and learn to apply methods of information representation, natural language generation, and voice interaction.

Bemerkung

time and place: t.b.a.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

421210009 NoRa - No Ransom

S. Lucks, J. Boßert, N. Lang Veranst. SWS: 10
Projekt

Beschreibung

In a previous project, students developed a prototype of a fileserver that hinders various kinds of ransomware attacks.

This semester, we would like to extend the prototype to a version that can be used in practice.

This includes programming in C++ and Python, as well as finding solutions to edgecases that have not been dealt with yet.

Bemerkung

time and place: t.b.a.

421210015 BlueP - The Truth behind Matrix: Virtual Machines and the Blue Pill Environment

R. Adejoh, A. Jakoby Veranst. SWS: 10
Projekt

Traffic Data and Simulation

U. Plank-Wiedenbeck, M. Fedior, F. Post, O. Singler, J. Uhlmann Veranst. SWS: 4

Projekt

Mi, wöch., 11:00 - 12:30, Marienstraße 7 B - Student Design Studio – SDS 303, 20.10.2021 - 02.02.2022

Beschreibung

The project consists of a seminar during the semester. The project provides practical information on traffic data acquisition, preparation, and processing and microscopic traffic simulation. Students work on a project including a term paper during the semester, which concludes with a presentation.
The participants work on a practical problem within the research project ”Bauhaus.Mobility Lab”.
Using trajectories to calibrate microscopic traffic simulations is a promising field of research. In groups, the students receive and generate vehicle trajectory data. The own data will be generated via UAVs and traffic surveys at an intersection in Erfurt. The participants examine and process the trajectories using Machine Learning. Furthermore, they set up microscopic traffic models and investigate different calibration parameters for realistic driving behaviour simulation.

Bemerkung

<p>Interested persons please contact Mr. Marco Fedior (marco.fedior@uni-weimar.de)

Voraussetzungen

The project requires prior knowledge in microscopic traffic simulation with PTV VISSIM and working with large data sets in Python. Additional knowledge in Machine Learning and object tracking with Computer Vision are welcome.

Leistungsnachweis

Term paper and presentation