Vorlesungsverzeichnis

M.Sc. Digital Engineering

Sommer 2022

Stand 30.11.2022

M.Sc. Digital Engineering

Faculty Welcome for Master's Students Digital Engineering

Monday, 4th April 2022, 11.00 a.m., room 3.31, Schwanseestraße 143

Project fair

Monday, 4th April 2022, 5 p.m. via Moodle.

Fundamentals (F)

Advanced Numerical Mathematics

4556105 Advanced Numerical Mathematics

B. Rüffer Veranst. SWS: 4

Vorlesung

Mo, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2, Lecture , ab 11.04.2022
Mo, wöch., 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, Exercise, ab 11.04.2022
Mi, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Seminarraum 210, Klausur / written exam, 03.08.2022 - 03.08.2022

Beschreibung

Höhere Numerik

Effiziente Lösung linearer und nichtlinearer Gleichungssysteme;
• Diskretisierungsmethoden für verschiedene Typen partieller Differentialgleichungen
• Projektionsverfahren, Stabilität, Konvergenz und Konditionszahl
• Direkte Löser für schwach besetzte Systemmatrizen
• Fixpunktsatz, iterative Löser, Gesamtschrittverfahren, Einzelschrittverfahren, Gradientenverfahren, Relaxationsverfahren, Multiskalenmethoden und Überblick über andere Zugänge
• Eigenwertprobleme, iterative Löser
• Gebietszerlegungsverfahren

engl. Beschreibung/ Kurzkommentar

Advanced Numerical Mathematics

Efficient solution of linear and non-linear systems of algebraic equations;
• Discretization methods for different types of partial differential equations
• Projection methods, stability and convergence, condition number
• Direct solvers for sparse systems
• Fixed-point theorem, iterative solvers: Total step method, single step method, gradient methods, relaxation methods, multiscale methods and a survey on other approaches
• Eigenvalue problems, iterative solvers
• Domain decomposition methods

Voraussetzungen

Courses in Linear Algebra, Analysis

Leistungsnachweis

Project

Algorithms and Datastructures

4555211 Algorithmen und Datenstrukturen

C. Wüthrich, F. Andreussi, Projektbörse Fak. KuG Veranst. SWS: 4

Vorlesung

Di, wöch., 13:30 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, Vorlesung, ab 12.04.2022
Mi, wöch., 09:15 - 10:45, Steubenstraße 6, Haus F - Hörsaal K20, Übung, ab 13.04.2022
Di, Einzel, 11:30 - 13:30, Steubenstraße 6, Haus F - Hörsaal K20, Klausur / written exam, 26.07.2022 - 26.07.2022

Beschreibung

Das Lernziel dieser Veranstaltung soll zum einen der generelle Umgang und die selbstständige Entwicklung, Analyse, und Optimierung von Algorithmen und Datenstrukturen sein. Zum anderen soll ein Überblick über gängige problemspezifische Verfahren und deren Anwendung in der Praxis vermittelt werden.

engl. Beschreibung/ Kurzkommentar

Algorithms and Data Structures

The lecture deals with the principle and the implementation of basic algorithms and data structures. The course teaches among all, the Strings, geometric problems, graphs, mathematical algorithms and NP-complete problems.

Leistungsnachweis

Beleg, Klausur

Applied Mathematics and Stochastics

Introduction to Mechanics

Nonlinear Continuum Mechanics

Object-oriented Modeling and Programming in Engineering

Software Engineering

Statistics

301005 Statistics

B. Rüffer Veranst. SWS: 4

Integrierte Vorlesung

Mo, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, ab 18.04.2022
Mo, wöch., 13:30 - 15:00, Coudraystraße 13 B - Seminarraum 210, ab 18.04.2022
Mi, Einzel, 13:30 - 15:00, Coudraystraße 13 B - Hörsaal 3, 22.06.2022 - 22.06.2022
Do, Einzel, 13:30 - 15:00, Coudraystraße 11 C - Seminarraum/Hörsaal 001, 23.06.2022 - 23.06.2022
Mi, Einzel, 09:00 - 12:00, Coudraystraße 13 B - Seminarraum 210, written exam, 20.07.2022 - 20.07.2022

engl. Beschreibung/ Kurzkommentar

Statistics

Contents:
- Probability (Events, classical probability, axiomatic approach, conditional probability)
- Random variables (Discrete random variables, continuous random variables, limit theorems)
- Descriptive statistics (Graphical representation and frequency distributions, location and scattering parameters, bivariate and multivariate analysis: dependence and correlation, regression analysis)
- Inductive statistics
- Point and interval estimation
- Parameter testing
- Goodness-of-fit-tests
- Nonparametric tests
- Tests for independence and correlation

Voraussetzungen

B.Sc. in a related study field, Basic knowledge on random variables and the most important distributions

Leistungsnachweis

Written exam

Structural Dynamics

Structural Engineering Models

Modelling (M)

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

Advanced Building Information Modeling

303001 Advanced Building Information Modelling

C. Koch, M. Alabassy, J. Krischler Veranst. SWS: 4

Vorlesung

Mi, wöch., 09:15 - 10:45, Coudraystraße 13 B - Pool Fak. B 007, Exercise , ab 13.04.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Tutorial, 13.04.2022 - 01.06.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302, Tutorial, 13.04.2022 - 01.06.2022
Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, Lecture , ab 14.04.2022
Mi, wöch., 09:15 - 10:45, Marienstraße 7 B - Student Design Studio – SDS 303, Workshop, 08.06.2022 - 13.07.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Student Design Studio – SDS 303, Workshop, 08.06.2022 - 13.07.2022
Do, Einzel, 13:00 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 04.08.2022 - 04.08.2022

engl. Beschreibung/ Kurzkommentar

Advanced Building Information Modelling

Content: Advanced geometric and parametric modelling, Interoperability and collaboration concepts (IFC, IDM, BEP), Advanced use cases (e.g. clash detection, as-built model-ing), BIM programming (incl. visual programming)

Target qualifications: This module introduces advanced concepts of Building Information Modelling (BIM) to provide students with advanced knowledge in order to understand, analyze and discuss scientific research approaches related to BIM. Within the frame of the mod-ule project (coursework) the students will choose a topic from a pre-defined list or come up with their own topic. Based on that they will do detailed research, imple-ment a representative concept in a software prototype and discuss findings and limi-tations. Also the students acquire skills of scientific working and presentation.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of Computer-Aided Design, BIM concepts, and object-oriented programming

Leistungsnachweis

written report, presentation

Advanced Modelling - Calculation

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

B. Rüffer, A. Legatiuk Veranst. SWS: 4
Vorlesung
Di, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

Scientifically orientated education in mathematical modelling and computer science in view of a complex interdisciplinary and networked field of work and research, modelling and simulation.

Students will have experience in Computer Aided Engineering (CAE) by establishing a problem specific model on the basis of a mathematical formulation, an applicable solution technique, design of efficient data structures and software implementation.

Numerical and analytical solution of partial differential equations, series expansions, integral representations, finite difference methods, description of heat flow, diffusion, wave propagation and elastostatic problems.

The topics are discussed theoretically and then implemented.

Convergence, stability and error analysis of finite difference methods (FDM). Modelling of steady and unsteady heat conduction problems, wave propagation and vibrations and problems from linear thermo-elasticity in 2D and 3D. After considering the mathematical basis, the students will work on individual projects passing all levels of work (engineering model, mathematical model, numerical model, computer model, simulation, evaluation).

The solution methods will be implemented by help of MAPLE or MATLAB.

Bemerkung

This lecture replaces "Advanced Analysis". It is therefore not possible to receive credits for both courses.

Die Veranstaltung ersetzt "Advanced Analysis" und kann daher nicht gemeinsam mit dieser Veranstaltung angerechnet werden.

Leistungsnachweis

1 Project report + Presentation

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

Collaborative Data Management

Computer models for physical processes - from observation to simulation

Introduction to Optimization

451002 Introduction to Optimization (L+E)

T. Lahmer Veranst. SWS: 3
Integrierte Vorlesung
Mo, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, Lecture
Do, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise Dates by arrangement

Beschreibung

Introduction to Optimization (451002):

Definitions, Classification of Optimization Problems,

Linear Problems, Simplex Method, Nonlinear Problems: Constrained and unconstrained continuous problems, descent methods and variants. (Robust) Structural Optimization (including Shape and Topology Optimization)

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

451006 Optimization in Applications (P)

T. Lahmer Veranst. SWS: 3
Projektmodul/Projekt

Beschreibung

Optimization in Applications (451006):

Optimization in Applications is generally a project assigned to the students including own programming and modelling. E.g. innovative optimization strategies are to be implemented in Matlab, Python or similar. Alternatively, engineering models could be subjected to optimization software.

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

Macroscopic Transport Modelling

Modelling in the development process

Optimization in Applications

451002 Introduction to Optimization (L+E)

T. Lahmer Veranst. SWS: 3
Integrierte Vorlesung
Mo, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, Lecture
Do, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise Dates by arrangement

Beschreibung

Introduction to Optimization (451002):

Definitions, Classification of Optimization Problems,

Linear Problems, Simplex Method, Nonlinear Problems: Constrained and unconstrained continuous problems, descent methods and variants. (Robust) Structural Optimization (including Shape and Topology Optimization)

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

451006 Optimization in Applications (P)

T. Lahmer Veranst. SWS: 3
Projektmodul/Projekt

Beschreibung

Optimization in Applications (451006):

Optimization in Applications is generally a project assigned to the students including own programming and modelling. E.g. innovative optimization strategies are to be implemented in Matlab, Python or similar. Alternatively, engineering models could be subjected to optimization software.

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

Raumbezogene Informationssysteme/ Spatial information systems (GIS)

Simulation and Validation (SaV)

Design and Interpretation of Experiments / Signal Processing

Experimental Structural Dynamics

401009 Experimental structural dynamics and Structural monitoring (P)

V. Zabel Veranst. SWS: 4
Projekt
Di, wöch., 07:30 - 12:30, Marienstraße 7 B - Projektraum 301

Beschreibung

The students obtain deepened knowledge in structural dynamics, structural dynamic analysis, data processing, dynamic test equipment and its handling. They learn to analyse the dynamic behaviour of a structure utilizing both numerical and experimental state-of-the-art methods. Furthermore, the students have to develop strategies and concepts of investigation. The work in small groups enhances the social competence of the students.

Operational modal analysis, sensor types, sensor positioning, data analysis and assessment, assessment of structural changes, structural modelling, model updating

Bemerkung

14 students from NHRE only

Voraussetzungen

Structural dynamics

Leistungsnachweis

1 Project report + intermediate and final presentations

„ Experimental structural dynamics”

(100%) / **SuSe**

Extended Finite Elements and Mesh Free Methods

Finite Element Methods (FEM)

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

Linear FEM

Modelling of Steel Structures and Numerical Simulation

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

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

Vorlesung

1-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, Exercise
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise
2-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, Exercise
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Exercise
Mo, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, Lecture
Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal B, Lecture

Beschreibung

The students will be familiar with skills and expertise in the field of nonlinear structural analyses. Extensive knowledge of theoretical basics and modern modelling methods including numerical representations are the aim of the course. The students will acquire skills in handling advanced tools for the analysis and the design of structures.

Design of steel structures using finite element methods; basics of the design; modelling of structures and loads; nonlinear material behaviour, numerical analyses of steel-members and structures regarding geometric and physical nonlinearities; stability behaviour of members including flexural and lateral torsional buckling

Leistungsnachweis

1 Project report

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

1 written exam

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

Nonlinear FEM

Process modelling and simulation in logistics and construction

Simulation Methods in Engineering

303002 Simulation Methods in Engineering

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

Vorlesung

Fr, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, 22.04.2022 - 20.05.2022
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Exercise , ab 22.04.2022
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302, Exercise , ab 22.04.2022
Fr, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, ab 03.06.2022

engl. Beschreibung/ Kurzkommentar

Simulation Methods in Engineering

Content:

- System analysis and modelling
- System dynamics
- Discrete event simulation
- Multi-agent simulation
- Input data and stochastic simulation

- Simulation based optimization
- Introduction to the software AnyLogic

Target qualifications:

This module provides students with comprehensive knowledge about computer based simulation concepts to address practical challenges in engineering. Modern simulation and optimization software is introduced within tutorials. The module project (coursework) offers an opportunity to students to work in groups on current problems in the context of civil and environmental engineering (e.g. production logistics, pedestrian simulation, pollutant dispersion). Using object-oriented simula-tion software the students will analyze, model and simulate different engineering systems. The programming is carried out using Java. Also the students acquire team working and presentation skills.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of programming

Leistungsnachweis

Short group report, group presentation, written exam

Stochastic Simulation Techniques and Structural Reliability

451007 Stochastic Simulation Techniques and Structural Reliability (L+E)

T. Lahmer Veranst. SWS: 3

Integrierte Vorlesung

Mi, wöch., 11:00 - 12:30, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), Lecture
Fr, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise dates by arrangement

Beschreibung

Soils, rocks and materials like concrete are in the natural state among the most variable of all engineering materials. Engineers need to deal with this variability and make decisions in situations of little data, i.e. under high uncertainties. The course aims in providing the students with techniques state of the art in risk assessment (structural reliability) and stochastic simulation.
The course topics comprise
- (a very brief review) of probability theory
- discrete and continuous random processes and fields
- estimation of statistical parameters
- stochastic simulation techniques (Monte Carlo Samplings)
- reliability-based design
- sensitivity analysis
- structural safety
- Risk assessment and stochastic modelling in practice

Bemerkung

The lecture consists of weekly lectures by Prof. Tom Lahmer (Bauhaus University Weimar) throughout the semester and an intensive practical training (Blockkurs) on applications by Dr. Thomas Most (DYNARDO, Weimar)
Please indicate your interest in the course via an E-Mail to Prof. Tom Lahmer (tom.lahmer@uni-weimar.de) by briefly citing the title of the lecture and providing your name until **April 1st, 2022** as this will make the organization of rooms, course material, etc. much easier.

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Voraussetzungen

Basic knowledge in probability theory

Leistungsnachweis

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

”Stochastic Simulation Techniques and Structural Reliability” / (50%) / **SuSe** + WiSe

451011 Stochastic Simulation Techniques and Structural Reliability (P)

T. Lahmer Veranst. SWS: 3
Projektmodul/Projekt

Beschreibung

The course topics comprise

- (a very brief review) of probability theory
- discrete and continuous random processes and fields
- estimation of statistical parameters
- stochastic simulation techniques (Monte Carlo Simulation)
- reliability-based design
- sensitivity analysis
- structural reliability (FORM, FOSM, Subset Simulation, …)
- Risk assessment and stochastic modelling in practice

The project (extra 3 credits) involves own programming of stochastic simulation algorithms, e.g. generators of random fields, methods to assess structural reliability, and combination of stochastic simulation techniques with engineering models.

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Voraussetzungen

Basic knowledge in probability theory

Leistungsnachweis

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

”Stochastic Simulation Techniques and Structural Reliability” / (50%) / **SuSe** + WiSe

Structural Health Monitoring

Visualization and Data Science (VaDS)

41729000 Software Engineering

J. Ringert Veranst. SWS: 4
Vorlesung
Di, wöch., 09:15 - 10:45, Schwanseestraße 143 - Seminarraum 2.16, lecture, ab 05.04.2022
Fr, wöch., 11:00 - 12:30, Schwanseestraße 143 - Seminarraum 2.16, lab class, ab 08.04.2022
Fr, Einzel, 09:00 - 11:00, exam, 12.08.2022 - 12.08.2022

Beschreibung

We introduce the most important aspects of software engineering.

- Motivation and history of software engineering
- Lifecycle models for software development
- Requirements engineering
- Requirement notations
- Software modelling
- Software analysis
- Design patterns
- Testing
- Software quality
- Agile principles
- Open Source Software

After completion students will be able to

- Compare and evaluate software lifecycle models
- Read, create, and assess the quality of requirements
- Read common software modelling notations
- Evaluate and select appropriate software testing strategies

Understand principles of OSS

422150030 Big Data and Language Technologies

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

Seminar

Mo, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 3.09, Seminar, ab 11.04.2022
Mo, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 3.09, Übung, ab 11.04.2022

Beschreibung

Information on the web is growing at an exponential pace, courtesy of social media platforms, blogs, and news.

Such large scale data sources call for high-end, scalable, distributed architectures for cognitive analysis, which shape the business decisions of many industries. In addition, deep learning has been propelled into mainstream and is now accessible to researchers and companies alike, thanks to tools such as TensorFlow, PyTorch. The Webis research group operates large-scale high-performance compute infrastructure (totaling more than 3000 CPU cores, 10+ Petabytes of storage, and 24 high-end GPUs), which will be put to use in the course of this seminar. Students will receive application-oriented training in Big data and deep learning frameworks, solve tasks, and explore interesting research questions.

Voraussetzungen

This seminar requires good skills in both programming and algorithms.

Leistungsnachweis

geforderte Prüfungsleistung: Präsentation, Ausarbeitung mit Bericht

422150031 Generative Software Engineering

J. Ringert Veranst. SWS: 4

Vorlesung

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal A, Lecture, ab 05.04.2022

Fr, wöch., 13:30 - 15:00, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 08.04.2022
Mo, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, written exam, 08.08.2022 - 08.08.2022

Beschreibung

We introduce main approaches and techniques to generative software development.

- Model Driven Engineering
- Software Modeling languages for structure and behavior
  - Class Diagrams, Object Diagrams, OCL
  - Sequence Diagrams and State Machines
- Software model consistency and semantics
- Code Generation from class diagrams
- Code generation from State Machines
- Reactive Synthesis from temporal specifications
- Software Product Lines
- Domain Specific Languages
- Model Transformations

After completion students will be able to

- Contrast different modelling languages and chose based on purpose
- Analyze model consistency
- Evaluate and apply code generators
- integrate generated code in software projects
- create and analyze temporal specifications
- synthesize software from temporal specifications
- understand domain specific languages and model transformations

Bemerkung

Lecturer: Prof. Ringert

422150032 Complexity Theory

A. Jakoby Veranst. SWS: 4

Vorlesung

Di, wöch., 11:00 - 12:30, Lecture SR 3.31, Schwanseestraße 143, ab 05.04.2022
Do, wöch., 09:15 - 10:45, Lab class Lecture Hall 6, Coudraystraße 9A, ab 07.04.2022
Do, Einzel, 09:00 - 11:00, written exam room: SR 210,C 13B, 29.09.2022 - 29.09.2022

Beschreibung

The aim this course is to impart basic knowledge on concepts of complexity theory. The course present knowledge on the limits of information processing.

Key topics include

- Complexity Classes
- Reductions
- Efficiency versus Intractability
- NP complete problems
- Approximability

engl. Beschreibung/ Kurzkommentar

Complexity Theory

The aim this course is to impart basic knowledge on concepts of complexity theory. The course present knowledge on the limits of information processing.

Key topics include

- Complexity Classes
- Reductions
- Efficiency versus Intractability
- NP complete problems

Voraussetzungen

Diskrete Mathematik

Leistungsnachweis

Klausur

4345600 Computer Graphics II: Computer Animation

C. Wüthrich, G. Pandolfo Veranst. SWS: 3

Vorlesung

Fr, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 08.04.2022
Mo, wöch., 17:00 - 18:30, Lecture, ab 11.04.2022
Do, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal B, written exam, 28.07.2022 - 28.07.2022

Beschreibung

Das Ziel der Veranstaltungen ist die interdisziplinäre Vermittlung ästhetischer und technischer Aspekte der Computergrafik und -Animation von der Theorie bis in die Praxis.

Die Veranstaltung besteht aus einer eigens für Medienkünstler / Gestalter entwickelten Vorlesung und einer Übung, in der Künstler und Informatiker interdisziplinär zusammen arbeiten können.
In der Vorlesung werden die Studenten mit den nötigen technischen Details versorgt.
Die Übung wird von M.F.A Gianluca Pandolfo geleitet und deckt sowohl technische als auch ästhetische Grundlagen ab (Modellieren, Rendern, Animieren). Gearbeitet wird mit Blender 3D. Ziel der Übung ist die Fertigstellung eines einminütigen 3D-Animationsfilms als finale Abgabe.

engl. Beschreibung/ Kurzkommentar

Computer Animation

Three-dimensional Computer Graphics and Computer Animation are now widespreadly used in the Arts and in Design. Aim of this is to allow students to understand the modelling and rendering techniques used in common high level animation programs.
Successful students in this course should be able to conceive and produce a 3D animation and should be able to cooperate with Computer Scientists on a common 3D animation project, which might at times involve the specification of requirements for programming plugins for the animation system. At the end of the course they should master the steps required for the conception, design and rendering of a 3D animation software.

Leistungsnachweis

Beleg, Klausur

4445203 Randomized Algorithms

A. Jakoby Veranst. SWS: 4

Vorlesung

Do, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 2.16, Lecture, ab 07.04.2022
Do, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, lab class, ab 07.04.2022

Beschreibung

Randomisierte Algorithmen

Für viele Probleme stellen randomisierte Algorithmen die einzigen bekannten effizienten Lösungsverfahren dar. Für manches andere Problem erhalten wir mit einem solchen Verfahren Algorithmen, die um vieles einfacher und verständlicher sind als alle bekannten deterministischen Verfahren. Es ist daher nicht verwunderlich, dass wir randomisierte Algorithmen in viele Anwendungsgebieten finden, wie z.B. in

- Datenstrukturen,
- Graphenalgorithmen,
- parallelen und verteilen Systemen,
- Online-Algorithmen,
- Zahlentheorie und
- geometrische Algorithmen.

In der Vorlesung *Randomisierte Algorithmen* werden wir Verfahren aus einigen dieser Gebiete und grundlegende Techniken für randomisierte Algorithmen vorstellen und analysieren.

Darüber hinaus werden grundlegende probabilistische Methoden zur Analyse von Algorithmen vorgestellt.

engl. Beschreibung/ Kurzkommentar

Randomized Algorithms

For many problems randomized algorithms are the only known efficient solution method. For some other problem we can find randomized algorithms that are much simpler and more understandable than any known deterministic method. It is therefore not surprising that we find randomized algorithms in many areas, such as in

- data structures,
- graph algorithms,
- parallel and distributed systems,
- on-line algorithms,
- number theory, and
- geometric algorithms.

In the lecture Randomized Algorithms, we will present and analyze randomized algorithms and basic methods from some of these areas. Furthermore, basic probabilistic methods for the analysis of algorithms are presented.

Voraussetzungen

Bsc in a relevant study field

Leistungsnachweis

oral examination

Image Analysis and Object Recognition

4336010 Image Analysis and Object Recognition

V. Rodehorst, C. Benz Veranst. SWS: 3

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lecture, ab 05.04.2022
Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 14.04.2022
Di, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal A, Klausur / written exam, 02.08.2022 - 02.08.2022
Di, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal B, Klausur / written exam, 02.08.2022 - 02.08.2022

Beschreibung

Bildanalyse und Objekterkennung

Die Vorlesung gibt eine Einführung in die Grundlagen der Mustererkennung und Bildanalyse. Behandelt werden unter anderem die Bildverbesserung, lokale und morphologische Operatoren, Kantenerkennung, Bilddarstellung im Frequenzraum, Fourier-Transformation, Hough-Transformation, Segmentierung, Skelettierung, Objektklassifizierung und maschinelles Lernen zur visuellen Objekterkennung.

engl. Beschreibung/ Kurzkommentar

Image analysis and object recognition

The lecture gives an introduction to the basic concepts of pattern recognition and image analysis. It covers topics as image enhancement, local and morphological operators, edge detection, image representation in frequency domain, Fourier transform, Hough transform, segmentation, thinning, object categorization and machine learning for visual object recognition.

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und Klausur (sowie des Final Projects für das Erreichen der 6 ECTS)

Introduction to Machine Learning

Mobile Information Systems

Photogrammetric Computer Vision

Real-time Rendering

Search Algorithms

Search-Based Software Engineering

Software Product Line Engineering

Visualization

4555262 Visualisierung

B. Fröhlich, N.N., G. Rendle, P. Riehmann Veranst. SWS: 3

Vorlesung
Do, wöch., 09:15 - 10:45, Lecture / Lab class - taught online (live&recorded)- Moodle: https://moodle.uni-weimar.de/course/view.php?id=38582 , ab 07.04.2022
Fr, Einzel, 09:15 - 11:15, Marienstraße 13 C - Hörsaal A, Klausur / written exam, 30.09.2022 - 30.09.2022

Beschreibung

Im ersten Teil der Veranstaltung werden die wichtigsten Verfahren und Techniken aus dem Bereich der Informationsvisualisierung für folgende Datentypen vorgestellt: multi-dimensionale und hierarchische Daten, Graphen, Zeitreihen und mengenbasierte Daten. Der zweite Teil beschäftigt sich mit verschiedenen Ansätzen und Algorithmen zur Visualisierung volumetrischer und vektorieller Simulations- und Messdaten. Die Veranstaltung wird englischsprachig angeboten.

In den Übungen werden eine Auswahl der in den Vorlesungen vorgestellten Visualisierungsansätze umgesetzt, getestet und evaluiert. Ein separates Abschlussprojekt wird angeboten und mit zusätzlich 1,5 ETCS angerechnet.

Bemerkung

Bitte beachten Sie:
um 6ECTS Punkte zu erhalten, ist zusätzlich der Kurs "Visualization - Final Project" verpflichtend zu belegen.

Voraussetzungen

Programmierkenntnisse sowie gute Kenntnisse von Algorithmen und Datenstrukturen sind erforderlich, z.B. nachgewiesen durch den erfolgreichen Abschluss der entsprechenden Lehrveranstaltungen des Bachelor-Studiengangs Medieninformatik. In den Laborveranstaltungen werden JavaScript- und grundlegende GLSL-Programmierung eingesetzt. Grundkenntnisse der Computergrafik sind hilfreich, z.B. erworben durch die Vorlesung Computergrafik im Bachelor-Studiengang Medieninformatik.

Leistungsnachweis

Vorlesungsbegleitende Übungen, mündliche oder schriftliche Prüfung.

Ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1.5 ECTS.

420160006 Visualization - Final Project

B. Fröhlich, N.N., J. Reibert, G. Rendle Veranst. SWS: 1
Independent Study

Beschreibung

Im Abschlussprojekt der Vorlesung „Visualisierung” sollen die Teilnehmer die erlangten theoretischen und praktischen Fertigkeiten auf den Entwurf, die Implementierung und die Präsentation eines eigenständigen kleinen Forschungsprojektes anwenden. Dazu soll ein Problem ausgewählt, eine Lösung entwickelt, eine effiziente Implementierung realisiert und die Ergebnisse abschließend in einem Vortrag präsentiert werden.

Dies ist eine wertvolle Gelegenheit, an einem selbst gewählten Thema im Bereich der Visualisierung zu arbeiten.

Voraussetzungen

Erfolgreiche Teilnahme an der Vorlesung „Visualization”

Leistungsnachweis

Dokumentation, Abschlusspräsentation

Elective Modules

4555262 Visualisierung

B. Fröhlich, N.N., G. Rendle, P. Riehmann Veranst. SWS: 3
Vorlesung
Do, wöch., 09:15 - 10:45, Lecture / Lab class - taught online (live&recorded)- Moodle: https://moodle.uni-weimar.de/course/view.php?id=38582 , ab 07.04.2022
Fr, Einzel, 09:15 - 11:15, Marienstraße 13 C - Hörsaal A, Klausur / written exam, 30.09.2022 - 30.09.2022

Beschreibung

Im ersten Teil der Veranstaltung werden die wichtigsten Verfahren und Techniken aus dem Bereich der Informationsvisualisierung für folgende Datentypen vorgestellt: multi-dimensionale und hierarchische Daten, Graphen, Zeitreihen und mengenbasierte Daten. Der zweite Teil beschäftigt sich mit verschiedenen Ansätzen und Algorithmen zur Visualisierung volumetrischer und vektorieller Simulations- und Messdaten. Die Veranstaltung wird englischsprachig angeboten.

In den Übungen werden eine Auswahl der in den Vorlesungen vorgestellten Visualisierungsansätze umgesetzt, getestet und evaluiert. Ein separates Abschlussprojekt wird angeboten und mit zusätzlich 1,5 ETCS angerechnet.

Bemerkung

Bitte beachten Sie:
um 6ECTS Punkte zu erhalten, ist zusätzlich der Kurs "Visualization - Final Project" verpflichtend zu belegen.

Voraussetzungen

Programmierkenntnisse sowie gute Kenntnisse von Algorithmen und Datenstrukturen sind erforderlich, z.B. nachgewiesen durch den erfolgreichen Abschluss der entsprechenden Lehrveranstaltungen des Bachelor-Studiengangs Medieninformatik. In den Laborveranstaltungen werden JavaScript- und grundlegende GLSL-Programmierung eingesetzt. Grundkenntnisse der Computergrafik sind hilfreich, z.B. erworben durch die Vorlesung Computergrafik im Bachelor-Studiengang Medieninformatik.

Leistungsnachweis

Vorlesungsbegleitende Übungen, mündliche oder schriftliche Prüfung.

Ein abschließendes Projekt wird separat bewertet und erhält zusätzliche 1.5 ECTS.

420160006 Visualization - Final Project

B. Fröhlich, N.N., J. Reibert, G. Rendle Veranst. SWS: 1
Independent Study

Beschreibung

Im Abschlussprojekt der Vorlesung „Visualisierung” sollen die Teilnehmer die erlangten theoretischen und praktischen Fertigkeiten auf den Entwurf, die Implementierung und die Präsentation eines eigenständigen kleinen Forschungsprojektes anwenden. Dazu soll ein Problem ausgewählt, eine Lösung entwickelt, eine effiziente Implementierung realisiert und die Ergebnisse abschließend in einem Vortrag präsentiert werden.

Dies ist eine wertvolle Gelegenheit, an einem selbst gewählten Thema im Bereich der Visualisierung zu arbeiten.

Voraussetzungen

Erfolgreiche Teilnahme an der Vorlesung „Visualization”

Leistungsnachweis

Dokumentation, Abschlusspräsentation

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

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

Vorlesung

1-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 301, Exercise
1-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise
2-Gruppe Mo, wöch., 11:00 - 12:30, Marienstraße 7 B - Projektraum 302, Exercise
2-Gruppe Mi, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 302, Exercise
Mo, wöch., 11:00 - 12:30, Marienstraße 13 C - Hörsaal B, Lecture
Mi, wöch., 07:30 - 09:00, Marienstraße 13 C - Hörsaal B, Lecture

Beschreibung

The students will be familiar with skills and expertise in the field of nonlinear structural analyses. Extensive knowledge of theoretical basics and modern modelling methods including numerical representations are the aim of the course. The students will acquire skills in handling advanced tools for the analysis and the design of structures.

Design of steel structures using finite element methods; basics of the design; modelling of structures and loads; nonlinear material behaviour, numerical analyses of steel-members and structures regarding geometric and physical nonlinearities; stability behaviour of members including flexural and lateral torsional buckling

Leistungsnachweis

1 Project report

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

1 written exam

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

301005 Statistics

B. Rüffer Veranst. SWS: 4

Integrierte Vorlesung

Mo, wöch., 07:30 - 09:00, Coudraystraße 13 A - Hörsaal 2, ab 18.04.2022
Mo, wöch., 13:30 - 15:00, Coudraystraße 13 B - Seminarraum 210, ab 18.04.2022
Mi, Einzel, 13:30 - 15:00, Coudraystraße 13 B - Hörsaal 3, 22.06.2022 - 22.06.2022
Do, Einzel, 13:30 - 15:00, Coudraystraße 11 C - Seminarraum/Hörsaal 001, 23.06.2022 - 23.06.2022
Mi, Einzel, 09:00 - 12:00, Coudraystraße 13 B - Seminarraum 210, written exam, 20.07.2022 - 20.07.2022

engl. Beschreibung/ Kurzkommentar

Statistics

Contents:
- Probability (Events, classical probability, axiomatic approach, conditional probability)
- Random variables (Discrete random variables, continuous random variables, limit theorems)
- Descriptive statistics (Graphical representation and frequency distributions, location and scattering parameters, bivariate and multivariate analysis: dependence and correlation, regression analysis)
- Inductive statistics
- Point and interval estimation
- Parameter testing
- Goodness-of-fit-tests
- Nonparametric tests
- Tests for independence and correlation

Voraussetzungen

B.Sc. in a related study field, Basic knowledge on random variables and the most important distributions

Leistungsnachweis

Written exam

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

B. Rüffer, A. Legatiuk Veranst. SWS: 4

Vorlesung

Di, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

Scientifically orientated education in mathematical modelling and computer science in view of a complex interdisciplinary and networked field of work and research, modelling and simulation.

Students will have experience in Computer Aided Engineering (CAE) by establishing a problem specific model on the basis of a mathematical formulation, an applicable solution technique, design of efficient data structures and software implementation.

Numerical and analytical solution of partial differential equations, series expansions, integral representations, finite difference methods, description of heat flow, diffusion, wave propagation and elastostatic problems.

The topics are discussed theoretically and then implemented.

Convergence, stability and error analysis of finite difference methods (FDM). Modelling of steady and unsteady heat conduction problems, wave propagation and vibrations and problems from linear thermo-elasticity in 2D and 3D. After considering the mathematical basis, the students will work on individual projects passing all levels of work (engineering model, mathematical model, numerical model, computer model, simulation, evaluation).

The solution methods will be implemented by help of MAPLE or MATLAB.

Bemerkung

This lecture replaces "Advanced Analysis". It is therefore not possible to receive credits for both courses.

Die Veranstaltung ersetzt "Advanced Analysis" und kann daher nicht gemeinsam mit dieser Veranstaltung angerechnet werden.

Leistungsnachweis

1 Project report + Presentation

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

303001 Advanced Building Information Modelling

C. Koch, M. Alabassy, J. Krischler Veranst. SWS: 4

Vorlesung

Mi, wöch., 09:15 - 10:45, Coudraystraße 13 B - Pool Fak. B 007, Exercise , ab 13.04.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Tutorial, 13.04.2022 - 01.06.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302, Tutorial, 13.04.2022 - 01.06.2022
Do, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, Lecture , ab 14.04.2022

Mi, wöch., 09:15 - 10:45, Marienstraße 7 B - Student Design Studio – SDS 303, Workshop, 08.06.2022 - 13.07.2022
Mi, wöch., 13:30 - 15:00, Marienstraße 7 B - Student Design Studio – SDS 303, Workshop, 08.06.2022 - 13.07.2022
Do, Einzel, 13:00 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 04.08.2022 - 04.08.2022

engl. Beschreibung/ Kurzkommentar

Advanced Building Information Modelling

Content: Advanced geometric and parametric modelling, Interoperability and collaboration concepts (IFC, IDM, BEP), Advanced use cases (e.g. clash detection, as-built model-ing), BIM programming (incl. visual programming)

Target qualifications: This module introduces advanced concepts of Building Information Modelling (BIM) to provide students with advanced knowledge in order to understand, analyze and discuss scientific research approaches related to BIM. Within the frame of the mod-ule project (coursework) the students will choose a topic from a pre-defined list or come up with their own topic. Based on that they will do detailed research, imple-ment a representative concept in a software prototype and discuss findings and limi-tations. Also the students acquire skills of scientific working and presentation.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of Computer-Aided Design, BIM concepts, and object-oriented programming

Leistungsnachweis

written report, presentation

303002 Simulation Methods in Engineering

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

Vorlesung

Fr, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, 22.04.2022 - 20.05.2022
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 301, Exercise , ab 22.04.2022
Fr, wöch., 13:30 - 15:00, Marienstraße 7 B - Projektraum 302, Exercise , ab 22.04.2022
Fr, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal A, ab 03.06.2022

engl. Beschreibung/ Kurzkommentar

Simulation Methods in Engineering

Content:

- System analysis and modelling
- System dynamics
- Discrete event simulation
- Multi-agent simulation
- Input data and stochastic simulation
- Simulation based optimization
- Introduction to the software AnyLogic

Target qualifications:

This module provides students with comprehensive knowledge about computer based simulation concepts to address practical challenges in engineering. Modern simulation and optimization software is introduced within tutorials. The module project (coursework) offers an opportunity to students to work in groups on current problems in the context of civil and environmental engineering (e.g. production logistics, pedestrian simulation, pollutant dispersion). Using object-oriented simula-tion software the students will analyze, model and simulate different engineering systems. The programming is carried out using Java. Also the students acquire team working and presentation skills.

Voraussetzungen

Recommended require-ments for participation: Basic knowledge of programming

Leistungsnachweis

Short group report, group presentation, written exam

420160000 Introduction to Natural Language Processing

B. Stein, M. Wolska, N. Kolyada, M. Wiegmann Veranst. SWS: 4
Vorlesung

Do, wöch., 15:15 - 16:45, Lecture, ab 07.04.2022
Do, wöch., 17:00 - 18:30, Lab class, ab 07.04.2022
Do, Einzel, 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 2.16, 14.07.2022 - 14.07.2022
Do, Einzel, 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, 14.07.2022 - 14.07.2022
Fr, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal A, written exam, 29.07.2022 - 29.07.2022

Beschreibung

This course gives an overview of basic techniques of working with language data. We will introduce basic linguistic notions, issues involved in building and working with language corpora, current standard techniques for preparing text for analysis, and methods of computational processing of a subset of language phenomena. By the end of the course students will

(1) have an understanding of key word-level, syntactic, semantic, and discourse phenomena,

(2) be aware of issues involved in building text corpora,

(3) be familiar with typical language processing tasks addressed in the NLP community and methods of addressing them, and

(4) will be able to perform tasks that are part of a standard NLP pipeline.

Leistungsnachweis

Klausur

422150030 Big Data and Language Technologies

B. Stein, J. Bevendorff, M. Völske Veranst. SWS: 4
Seminar

Mo, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 3.09, Seminar, ab 11.04.2022
Mo, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 3.09, Übung, ab 11.04.2022

Beschreibung

Information on the web is growing at an exponential pace, courtesy of social media platforms, blogs, and news.

Such large scale data sources call for high-end, scalable, distributed architectures for cognitive analysis, which shape the business decisions of many industries. In addition, deep learning has been propelled into mainstream and is now accessible to researchers and companies alike, thanks to tools such as TensorFlow, PyTorch. The Webis research group operates large-scale high-performance compute infrastructure (totaling more than 3000 CPU cores, 10+ Petabytes of storage, and 24 high-end GPUs), which will be put to use in the course of this seminar. Students will receive application-oriented training in Big data and deep learning frameworks, solve tasks, and explore interesting research questions.

Voraussetzungen

This seminar requires good skills in both programming and algorithms.

Leistungsnachweis

geforderte Prüfungsleistung: Präsentation, Ausarbeitung mit Bericht

422150031 Generative Software Engineering

J. Ringert Veranst. SWS: 4

Vorlesung

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal A, Lecture, ab 05.04.2022
Fr, wöch., 13:30 - 15:00, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 08.04.2022
Mo, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, written exam, 08.08.2022 - 08.08.2022

Beschreibung

We introduce main approaches and techniques to generative software development.

- Model Driven Engineering
- Software Modeling languages for structure and behavior
  - Class Diagrams, Object Diagrams, OCL
  - Sequence Diagrams and State Machines
- Software model consistency and semantics
- Code Generation from class diagrams
- Code generation from State Machines
- Reactive Synthesis from temporal specifications
- Software Product Lines
- Domain Specific Languages
- Model Transformations

After completion students will be able to

- Contrast different modelling languages and chose based on purpose
- Analyze model consistency
- Evaluate and apply code generators
- integrate generated code in software projects
- create and analyze temporal specifications
- synthesize software from temporal specifications
- understand domain specific languages and model transformations

Bemerkung

Lecturer: Prof. Ringert

422150032 Complexity Theory

A. Jakoby Veranst. SWS: 4

Vorlesung

Di, wöch., 11:00 - 12:30, Lecture SR 3.31, Schwanseestraße 143, ab 05.04.2022
Do, wöch., 09:15 - 10:45, Lab class Lecture Hall 6, Coudraystraße 9A, ab 07.04.2022
Do, Einzel, 09:00 - 11:00, written exam room: SR 210,C 13B, 29.09.2022 - 29.09.2022

Beschreibung

The aim this course is to impart basic knowledge on concepts of complexity theory. The course present knowledge on the limits of information processing.

Key topics include

- Complexity Classes
- Reductions
- Efficiency versus Intractability
- NP complete problems
- Approximability

engl. Beschreibung/ Kurzkommentar

Complexity Theory

The aim this course is to impart basic knowledge on concepts of complexity theory. The course present knowledge on the limits of information processing.

Key topics include

- Complexity Classes
- Reductions
- Efficiency versus Intractability
- NP complete problems

Voraussetzungen

Diskrete Mathematik

Leistungsnachweis

Klausur

422160000 Applied Cryptography

S. Lucks Veranst. SWS: 2
Seminar

Bemerkung

Block seminiar during the lecture-free period

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

422160001 Aspekte der Netzwerksicherheit

A. Jakoby, R. Adejoh Veranst. SWS: 2
Seminar
Di, wöch., 17:00 - 18:30, Coudraystraße 13 B - Seminarraum 208, ab 05.04.2022

Bemerkung

First session: Tuesday . April 5th, 2022, SR 208, C 13 B.

4336010 Image Analysis and Object Recognition

V. Rodehorst, C. Benz Veranst. SWS: 3

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lecture, ab 05.04.2022
Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 14.04.2022
Di, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal A, Klausur / written exam, 02.08.2022 - 02.08.2022
Di, Einzel, 10:00 - 12:00, Marienstraße 13 C - Hörsaal B, Klausur / written exam, 02.08.2022 - 02.08.2022

Beschreibung

Bildanalyse und Objekterkennung

Die Vorlesung gibt eine Einführung in die Grundlagen der Mustererkennung und Bildanalyse. Behandelt werden unter anderem die Bildverbesserung, lokale und morphologische Operatoren, Kantenerkennung, Bilddarstellung im Frequenzraum, Fourier-Transformation, Hough-Transformation, Segmentierung, Skelettierung, Objektklassifizierung und maschinelles Lernen zur visuellen Objekterkennung.

engl. Beschreibung/ Kurzkommentar

Image analysis and object recognition

The lecture gives an introduction to the basic concepts of pattern recognition and image analysis. It covers topics as image enhancement, local and morphological operators, edge detection, image representation in frequency domain, Fourier transform, Hough transform, segmentation, thinning, object categorization and machine learning for visual object recognition.

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen und Klausur (sowie des Final Projects für das Erreichen der 6 ECTS)

4345600 Computer Graphics II: Computer Animation

C. Wüthrich, G. Pandolfo Veranst. SWS: 3

Vorlesung

Fr, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 08.04.2022
Mo, wöch., 17:00 - 18:30, Lecture, ab 11.04.2022
Do, Einzel, 09:00 - 11:00, Marienstraße 13 C - Hörsaal B, written exam, 28.07.2022 - 28.07.2022

Beschreibung

Das Ziel der Veranstaltungen ist die interdisziplinäre Vermittlung ästhetischer und technischer Aspekte der Computergrafik und -Animation von der Theorie bis in die Praxis.

Die Veranstaltung besteht aus einer eigens für Medienkünstler / Gestalter entwickelten Vorlesung und einer Übung, in der Künstler und Informatiker interdisziplinär zusammen arbeiten können.
In der Vorlesung werden die Studenten mit den nötigen technischen Details versorgt.
Die Übung wird von M.F.A Gianluca Pandolfo geleitet und deckt sowohl technische als auch ästhetische Grundlagen ab (Modellieren, Rendern, Animieren). Gearbeitet wird mit Blender 3D. Ziel der Übung ist die Fertigstellung eines einminütigen 3D-Animationsfilms als finale Abgabe.

engl. Beschreibung/ Kurzkommentar

Computer Animation

Three-dimensional Computer Graphics and Computer Animation are now widespreadly used in the Arts and in Design. Aim of this is to allow students to understand the modelling and rendering techniques used in common high level animation programs.
Successful students in this course should be able to conceive and produce a 3D animation and should be able to cooperate with Computer Scientists on a common 3D animation project, which might at times involve the specification of requirements for programming plugins for the animation system. At the end of the course they should master the steps required for the conception, design and rendering of a 3D animation software.

Leistungsnachweis

Beleg, Klausur

4445203 Randomized Algorithms

A. Jakoby Veranst. SWS: 4

Vorlesung

Do, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 2.16, Lecture, ab 07.04.2022
Do, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, lab class, ab 07.04.2022

Beschreibung

Randomisierte Algorithmen

Für viele Probleme stellen randomisierte Algorithmen die einzigen bekannten effizienten Lösungsverfahren dar. Für manches andere Problem erhalten wir mit einem solchen Verfahren Algorithmen, die um vieles einfacher und verständlicher sind als alle bekannten deterministischen Verfahren. Es ist daher nicht verwunderlich, dass wir randomisierte Algorithmen in viele Anwendungsgebieten finden, wie z.B. in

- Datenstrukturen,
- Graphenalgorithmen,
- parallelen und verteilen Systemen,
- Online-Algorithmen,
- Zahlentheorie und
- geometrische Algorithmen.

In der Vorlesung *Randomisierte Algorithmen* werden wir Verfahren aus einigen dieser Gebiete und grundlegende Techniken für randomisierte Algorithmen vorstellen und analysieren.

Darüber hinaus werden grundlegende probabilistische Methoden zur Analyse von Algorithmen vorgestellt.

engl. Beschreibung/ Kurzkommentar

Randomized Algorithms

For many problems randomized algorithms are the only known efficient solution method. For some other problem we can find randomized algorithms that are much simpler and more understandable than any known deterministic method. It is therefore not surprising that we find randomized algorithms in many areas, such as in

- data structures,
- graph algorithms,
- parallel and distributed systems,
- on-line algorithms,

- number theory, and
- geometric algorithms.

In the lecture Randomized Algorithms, we will present and analyze randomized algorithms and basic methods from some of these areas. Furthermore, basic probabilistic methods for the analysis of algorithms are presented.

Voraussetzungen

Bsc in a relevant study field

Leistungsnachweis

oral examination

451002 Introduction to Optimization (L+E)

T. Lahmer Veranst. SWS: 3
Integrierte Vorlesung
Mo, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal B, Lecture
Do, wöch., 07:30 - 09:00, Marienstraße 7 B - Projektraum 301, Exercise Dates by arrangement

Beschreibung

Introduction to Optimization (451002):

Definitions, Classification of Optimization Problems,

Linear Problems, Simplex Method, Nonlinear Problems: Constrained and unconstrained continuous problems, descent methods and variants. (Robust) Structural Optimization (including Shape and Topology Optimization)

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

451006 Optimization in Applications (P)

T. Lahmer Veranst. SWS: 3
Projektmodul/Projekt

Beschreibung

Optimization in Applications (451006):

Optimization in Applications is generally a project assigned to the students including own programming and modelling. E.g. innovative optimization strategies are to be implemented in Matlab, Python or similar. Alternatively, engineering models could be subjected to optimization software.

Bemerkung

Possible combinations with other lectures acc. to the NHRE-Moduleguide.

Leistungsnachweis

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

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

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

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

4526501 Academic English Part One

G. Atkinson Veranst. SWS: 2

Kurs

Di, wöch., 17:00 - 18:30, Online (Moodle) , ab 26.04.2022

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, Online (Moodle) , ab 27.04.2022

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

4555211 Algorithmen und Datenstrukturen

C. Wüthrich, F. Andreussi, Projektbörse Fak. KuG Veranst. SWS: 4

Vorlesung

Di, wöch., 13:30 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, Vorlesung, ab 12.04.2022
Mi, wöch., 09:15 - 10:45, Steubenstraße 6, Haus F - Hörsaal K20, Übung, ab 13.04.2022
Di, Einzel, 11:30 - 13:30, Steubenstraße 6, Haus F - Hörsaal K20, Klausur / written exam, 26.07.2022 - 26.07.2022

Beschreibung

Das Lernziel dieser Veranstaltung soll zum einen der generelle Umgang und die selbstständige Entwicklung, Analyse, und Optimierung von Algorithmen und Datenstrukturen sein. Zum anderen soll ein Überblick über gängige problemspezifische Verfahren und deren Anwendung in der Praxis vermittelt werden.

engl. Beschreibung/ Kurzkommentar

Algorithms and Data Structures

The lecture deals with the principle and the implementation of basic algorithms and data structures. The course teaches among all, the Strings, geometric problems, graphs, mathematical algorithms and NP-complete problems.

Leistungsnachweis

Beleg, Klausur

4556105 Advanced Numerical Mathematics

B. Rüffer Veranst. SWS: 4
Vorlesung
Mo, wöch., 09:15 - 10:45, Coudraystraße 13 A - Hörsaal 2, Lecture , ab 11.04.2022
Mo, wöch., 11:00 - 12:30, Coudraystraße 13 A - Hörsaal 2, Exercise, ab 11.04.2022
Mi, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Seminarraum 210, Klausur / written exam, 03.08.2022 - 03.08.2022

Beschreibung

Höhere Numerik

Effiziente Lösung linearer und nichtlinearer Gleichungssysteme;
• Diskretisierungsmethoden für verschiedene Typen partieller Differentialgleichungen
• Projektionsverfahren, Stabilität, Konvergenz und Konditionszahl
• Direkte Löser für schwach besetzte Systemmatrizen
• Fixpunktsatz, iterative Löser, Gesamtschrittverfahren, Einzelschrittverfahren, Gradientenverfahren, Relaxationsverfahren, Multiskalenmethoden und Überblick über andere Zugänge
• Eigenwertprobleme, iterative Löser
• Gebietszerlegungsverfahren

engl. Beschreibung/ Kurzkommentar

Advanced Numerical Mathematics

Efficient solution of linear and non-linear systems of algebraic equations;
• Discretization methods for different types of partial differential equations
• Projection methods, stability and convergence, condition number
• Direct solvers for sparse systems
• Fixed-point theorem, iterative solvers: Total step method, single step method, gradient methods, relaxation methods, multiscale methods and a survey on other approaches
• Eigenvalue problems, iterative solvers
• Domain decomposition methods

Voraussetzungen

Courses in Linear Algebra, Analysis

Leistungsnachweis

Project

Project

421210004 Hot Topics in Computer Vision - Generated 3D Interior Design for Point Cloud Scene Understanding

V. Rodehorst, C. Benz, P. Debus, J. Eick
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/CUDA)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

421210004 Hot Topics in Computer Vision SoSe22

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/CUDA)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

422110006 Identifying triggering content

B. Stein, M. Wolska Veranst. SWS: 10
Projekt

Beschreibung

A trigger is a stimulus that elicits negative emotions or feelings of distress; these may be evoked by acts/events of whatever type, for instance, violence, trauma, death, eating disorders, or obscenity. In order to make it possible for sensitive audiences to prepare for the content, the use of so-called ``trigger warnings''---labels indicating the type of triggering content present---has become common in online communities and education. In this project we will investigate properties of (a subset of) triggering content using computational methods based on a corpus of fanfiction in which stories have been labelled with trigger warnings by the authors themselves. First, we will annotate segments of text which do contain distressing content. Annotations will be analyzed and a human judgement-based gold-

standard dataset will be constructed. Then, we will build classifiers to identify the triggering segments automatically (machine learning). The specific type of triggers to address will be agreed upon with the students at the beginning of the course.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

422110007 In Dialog with the Virtual Museum 2

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

Beschreibung

This project aims to create an interactive and immersive environment for learning about a specific topic. Users will be in a virtual replication of Walter Gropius' office, a historically significant room for the Bauhaus Movement, to experience its history.

Specifically, this project will continue to design and develop the voice interface that allows the users to ask their questions and inform themselves in an intuitive and natural way about the room's eventful history, pioneering design, and general significance for the Bauhaus style. With this setup, this project thus provides hands-on design and development experience for the "Metaverse" (as, for example, set as a goal by Facebook/Meta, Microsoft, or Nvidia). As per your interests, you will acquire skills in voice interaction design, conversational agents, knowledge representation, and language generation.

Bemerkung

Time and place will be announced at the project fair.

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

422110011 Aspekte der Nachhaltigkeit in der Informatik

J. Ehlers, A. Jakoby Veranst. SWS: 8
Projekt

422150038 Projekt SETAV-Software Engineering for Trusted Autonomous Systems

J. Ringert Veranst. SWS: 10
Projekt

Beschreibung

As part of the Software Engineering for Trusted Autonomous Systems we will develop a platform for an autonomous vehicle based on the Robot Operation System (ROS).

Bemerkung

Time and place will be announced at the project fair.