

# **Vorlesungsverzeichnis**

M.Sc. Human-Computer Interaction (ab PV19)

Sommer 2023

Stand 23.10.2023

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## M.Sc. Human-Computer Interaction (ab PV19)

### Faculty Welcome for Master's Students Human-Computer Interaction

Monday, 3<sup>rd</sup> April 2023, 11.00 a.m., Schwannseestraße 143, room 2.16

### Project fair

Monday, 3<sup>rd</sup> April 2023, 5 p.m., Steubenstraße 6, Audimax

## HCI Fundamentals

### Concepts & Methods

### Psychology

#### 4556227 Usability Engineering & Testing

#### J. Ehlers

Veranst. SWS: 4

Vorlesung

Do, Einzel, 11:30 - 13:30, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 20.07.2023 - 20.07.2023

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal B, Lecture

Do, wöch., 17:00 - 18:30, Lab class online

#### engl. Beschreibung/ Kurzkomentar

Usability indicates the "absence of frustration". But what makes a product or a service really usable? The course will introduce to the basic concepts, theories and methods of usability engineering and testing. We will discuss quality attributes that constitute good usability and will identify design flaws and product defects. Special emphasis will be put on quantitative measures to determine the ease-of-use of a system in various stages of development. Students will learn how to set up and run an empirical user study, including (but not limited to) test setting (field vs. lab), random sampling, designing and hypothesising. We will also discuss procedures for quantitative data analysis and adequate forms of documentation. To deepen the knowledge, the lecture is accompanied by practical training courses that link theoretical findings to systems and applications in the field of human-computer interaction.

#### Leistungsnachweis

Empirical exercises (tutorial) and written exam

## HCI Specialisation

### Specialisation HCI

#### 4556227 Usability Engineering & Testing

#### J. Ehlers

Veranst. SWS: 4

Vorlesung

Do, Einzel, 11:30 - 13:30, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 20.07.2023 - 20.07.2023

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal B, Lecture

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Usability indicates the "absence of frustration". But what makes a product or a service really usable? The course will introduce to the basic concepts, theories and methods of usability engineering and testing. We will discuss quality attributes that constitute good usability and will identify design flaws and product defects. Special emphasis will be put on quantitative measures to determine the ease-of-use of a system in various stages of development. Students will learn how to set up and run an empirical user study, including (but not limited to) test setting (field vs. lab), random sampling, designing and hypothesising. We will also discuss procedures for quantitative data analysis and adequate forms of documentation. To deepen the knowledge, the lecture is accompanied by practical training courses that link theoretical findings to systems and applications in the field of human-computer interaction.

**Leistungsnachweis**

Empirical exercises (tutorial) and written exam

**Specialisation Tech****420160004 Image Analysis and Object Recognition – Final Project****V. Rodehorst, C. Benz**

Veranst. SWS: 1

Independent Study

**Beschreibung**

Im Abschlussprojekt der Vorlesung „Image Analysis and Object Recognition“ sollen die Kenntnisse der Vorlesung an einer größeren praktischen Aufgabe vertieft werden.

**Voraussetzungen**

Erfolgreiche Teilnahme an der Vorlesung „Image Analysis and Object Recognition“

**Leistungsnachweis**

Dokumentation, Abschlusspräsentation

**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 04.04.2023

Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 13.04.2023

Mo, Einzel, 10:00 - 12:00, written exam, 17.07.2023 - 17.07.2023

**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/ Kurzkomentar**

## 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)

## 4555262 Visualisierung

**B. Fröhlich, G. Rendle, P. Riehmann**

Veranst. SWS: 3

Vorlesung

Do, wöch., 13:30 - 15:00, Lecture / Lab class , ab 13.04.2023

Do, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 2.16, 1st Lecture: in person, ab 13.04.2023

Mo, wöch., 17:00 - 18:30, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 17.04.2023

Di, wöch., 09:15 - 10:45, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 18.04.2023

Fr, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, schriftliche Prüfung / written exam, 29.09.2023 - 29.09.2023

### 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. Die abschließende Übungsaufgabe ermöglicht es Ihnen, ein eigenes Visualisierungsprojekt zu entwerfen, implementieren, evaluieren und präsentieren.

### 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, bewertete Übungen, mündliche oder schriftliche Prüfung und ein abschließendes Projekt.

Participation in lab classes (graded), oral exam and a final project.

## HCI Technologies

### Computer Vision

## 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 04.04.2023

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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)

**Visual Interfaces****4555262 Visualisierung****B. Fröhlich, G. Rendle, P. Riehmann**

Veranst. SWS: 3

Vorlesung

Do, wöch., 13:30 - 15:00, Lecture / Lab class , ab 13.04.2023

Do, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 2.16, 1st Lecture: in person, ab 13.04.2023

Mo, wöch., 17:00 - 18:30, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 17.04.2023

Di, wöch., 09:15 - 10:45, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 18.04.2023

Fr, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, schriftliche Prüfung / written exam, 29.09.2023 - 29.09.2023

**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.

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#### Leistungsnachweis

Vorlesungsbegleitende, bewertete Übungen, mündliche oder schriftliche Prüfung und ein abschließendes Projekt.

Participation in lab classes (graded), oral exam and a final project.

## Design Theory

### 323130013 Lecture Series Digital Culture 2: An Introduction to the Design Professions

**J. Willmann, M. Braun, Projektbörse Fak. KuG**

Veranst. SWS: 4

Wissenschaftliches Modul

Mo, wöch., 11:00 - 14:00, Steubenstraße 6, Haus F - Hörsaal K20, 17.04.2023 - 24.07.2023

#### Beschreibung

„Die Veranstaltung findet auf Englisch statt. Über die Sprachumschaltflagge (oben rechts) gelangen Sie zur englischsprachigen Beschreibung.“

#### Leistungsnachweis

In order to finish the course, students will a) work through the individual lectures; b) actively participate in the individual exercise session (80% minimum); and c) passing the written exam and receiving a positive grade.

## Research Project 1

### 423110005 Bauhaus Gamesfabrik II

**C. Wüthrich, W. Kissel, G. Pandolfo**

Veranst. SWS: 10

Projekt

Mi, wöch., 13:30 - 15:30, Raum 205, Marienstr. 7b, ab 12.04.2023

#### Beschreibung

"Bauhaus Gamesfabrik" ist ein interdisziplinäres Projekt zwischen Studierende der Fakultät K&G und der Fakultät Medien, dass sich in diesem Jahr mit der praktischen Entwicklung von Computerspielen (auch analogen Spielformaten) befasst.

#### Bemerkung

Ort und Zeit werden zur Projektbörse bekanntgegeben.

#### Voraussetzungen

Studierende der Medieninformatik sollten Programmierkenntnisse mitbringen. Studierende der Medienwissenschaft ein grundlegendes Interesse für Storytelling / Game Design

**Leistungsnachweis**

Abschlusspräsentation, fertiges Spiel.

**423110006 Content Warning Detection**

**B. Stein, M. Wolska, M. Wiegmann**  
Projekt

Veranst. SWS: 10

**Beschreibung**

Content warnings are often assigned to online content to give vulnerable groups an opportunity to avoid potentially discomfoting or distressing content. However, most online content requires the creator to add warning labels, which is often not done. We have previously created a large datasets (300k+) fanfiction stories with warning labels. In this project, we want to develop (one or more) machine learning models that add content warnings automatically. Depending on our success, we might submit the best model to a scientific competition on this dataset.

**Bemerkung**

Time and place will be announced at the project fair.

**Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

**423110007 Fifty shades of ChatGPT**

**B. Stein, M. Gohsen, K. Heinrich, J. Bevendorff**  
Projekt

Veranst. SWS: 10

**Beschreibung**

Large language models such as ChatGPT or GPT-3 represent a significant advance in the field of artificial intelligence. These models are trained on massive amounts of text data, which enables them to understand and generate human-like text. This project aims to investigate large language models for their capabilities to solve the following problems: (1) generating conversational responses and matching the generated information with knowledge from a knowledge base, and (2) generating coherent and engaging stories. A common requirement for these tasks is a low-latency infrastructure for our own language model, which we will try to develop in this project.

**Bemerkung**

Time and place will be announced at the project fair.

**Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

**423110008 Full blown HCI. Inflatables for data physicalization and tangible interaction.**

**E. Hornecker, H. Waldschütz**  
Projekt

Veranst. SWS: 10

**Beschreibung**



The use of shape-changing inflatable textile structures (short: inflatables) has gained attention as a promising approach in human-computer interaction (HCI) for lightweight, non-rigid interactions. Inflatables are discussed as actuators in the field of soft robotics, where ongoing developments combine pneumatic actuation techniques with pliable actuators, to construct robotic grippers, pneumatic-muscles, or locomotion systems, but have also been explored in HCI contexts. Moreover, inflatables offer a unique way to create shape-changing artifacts that dynamically (or in real-time) represent data in the physical realm, called data physicalizations, which represent data through material and geometric properties.

In this project we will be exploring inflatables for data physicalizations or tangible interfaces. We will create them using a manual hot press process to weld different sheet based materials such as tpu coated synthetic fabrics or other synthetic materials.

Following a Research through Design (RtD) approach, this project will challenge to create prototypes and develop them within a small team. This means conceptualising, designing, and building inflatable prototypes either as data physicalizations or prototypes for tangible interaction. One special focus will be on data physicalisations which need to be touched or interacted with, in order to 'get' the data (haptic data physicalisation).

This course is perfect for students who would like to be challenged to find problems, who enjoy individual and (multi-disciplinary) group-work, and to come up with their own concepts. Students will focus on research topics such as "data physicalisations", "affordances", "shape-changing interfaces", "qualitative data representations" and "ambient/peripheral interfaces". We encourage students to participate that have a high interest in prototyping with hardware (e.g., Arduino), working with materials (e.g., wood or silicone), or using traditional fabrication techniques (e.g., origami-folding). The project is most suited for students who want 18 ECTS.

#### **Bemerkung**

Time and place to be announced at the project fair.

#### **Voraussetzungen**

All participants should enjoy working in an interdisciplinary group, want to be creative, build prototypes, and be able to converse in English.

#### **Leistungsnachweis**

Active participation and interim presentations, practical problem-based work (both individual and in groups), and a project-based report.

### **423110009 Homo Economicus Meets the Metaverse**

**B. Fröhlich, E. Schott, S. Mühlhaus, T. Zöppig**  
Projekt

Veranst. SWS: 10

#### **Beschreibung**

Given current developments in virtual reality technologies and the metaverse, it is time to examine how we make decisions in social virtual environments. Behavioral economics studies the human decision-making process by conducting various experiments based on game theory and comparing the results to the best economic solutions. We know from real-world studies that psychology, culture, emotions, and cognition generally influence our decisions and keep us from acting like homo economicus, a hypothetical human being who makes optimal decisions in accordance with their rational self-interest.

In this project we will study the influence of the virtual environment and the appearance and expressiveness of avatars on decision making in social virtual reality. This behavioral economics study will be prepared, performed and analyzed in collaboration with Prof. Jürgen Rösch, Professor of Digital Economics, and a group of media management master's students.

#### **Bemerkung**

time and place: t.b.a.

### Voraussetzungen

Solid software programming / scripting experience (e.g. C#, C++, Python). Experience in Unity strongly recommended.

## 423110010 Kryptographie im Kopf -- Single-Page Crypto Challenge

**S. Lucks, J. Leuther, N. Lang**  
Projekt

Veranst. SWS: 10

### Beschreibung

Does a cryptosystem need to be complex in order to be secure? No! We want to create a simple state-of-the-art cryptosystem whose source code can fit easily onto one single page in print, or even on two slides for a presentation -- without referring to a crypto library.

Simplicity does not mean that the computations will be trivial or that users have to make compromises about the security. Simplicity means that independent implementations ``from memory'' will be compatible with each other: when a ``sender'' encrypts a message  $M$  under a key  $K$  and a ``receiver'' decrypts the ciphertext under the same key  $K$ , then the receiver will get  $M$  again, even when both sender and receiver are using their own implementation of the scheme they both memoized.

### Bemerkung

time and place to be announced at the project fair.

room:S143 Medsec/Webis-Lab

### Leistungsnachweis

Abschlusspräsentation, Abschlussbericht

## 423110011 LinuxDome 2.0 / Imaging Pipelines

**F. Andreussi, G. Pandolfo, C. Wüthrich**  
Projekt

Veranst. SWS: 10

### Beschreibung

In this project, we will work on two distinct tasks: on one side, the physical assembly of a new FullDome at S134, including a 3D soundsystem and multiple projectors running on a F.O.S.S. platform. On the other side, we will need to specify and build a Vulkan based System allowing to pipeline output from video processing software into the input of a different video processing hardware, in a similar way that Syphon and Spout do it in the Mac and Windows environments.

**Bemerkung**

time and place to be announced at the project fair.

### 423110012 Mining Arguments from Podcasts

**B. Stein, N. Mirzakhmedova, M. Wiegmann, J. Kiesel**  
Projekt

Veranst. SWS: 10

**Beschreibung**

Computational argumentation tries to present a user with pro and/or contra arguments on a controversial topic. These arguments are usually mined (extracted) from long and well-structured debates from websites like debate.org. However, the debates on these websites often cover few and outdated topics. An alternative source for a broad variety of up-to-date topics are transcribed podcasts. This project will leverage cutting-edge argument mining technologies and apply them to podcast data, providing insights into the nature of arguments in this context and how they differ from traditional debates.

**Bemerkung**

Time and place will be announced at the project fair.

**Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

### 423110013 Projekt MLOM II: Machine learning models on Arduino (Part II)

**J. Ringert, B. Burse**  
Projekt

Veranst. SWS: 10

**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.

### 423110014 Projekt SETAV III-Software Engineering for Trusted Autonomous Systems (PartIII)

**J. Ringert, .. Soaibuzzaman**  
Projekt

Veranst. SWS: 10

**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.

### 423110015 Quantum Crypto Rescue

**S. Lucks, J. Leuther, N. Lang**  
Projekt

Veranst. SWS: 10

#### Beschreibung

The future advent of quantum computers leads to a new analysis of current cryptographic schemes toward their post-quantum security. This does not only include asymmetric crypto schemes but also symmetric ones. The goal of this project is to discuss and elaborate strategies of salvaging currently used schemes such that we will still be able to use them securely despite having quantum computers.

#### Bemerkung

time and place to be announced at the project fair.

Room: S143 Medsec/Webis-Lab

#### Voraussetzungen

At least one lecture passed in Cryptography (e.g. Introduction to Modern Cryptography) and one in the field of theoretical computer science

#### Leistungsnachweis

Abschlusspräsentation, Abschlussbericht

### 423110016 Smart and Ubiquitous: Technology and physical safety

**E. Hornecker, M. Osipova**  
Projekt

Veranst. SWS: 10

#### Beschreibung

Smartphones, Smart Homes, Smart Health Monitors, Smart Cities... Ubiquitous technology applied for the good of people. Or is it? Does this actually deal with the problem? Or should these applications be given a second thought and designed differently?

In this project we will explore what are current problems regarding physical safety, which Smart and Ubiquitous Technologies can help to address them and what tools we have as HCI researchers to influence development of smart. We will plan and carry out mixed-method research on safety issues and investigate how smart and ubiquitous tech can address these. We plan to use methods such as Co-Design, Body Storming, Probes and others depending on the topic chosen. You will train to formulate a research question, gain experience to practically implement research methods, and get more acquainted with the use of ubiquitous technology.

#### Bemerkung

time to be announced.

Place: HCI-Lab, HK 7

#### Voraussetzungen

Participants should have attended either the Master level course 'Ubiquitous Computing' or the 'HCI Methods & Theory' course. They should be interested in engaging with the literature, doing empirical work and to work in teams

### Leistungsnachweis

Active participation and interim presentations, autonomous and self-initiated working mode, project documentation.

## 423110017 Teaching VR in VR

**B. Fröhlich, A. Lammert, E. Schott, T. Zöppig**  
Projekt

Veranst. SWS: 10

### Beschreibung

Since the pandemic, distance learning, teaching and training services have thrived. Last semester, we took our first steps towards exploring techniques for immersive teaching and learning of virtual reality concepts in virtual reality. Our vrEDUsys Unity teaching framework supports live teaching in VR as well as recording and playback of lectures in VR. Compared to regular teaching methods, this gives students first-hand exposure to virtual reality concepts. As a result, students have a greater awareness of usability issues and possible usage scenarios of virtual reality technology and 3D interaction concepts.

In this project, we aim to explore and develop further tools to support students and teachers in learning and teaching in virtual reality. Our research will start with reviewing and designing different concepts for virtual classrooms to address the following questions: What is the best way to combine knowledge transfer and hands-on experience in an interactive virtual environment? To what extent can gamification be used to foster a deeper understanding of different virtual reality techniques and concepts?

During the project you will be encouraged to design, develop and prototype your own concepts. The results of this project can be incorporated into the next iteration of our vrEDUsys Unity teaching framework and may be experienced by many future students.

### Bemerkung

time and place: t.b.a.

### Voraussetzungen

Solid software programming / scripting experience (e.g. C#, C++, Python). Experience in Unity strongly recommended.

## 423110020 Our Digital Limbs: Exploring Full-Body Movements for Stress Measurement

**J. Ehlers**  
Projekt

Veranst. SWS: 10

### Beschreibung

In the first third of the project, participants will work themselves into the Rokoko Studio Pro Software and provide a brief documentation for future generations of users. Afterwards they are asked to design and carry out an empirical study on the possibilities of determining levels of stress through various movements or body postures. Findings need to be statistically tested and documented in a lab report.

### Bemerkung

time and place will be announced at the project fair.

### Voraussetzungen

We assume you are interested to explore a software that enables to track body movements and to conduct an empirical study on the relationship between motions and stress experience.

### Leistungsnachweis

Project members need to get familiar with the Rokoko Studio Pro Software and provide a brief documentation for future users. Also, they will implement an empirical study with regards to stress-related body movements or postures. The latter findings need to be statistically tested and documented in a lab report.

## 423110022 Hot Topics in Computer Vision: Cloudy with a chance of 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

## Das versteckte Wissen der Stammbücher II

**A. Jakoby, R. Adejoh**

Projekt

### Beschreibung

Stammbücher und deren Einträge stellen ein soziales Netzwerk der vergangenen Jahrhunderte dar. In diesem Projekt soll dieses Netzwerk analysiert werden. Da die vorhandenen Stammbücher überwiegend in Deutsch verfasst sind, sind gute Deutschkenntnisse zwingend notwendig.

### Bemerkung

The time and place will be announced at the project fair.

## Research Project 2

### 423110005 Bauhaus Gamesfabrik II

**C. Wüthrich, W. Kissel, G. Pandolfo**

Veranst. SWS: 10

Projekt

Mi, wöch., 13:30 - 15:30, Raum 205, Marienstr. 7b, ab 12.04.2023

**Beschreibung**

"Bauhaus Gamesfabrik" ist ein interdisziplinäres Projekt zwischen Studierende der Fakultät K&G und der Fakultät Medien, dass sich in diesem Jahr mit der praktischen Entwicklung von Computerspielen (auch analogen Spielformaten) befasst.

**Bemerkung**

Ort und Zeit werden zur Projektbörse bekanntgegeben.

**Voraussetzungen**

Studierende der Medieninformatik sollten Programmierkenntnisse mitbringen. Studierende der Medienwissenschaft ein grundlegendes Interesse für Storytelling / Game Design

**Leistungsnachweis**

Abschlusspräsentation, fertiges Spiel.

**423110006 Content Warning Detection****B. Stein, M. Wolska, M. Wiegmann**

Veranst. SWS: 10

Projekt

**Beschreibung**

Content warnings are often assigned to online content to give vulnerable groups an opportunity to avoid potentially discomfoting or distressing content. However, most online content requires the creator to add warning labels, which is often not done. We have previously created a large datasets (300k+) fanfiction stories with warning labels. In this project, we want to develop (one or more) machine learning models that add content warnings automatically. Depending on our success, we might submit the best model to a scientific competition on this dataset.

**Bemerkung**

Time and place will be announced at the project fair.

**Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

**423110007 Fifty shades of ChatGPT****B. Stein, M. Gohsen, K. Heinrich, J. Bevendorff**

Veranst. SWS: 10

Projekt

**Beschreibung**

Large language models such as ChatGPT or GPT-3 represent a significant advance in the field of artificial intelligence. These models are trained on massive amounts of text data, which enables them to understand and generate human-like text. This project aims to investigate large language models for their capabilities to solve the following problems: (1) generating conversational responses and matching the generated information with knowledge

from a knowledge base, and (2) generating coherent and engaging stories. A common requirement for these tasks is a low-latency infrastructure for our own language model, which we will try to develop in this project.

#### **Bemerkung**

Time and place will be announced at the project fair.

#### **Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

### **423110008 Full blown HCI. Inflatables for data physicalization and tangible interaction.**

**E. Hornecker, H. Waldschütz**

Veranst. SWS: 10

Projekt

#### **Beschreibung**

The use of shape-changing inflatable textile structures (short: inflatables) has gained attention as a promising approach in human-computer interaction (HCI) for lightweight, non-rigid interactions. Inflatables are discussed as actuators in the field of soft robotics, where ongoing developments combine pneumatic actuation techniques with pliable actuators, to construct robotic grippers, pneumatic-muscles, or locomotion systems, but have also been explored in HCI contexts. Moreover, inflatables offer a unique way to create shape-changing artifacts that dynamically (or in real-time) represent data in the physical realm, called data physicalizations, which represent data through material and geometric properties.

In this project we will be exploring inflatables for data physicalizations or tangible interfaces. We will create them using a manual hot press process to weld different sheet based materials such as tpu coated synthetic fabrics or other synthetic materials.

Following a Research through Design (RtD) approach, this project will challenge to create prototypes and develop them within a small team. This means conceptualising, designing, and building inflatable prototypes either as data physicalizations or prototypes for tangible interaction. One special focus will be on data physicalisations which need to be touched or interacted with, in order to 'get' the data (haptic data physicalisation).

This course is perfect for students who would like to be challenged to find problems, who enjoy individual and (multi-disciplinary) group-work, and to come up with their own concepts. Students will focus on research topics such as "data physicalisations", "affordances", "shape-changing interfaces", "qualitative data representations" and "ambient/peripheral interfaces". We encourage students to participate that have a high interest in prototyping with hardware (e.g., Arduino), working with materials (e.g., wood or silicone), or using traditional fabrication techniques (e.g., origami-folding). The project is most suited for students who want 18 ECTS.

#### **Bemerkung**

Time and place to be announced at the project fair.

#### **Voraussetzungen**

All participants should enjoy working in an interdisciplinary group, want to be creative, build prototypes, and be able to converse in English.

#### **Leistungsnachweis**

Active participation and interim presentations, practical problem-based work (both individual and in groups), and a project-based report.

### **423110009 Homo Economicus Meets the Metaverse**



**B. Fröhlich, E. Schott, S. Mühlhaus, T. Zöppig**  
Projekt

Veranst. SWS: 10

### Beschreibung

Given current developments in virtual reality technologies and the metaverse, it is time to examine how we make decisions in social virtual environments. Behavioral economics studies the human decision-making process by conducting various experiments based on game theory and comparing the results to the best economic solutions. We know from real-world studies that psychology, culture, emotions, and cognition generally influence our decisions and keep us from acting like homo economicus, a hypothetical human being who makes optimal decisions in accordance with their rational self-interest.

In this project we will study the influence of the virtual environment and the appearance and expressiveness of avatars on decision making in social virtual reality. This behavioral economics study will be prepared, performed and analyzed in collaboration with Prof. Jürgen Rösch, Professor of Digital Economics, and a group of media management master's students.

### Bemerkung

time and place: t.b.a.

### Voraussetzungen

Solid software programming / scripting experience (e.g. C#, C++, Python). Experience in Unity strongly recommended.

## 423110010 Kryptographie im Kopf -- Single-Page Crypto Challenge

**S. Lucks, J. Leuther, N. Lang**  
Projekt

Veranst. SWS: 10

### Beschreibung

Does a cryptosystem need to be complex in order to be secure? No! We want to create a simple state-of-the-art cryptosystem whose source code can fit easily onto one single page in print, or even on two slides for a presentation -- without referring to a crypto library.

Simplicity does not mean that the computations will be trivial or that users have to make compromises about the security. Simplicity means that independent implementations ``from memory'' will be compatible with each other: when a ``sender'' encrypts a message  $M$  under a key  $K$  and a ``receiver'' decrypts the ciphertext under the same key  $K$ , then the receiver will get  $M$  again, even when both sender and receiver are using their own implementation of the scheme they both memoized.

### Bemerkung

time and place to be announced at the project fair.

room: S143 Medsec/Webis-Lab

### Leistungsnachweis

Abschlusspräsentation, Abschlussbericht

**423110011 LinuxDome 2.0 / Imaging Pipelines****F. Andreussi, G. Pandolfo, C. Wüthrich**  
Projekt

Veranst. SWS: 10

**Beschreibung**

In this project, we will work on two distinct tasks: on one side, the physical assembly of a new FullDome at S134, including a 3D soundsystem and multiple projectors running on a F.O.S.S. platform. On the other side, we will need to specify and build a Vulkan based System allowing to pipeline output from video processing software into the input of a different video processing hardware, in a similar way that Syphon and Spout do it in the Mac and Windows environments.

**Bemerkung**

time and place to be announced at the project fair.

**423110012 Mining Arguments from Podcasts****B. Stein, N. Mirzakhmedova, M. Wiegmann, J. Kiesel**  
Projekt

Veranst. SWS: 10

**Beschreibung**

Computational argumentation tries to present a user with pro and/or contra arguments on a controversial topic. These arguments are usually mined (extracted) from long and well-structured debates from websites like debate.org. However, the debates on these websites often cover few and outdated topics. An alternative source for a broad variety of up-to-date topics are transcribed podcasts. This project will leverage cutting-edge argument mining technologies and apply them to podcast data, providing insights into the nature of arguments in this context and how they differ from traditional debates.

**Bemerkung**

Time and place will be announced at the project fair.

**Leistungsnachweis**

Abschlusspräsentation und Ausarbeitung

**423110013 Projekt MLOM II: Machine learning models on Arduino (Part II)****J. Ringert, B. Burse**  
Projekt

Veranst. SWS: 10

**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.

### 423110014 Projekt SETAV III-Software Engineering for Trusted Autonomous Systems (PartIII)

**J. Ringert, .. Soaibuzzaman**  
Projekt

Veranst. SWS: 10

#### 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.

### 423110015 Quantum Crypto Rescue

**S. Lucks, J. Leuther, N. Lang**  
Projekt

Veranst. SWS: 10

#### Beschreibung

The future advent of quantum computers leads to a new analysis of current cryptographic schemes toward their post-quantum security. This does not only include asymmetric crypto schemes but also symmetric ones. The goal of this project is to discuss and elaborate strategies of salvaging currently used schemes such that we will still be able to use them securely despite having quantum computers.

#### Bemerkung

time and place to be announced at the project fair.

Room: S143 Medsec/Webis-Lab

#### Voraussetzungen

At least one lecture passed in Cryptography (e.g. Introduction to Modern Cryptography) and one in the field of theoretical computer science

#### Leistungsnachweis

Abschlusspräsentation, Abschlussbericht

### 423110016 Smart and Ubiquitous: Technology and physical safety

**E. Hornecker, M. Osipova**

Veranst. SWS: 10

Projekt

### Beschreibung

Smartphones, Smart Homes, Smart Health Monitors, Smart Cities... Ubiquitous technology applied for the good of people. Or is it? Does this actually deal with the problem? Or should these applications be given a second thought and designed differently?

In this project we will explore what are current problems regarding physical safety, which Smart and Ubiquitous Technologies can help to address them and what tools we have as HCI researchers to influence development of smart. We will plan and carry out mixed-method research on safety issues and investigate how smart and ubiquitous tech can address these. We plan to use methods such as Co-Design, Body Storming, Probes and others depending on the topic chosen. You will train to formulate a research question, gain experience to practically implement research methods, and get more acquainted with the use of ubiquitous technology.

### Bemerkung

time to be announced.

Place: HCI-Lab, HK 7

### Voraussetzungen

Participants should have attended either the Master level course 'Ubiquitous Computing' or the 'HCI Methods & Theory' course. They should be interested in engaging with the literature, doing empirical work and to work in teams

### Leistungsnachweis

Active participation and interim presentations, autonomous and self-initiated working mode, project documentation.

## 423110017 Teaching VR in VR

**B. Fröhlich, A. Lammert, E. Schott, T. Zöppig**  
Projekt

Veranst. SWS: 10

### Beschreibung

Since the pandemic, distance learning, teaching and training services have thrived. Last semester, we took our first steps towards exploring techniques for immersive teaching and learning of virtual reality concepts in virtual reality. Our vrEDUsys Unity teaching framework supports live teaching in VR as well as recording and playback of lectures in VR. Compared to regular teaching methods, this gives students first-hand exposure to virtual reality concepts. As a result, students have a greater awareness of usability issues and possible usage scenarios of virtual reality technology and 3D interaction concepts.

In this project, we aim to explore and develop further tools to support students and teachers in learning and teaching in virtual reality. Our research will start with reviewing and designing different concepts for virtual classrooms to address the following questions: What is the best way to combine knowledge transfer and hands-on experience in an interactive virtual environment? To what extent can gamification be used to foster a deeper understanding of different virtual reality techniques and concepts?

During the project you will be encouraged to design, develop and prototype your own concepts. The results of this project can be incorporated into the next iteration of our vrEDUsys Unity teaching framework and may be experienced by many future students.

### Bemerkung

time and place: t.b.a.

### Voraussetzungen

Solid software programming / scripting experience (e.g. C#, C++, Python). Experience in Unity strongly recommended.

## 423110020 Our Digital Limbs: Exploring Full-Body Movements for Stress Measurement

**J. Ehlers**  
Projekt

Veranst. SWS: 10

### Beschreibung

In the first third of the project, participants will work themselves into the Rokoko Studio Pro Software and provide a brief documentation for future generations of users. Afterwards they are asked to design and carry out an empirical study on the possibilities of determining levels of stress through various movements or body postures. Findings need to be statistically tested and documented in a lab report.

### Bemerkung

time and place will be announced at the project fair.

### Voraussetzungen

We assume you are interested to explore a software that enables to track body movements and to conduct an empirical study on the relationship between motions and stress experience.

### Leistungsnachweis

Project members need to get familiar with the Rokoko Studio Pro Software and provide a brief documentation for future users. Also, they will implement an empirical study with regards to stress-related body movements or postures. The latter findings need to be statistically tested and documented in a lab report.

## 423110022 Hot Topics in Computer Vision: Cloudy with a chance of 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

## Das versteckte Wissen der Stammbücher II

**A. Jakoby, R. Adejoh**

Projekt

### Beschreibung

Stammbücher und deren Einträge stellen ein soziales Netzwerk der vergangenen Jahrhunderte dar. In diesem Projekt soll dieses Netzwerk analysiert werden. Da die vorhandenen Stammbücher überwiegend in Deutsch verfasst sind, sind gute Deutschkenntnisse zwingend notwendig.

### Bemerkung

The time and place will be announced at the project fair.

## Electives

### 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 04.04.2023

Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 13.04.2023

Mo, Einzel, 10:00 - 12:00, written exam, 17.07.2023 - 17.07.2023

### 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/ Kurzkomentar

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)

### 420160004 Image Analysis and Object Recognition – Final Project

**V. Rodehorst, C. Benz**

Veranst. SWS: 1

Independent Study

**Beschreibung**

Im Abschlussprojekt der Vorlesung „Image Analysis and Object Recognition“ sollen die Kenntnisse der Vorlesung an einer größeren praktischen Aufgabe vertieft werden.

**Voraussetzungen**

Erfolgreiche Teilnahme an der Vorlesung „Image Analysis and Object Recognition“

**Leistungsnachweis**

Dokumentation, Abschlusspräsentation

**4555262 Visualisierung****B. Fröhlich, G. Rendle, P. Riehm**

Veranst. SWS: 3

Vorlesung

Do, wöch., 13:30 - 15:00, Lecture / Lab class , ab 13.04.2023

Do, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 2.16, 1st Lecture: in person, ab 13.04.2023

Mo, wöch., 17:00 - 18:30, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 17.04.2023

Di, wöch., 09:15 - 10:45, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 18.04.2023

Fr, Einzel, 09:00 - 12:00, Marienstraße 13 C - Hörsaal A, schriftliche Prüfung / written exam, 29.09.2023 - 29.09.2023

**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. Die abschließende Übungsaufgabe ermöglicht es Ihnen, ein eigenes Visualisierungsprojekt zu entwerfen, implementieren, evaluieren und präsentieren.

**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, bewertete Übungen, mündliche oder schriftliche Prüfung und ein abschließendes Projekt.

Participation in lab classes (graded), oral exam and a final project.

**123124503 Wie wohnen Wir? Wie wollen wir wohnen? Fassadenprojektion Haus Am Horn**

**S. Trillhof, S. Zierold**

Veranst. SWS: 4

Seminar

Di, wöch., 09:15 - 12:30, Marienstraße 9 - Seminarraum 203, 11.04.2023 - 04.07.2023

**Beschreibung**

Master Architektur, Master MediaArchitecture, MKG, HCI

6 ECTS Seminar, Fachmodul, Darstellen im Kontext

Sommersemester 2023 (11.04.-16.07. und 31.08-01.09.)

Sprache Deutsch/Englisch

Leitung: Dr. Sabine Zierold

Lehrauftrag: Lea Brugnoli

Kooperation: Klassik Stiftung Weimar und Public Art Lab Berlin

Dienstags 9:15-12:30 Uhr

**Wie wohnen Wir? Wie wollen wir wohnen? Fassadenprojektion Haus Am Horn**

2023 feiert die Bauhaus-Universität Weimar gemeinsam mit der Klassik Stiftung Weimar das Jubiläum der historischen Bauhaus-Ausstellung von 1923. Die Klassik Stiftung Weimar legt den Fokus auf das Wohnen als soziale, politische und gesellschaftliche Aufgabe. Walter Gropius entwickelte 1923 das Konzept eines Baukastens im Großen.

Das Haus Am Horn ist ein Versuchshaus des Bauhauses in Weimar, das anlässlich der ersten Bauhaus-Ausstellung nach dem Entwurf des Malers Georg Muche 1923 realisiert wurde. Es sollte als Gesamtkunstwerk die Verbindung von Bau, Kunst, Handwerk und Technik in einer modernen Wohnform demonstrieren. Die Einrichtung des Hauses wurde von den Schülern in den Werkstätten realisiert und der Bau mit neuen Materialien erstellt.

Das Seminar beabsichtigt die künstlerische und technische Umsetzung von inhaltlich und gestalterisch anspruchsvollen Konzepten für die Fassadenprojektion, die von den Studierenden auf der Grundlage eigener Recherchen und Experimente vor dem Hintergrund der historischen Bauhaus-Ausstellung und der Geschichte des Haus Am Horn entwickelt werden. Das Thema Wohnen ist der inhaltliche Rahmen und wirft Fragen auf. Wie könnte der Tagesablauf einer Familie im Haus gewesen sein? Wie ist mein Tagesablauf? In welchen Wohnformen habe ich bisher gelebt? Wie möchte ich in Zukunft wohnen? Wie stellen wir uns heute die Verbindung von Wohnen, Leben und Arbeiten vor? u.s.w.

Zum gemeinsamen Thema kann mit analogen und digitalen Techniken und Werkzeugen gearbeitet werden. Das Spektrum der Content-Erstellung umfasst die Gestaltung und Entwicklung von Texten, Bildern, Grafiken, Animationen, Videos oder Renderings, aus denen die Narration und das Storyboard entwickelt wird.

Das Seminar gibt Einblick in den gesamten Workflow und die technische Umsetzung mit unterschiedlichen Programmen, wie z.B. Resolume.



Die Vorbereitung, technische Umsetzung, Durchführung und Dokumentation der 1:1 Projektion auf die Fassade des Haus Am Horn ist Teil des Seminars und findet während der Bauhaus-Woche am 31.08. und 01.09.23 statt. Für die Gerüststellung und den Wetterschutz wird eine Firma beauftragt.

Ergänzend zum Seminar findet am Mittwoch, den 14.06.23, 12:30-17:00 Uhr ein Artathon und Symposium zum Thema „Nature Data Narratives“ statt. Das Symposium findet im Rahmen der Media Architecture Biennale 2023 online statt und der Artathon wird im Rahmen des EU Projektes Augmented Europe an der Bauhaus-Universität Weimar in Präsenz durchgeführt.

Das erste Treffen findet am Dienstag, den 11.04.23 statt. Die Einschreibung findet ab dem 03.04.2023 über das Bison-Portal statt. Erst nach Zulassung in den Kurs werden Sie in den Moodle-Raum eingeschrieben.

## 301016 Complex dynamics

**B. Rüffer**

Veranst. SWS: 4

Vorlesung

Di, wöch., 09:15 - 12:30, Coudraystraße 13 B - Hörsaal 3, ab 09.05.2023

Di, wöch., 07:30 - 10:45, Coudraystraße 13 A - Hörsaal 2

### Beschreibung

After the course the students will be able to analyse mathematical models that describe dynamic behaviour, as they occur in engineering (e.g. mechanical coupling of building structures), in biology and in physics, but also in multi-agent systems in computer science, or as opinion dynamics in psychology. Based on examples from different disciplines, students learn to build simplified models that allow to answer questions on their long-term behaviour. Students will be able to apply methods of feedback design that help shape the dynamics of a given system, along with the relevant stability concepts. As several topics lend themselves for computer simulation, students of this course will develop a proficiency to both implement and analyse mathematical models using computational tools and software.

### Bemerkung

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

### Voraussetzungen

B.Sc., knowledge in Matlab or Python

### Leistungsnachweis

#### 1 written exam

"Complex dynamics"

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

## 301017 Mathematics for data science

**B. Rüffer, M. Schönlein**

Veranst. SWS: 4

Vorlesung

Mi, Einzel, 13:30 - 16:45, Coudraystraße 13 B - Hörsaal 3, 05.04.2023 - 05.04.2023

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

**Beschreibung**

After the course the students will be familiar with the fundamental concepts of data science. The participants can analyse given data sets with respect to dimensionality reduction and clustering. They also know the basic structure of neural networks and support vector machines to solve classification tasks. The participants know relevant methods from linear algebra and optimization and can apply these techniques. This embraces the design of appropriate algorithms and the implementation of different numerical methods to solve the corresponding problems.

**Bemerkung**

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

**Voraussetzungen**

B. Sc.; Analysis and Linear Algebra at Bachelor level, knowledge of Matlab or Python

**Leistungsnachweis****1 written exam**

"Complex dynamics"

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

**417130003 Discrete Optimization****A. Jakoby**

Veranst. SWS: 4

Vorlesung

Do, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 2.16, Lecture , ab 13.04.2023

Do, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, lab class, ab 13.04.2023

**Beschreibung**

Diskrete Optimierung

Die diskrete / kombinatorische Optimierung ist ein Gebiet an der Schnittstelle von Mathematik und Informatik. Anwendungen für derartige Optimierungsprobleme sind in den vielfältigsten Bereichen zu finden.

Betrachtet werden sowohl diskrete Optimierungsprobleme, die effizient lösbar sind (kürzeste Wege, Flußprobleme), als auch NP-schwierige Probleme. Für letztere werden sowohl exakte Verfahren (Greedy-Algorithmen über Matroiden, Branch-and-Bound-Verfahren), als auch Heuristiken und Metaheuristiken zur näherungsweise Lösung behandelt.

**engl. Beschreibung/ Kurzkomentar**

Discrete Optimization

Discrete / combinatorial optimization is an area at the borderline of mathematics and computer science. Applications for such optimization problems can be found in the most varied areas.

Consideration is given to discrete optimization problems, which are efficiently solvable (e.g. shortest paths, flow problems), as well as NP-hard problems. For the latter, both exact methods (greedy algorithms on matroids, branch-and-bound methods), as well as heuristics and metaheuristics, are introduced.

### Voraussetzungen

Bsc in a relevant study field

### Leistungsnachweis

oral examination (individual appointments via Moodle)

## 422150031 Generative Software Engineering

### J. Ringert

Veranst. SWS: 4

Vorlesung

Mo, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, written exam, 07.08.2023 - 07.08.2023

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

Fr, wöch., 13:30 - 15:00, Coudraystraße 9 A - Hörsaal 6, Lab class

### 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

## 423150020 Advanced Topics in Software Engineering

### J. Ringert

Seminar

Fr, wöch., 15:15 - 16:45, Coudraystraße 13 B - Hörsaal 3

## 423150021 Deep Learning for Computer Vision

### V. Rodehorst, J. Eick, D. Tschirschwitz

Veranst. SWS: 4

Integrierte Vorlesung

Di, wöch., 09:15 - 10:45, ab 04.04.2023

Fr, wöch., 11:00 - 12:30, ab 14.04.2023

Mo, Einzel, 11:00 - 13:00, Schwanseestraße 143 - Seminarraum 2.16, schriftl. Prüfung / written exam, 31.07.2023 - 31.07.2023

### Beschreibung

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

### Bemerkung

Bitte melden Sie sich bis zum 11.04.2023 mit Ihrer Univeritäts-E-Mail über die Moodle-Plattform (<https://moodle.uni-weimar.de/course/view.php?id=43615>) an und füllen Sie den bereitgestellten Fragebogen aus. Bei Überschreitung der Teilnehmerzahl wird die Teilnahme an der Lehrveranstaltung "Introduction to Machine Learning and Data Mining" als Auswahlkriterium herangezogen.

### Voraussetzungen

Bachelor: Software Engineering II (B.Sc.), Analysis (B.Sc.) and Linear Algebra (B.sc.) oder gleichwertig.

Master: Object Oriented Modeling and Programming (M.Sc.) and Software Engineering (M.Sc.) oder gleichwertig.

### Leistungsnachweis

Erfolgreiche Teilnahme an den Laborübungen und dem Projekt mit abschließender Klausur.

Gewichtung: 50% Projekt und 50% Klausur

## 423150022 Firewalling und Netzwerktrennung

### A. Jakoby

Veranst. SWS: 2

Seminar

Di, wöch., 17:00 - 18:30, Lab, R. 2.38, S143

### Beschreibung

Im Seminar Firewalling und Netzwerktrennung werden die unterschiedlichen Linux Hilfsmittel zum Aufbau einer Firewall vorgestellt und umgesetzt. Neben dem klassischen Firewalling sollen auch weitere Konzepte der Netzwerktrennung, wie z.B. die Datendiode diskutiert werden.

Bei der Vergabe der beschränkten Seminarstellen werden Studierende des Masterstudienganges CS4DM und des Bachelorstudienganges Informatik mit Schwerpunkt Data Science and Security bevorzugt. Die Anmeldung erfolgt über Email an Andreas Jakoby.

## 423150023 Procedural Character Animation

**F. Andreussi, C. Wüthrich**

Veranst. SWS: 3

Seminar

Mi, Einzel, 13:30 - 15:00, Coudraystraße 13 B - Seminarraum 210, 26.04.2023 - 26.04.2023

### Beschreibung

Organic and believable Character Animation is increasingly important not only for Game Development but also for AR/VR applications and movie production (think about special effects, animating fantastical creatures and generating large scenes with thousands of characters, which would hardly be feasible using only real actors); however, animating by hand or using motion capture for every possible movement could be an extremely long, demanding and expensive task hence the development of techniques that use Machine Learning to generate Character Animations is more relevant than ever before.

During this seminar, we will explore together the evolution of the field during the last 10 years understanding various possible approaches to the problem (from the more data-intensive to the more training-based), then the participants will select a specific paper to focus on, understand in detail and present to the class and, after the presentations, there will be a time for discussing what has been learned and for comparing findings and opinions both on the theory and ideas behind the publications and on the implementation details, which will be part of the practical part at the end of the course and, hopefully, will lead to a Research Project in the following semesters.

Outline of the seminar (which could be modified):

- \* Introduction and Overview of the topics as frontal lectures (2-3 weekly meetings):
  - \* What is Procedural Animation?
  - \* Overview of the field and its common challenges/approaches/techniques
  - \* Overview of some fundamental papers + interesting talks from conferences where important techniques (like Motion Matching) were presented by their creator
- \* Individual paper study and presentation preparation (2-3 weeks – no meetings)
- \* Student presentations of selected papers (1-2 weekly meetings)
- \* Discussion/Round-table with students about papers, for questions and exchange of ideas (1-2 weekly meetings)
- \* Implementation tools (Unity/Unreal + Tensorflow/PyTorch, and alternatives)
- \* Eventual Final Project: Tutorial-like ML Implementation with chosen tools

### Bemerkung

the final course dates/times will be discussed at the first meeting

### Voraussetzungen

basic knowledge in ML and Computer graphics

### 423150028 Research Seminar: Affective Computing (Part 2)

**J. Ehlers**

Veranst. SWS: 3

Seminar

Fr, wöch., 15:15 - 16:45, Marienstraße 13 C - Hörsaal C

#### Beschreibung

Physiological computing (and its sub-discipline Affective Computing) applies data from the body's periphery (brain waves, skin conductance changes, pupil dynamics, heart rate variability etc.) to generate user-state representations and enable computer systems to dynamically adapt to changes in cognitive and/or affective processing. However, research usually focuses on controlled environments and certified measuring devices. The two-part research seminar aims to explore techniques to apply physiological/affective computing in daily scenarios via adapted instruments and to compare the results to findings from experimental lab studies. Students are asked to form small working groups and tackle (self-chosen) research questions by collecting and analysing physiological data from different experimental settings.

Part 2 aims to carry out data collection in noisy environments and on basis of customized instruments (e.g. smart phones, web cams).

Please note: Taking part does NOT require the attendance of the previous course (Part 1, WiSe 22/23).

#### Bemerkung

**Please note: Taking part does NOT require the attendance of the previous course (Part 1, WiSe 22/23).**

#### Leistungsnachweis

Empirical report

### 4526501 Academic English Part One

**G. Atkinson**

Veranst. SWS: 2

Kurs

Mi, wöch., 15:30 - 16:45, Consultations, R.218, S143 (indiv.appointments), ab 26.04.2023

Mi, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 3.09, Academic English Part I+II (alternating), ab 26.04.2023

#### Beschreibung

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

#### Bemerkung

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

#### Voraussetzungen

Registration (compulsory)

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

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

#### Leistungsnachweis

continuous assessment

### 4526502 Academic English Part Two

#### G. Atkinson

Veranst. SWS: 2

#### Kurs

Mi, wöch., 15:30 - 16:45, Consultations, R.2.18, S143 (indiv.appointments), ab 26.04.2023

Mi, wöch., 17:00 - 18:30, Schwannestraße 143 - Seminarraum 3.09, Academic English Part I+II alternating, ab 26.04.2023

#### Beschreibung

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

#### Bemerkung

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

#### Voraussetzungen

Registration (compulsory)

**All students must register.** First time participants 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

### 4556227 Usability Engineering & Testing

#### J. Ehlers

Veranst. SWS: 4

#### Vorlesung

Do, Einzel, 11:30 - 13:30, Steubenstraße 6, Haus F - Hörsaal K20, written exam, 20.07.2023 - 20.07.2023

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal B, Lecture

Do, wöch., 17:00 - 18:30, Lab class online

#### engl. Beschreibung/ Kurzkomentar

Usability indicates the "absence of frustration". But what makes a product or a service really usable? The course will introduce to the basic concepts, theories and methods of usability engineering and testing. We will discuss quality attributes that constitute good usability and will identify design flaws and product defects. Special emphasis will be put on quantitative measures to determine the ease-of-use of a system in various stages of development. Students will learn how to set up and run an empirical user study, including (but not limited to) test setting (field vs. lab), random sampling, designing and hypothesising. We will also discuss procedures for quantitative data analysis and adequate forms of documentation. To deepen the knowledge, the lecture is accompanied by practical training courses that link theoretical findings to systems and applications in the field of human-computer interaction.

**Leistungsnachweis**

Empirical exercises (tutorial) and written exam