UNIVERSITÄT ZU LÜBECK

Module Guide for the Study Path

Master Media Informatics 2014

Version from 3. April 2023

1st semester

2nd semester

3rd semester

4th semester

Arbitrary semester

CS4235-KP04, CS4235 - Media and Design Theory (DesignTheo)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), media informatics, 1st semester

Classes and lectures:

- Media and Design Theory (lecture, 2 SWS)
- Media and Design Theory (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- Marshal McLuhan (media as extensions of the body)
- Willém Flusser (Information, Images, Words, Models)
- Jean Baudrillard (Simulation)
- Paul Virilio (Dromology)
- Manfred Fassler (Post-Geographical Spaces)
- Wolfgang Welsch (Cross-Cultural Society)
- De Kerckhove (Connected Intelligence)
- Pierre Lévy (Collective Intelligence)
- Lev Manovich (The Language of New Media)
- History of Design Theory
- Gerd Selle (Comprehend Interface Design)
- Cordula Meyer (Does design needs a theory?)
- Felicidad Romero-Tejedor (Positions on the Science of Design)
- Design Gives (Objects) Sense
- Summary: The contribution of media- and design theory for media informatics

Qualification-goals/Competencies:

- The students know important representatives of media- and design theory.
- They are able to reflect multi-media and interactive systems with the help of media- and design theory and use this in for analysis and conception of such systems.

Grading through:

- written exam

Responsible for this module:

- Dr. Thomas Winkler

Teacher:

- Institute for Multimedia and Interactive Systems
- Dr. Thomas Winkler

Literature:

- Derrick de Kerckhove, Martina Leeker, Kerstin Schmidt (Hrsg.): McLuhan neu lesen: Kritische Analysen zu Medien und Kultur im 21. Jahrhundert - Transcript, 2008
- Bonsieppe, G.: Interface - Bollmann, 1996

Language:

- offered only in German

CS4260-KP08, CS4260 - Master Project Workplace Systems (MProArbSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	normally each year in the winter semester	8

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), media informatics, 1st semester

Classes and lectures:

- Master Project Workplace Systems (project work, 6 SWS)

Workload:

- 180 Hours group work
- 40 Hours written report
- 20 Hours oral presentation (including preparation)

Contents of teaching:

- Implementation of a Software System
- Project Management and Teamwork
- Analysis, Design, Implementation and Evaluation of Workplace Systems

Qualification-goals/Competencies:

- Students can effectively contribute to teamwork and critically assess their social skills.
- They know the specific requirements of workplace systems and can apply this knowledge in software development.
- They have the methodological competence to analyze complex tasks, divide them into sub-tasks and implement them based on division of labor.

Grading through:

- successful addressing of the project goals

Responsible for this module:

- Prof. Dr. rer. nat. Tilo Mentler
- Prof. Dr.-Ing. Nicole Jochems

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr.-Ing. Nicole Jochems
- MitarbeiterInnen des Instituts

Literature:

- M. Burhardt: Einführung in das Projektmanagement - Publicis Publ. 2013
- M. B. Rosson & J. M. Carroll: Usability engineering. Scenario-based development of human-computer interaction - Morgan Kaufmann series in interactive technologies, 1st ed. San Fancisco: Academic Press, 2002
- H. Beyer & K. Holtzblatt: Contextual design. Defining customer-centered systems - San Francisco, Calif: Morgan Kaufmann, 1998

Language:

- offered only in German

CS4640-KP04 - Hypermediasystems (HyperMeSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), media informatics, 1st semester
- Master Computer Science 2012 (compulsory), specialization field media informatics, 2nd semester

Classes and lectures:

- Hyper Media Systems (lecture, 2 SWS)
- Hyper Media Systems (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- History
- Navigation, Orientation and Search
- Semantic Web and Hypermedia Systems
- Applications and Examples
- Adaptability and adaptivity

Qualification-goals/Competencies:

- Students know the definition and the theoretical foundations of hypermedia systems and can explain these.
- They are able to identify and predict the difficulties and potentials of hypermedia systems based on historical and technological considerations.
- They can analyze, design, implement and evaluate hypermedia applications considering users and context.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Michael Herczeg

Teacher:

- Institute for Multimedia and Interactive Systems

- Prof. Dr. rer. nat. Michael Herczeg
- Prof. Dr.-Ing. Nicole Jochems

Literature:

- J. Nielsen: Multimedia, Hypertext und Internet - Wiesbaden: Vieweg, 1996
- R. Schulmeister: Grundlagen Hypermedialer Lernsysteme: Theorie, Didaktik, Design - München: Oldenbourg-Verlag, 2002

Language:

- offered only in German

PY4210-KP04, PY4210 - Engineering Psychology (IngPsy)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Psychology 2016 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2016 (optional subject), psychology, Arbitrary semester
- Master MES 2014 (optional subject), no specific field, 1st or 2nd semester
- Bachelor MES 2014 (optional subject), no specific field, Arbitrary semester
- Master Media Informatics 2014 (compulsory), psychology, 1st semester

Classes and lectures:

- Engineering Psychology (lecture, 2 SWS)
- Engineering Psychology (seminar, 1 SWS)

Workload:

- 75 Hours in-classroom work
- 45 Hours private studies and exercises

Contents of teaching:

- Overview over the lecture: Special features, psychological basics
- Introduction and overview: definition, brief introduction to philosophy of technics, technology use in everyday life, brief history of engineering psychology
- Man-machine-systems: definition, application, design and evaluation of MMS, age-differentiated design
- Usability: User Experience, Accessibility, Inclusive Design
- Assistance and automation: strategies, consequences, taxonomies
- Human information processing in interaction with technical systems: structure and process, Mental Models and cognitive modelling, strengths and weaknesses, limits, task dependency, complex problem solving, typical errors, heuristics
- Summary

Qualification-goals/Competencies:

- Students understand psychological fundamentals for the design and evaluation of man-machine-systems (MMS).
- Students can integrate their own work on MMS in a historical and sociological perspective.
- They can can plan, coordinate and conduct usability studies and work effectively in interdisciplinary teams with engineering psychologists, ergonomics and usability specialists and designers.

Grading through:

- written exam
- portfolio exam

Responsible for this module:

- Prof. Dr. rer. nat. Thomas Franke

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. nat. Thomas Franke

Literature:

- B. Zimolong & U. Konradt: Ingenieurpsychologie, Enzyklopädie der Psychologie, Wirtschafts-, Organisations- und Arbeitspsychologie - Serie 3 / Bd. 2 Ingenieurpsychologie, Hogrefe-Verlag: Göttingen, 1990 / 2006
- W. Hacker: Allgemeine Arbeitspsychologie - Hogrefe Verlag, 2014
- P. Badke-Schaub, G. Hofinger & K. Lauche: Human Factors, Psychologie des sicheren Handelns - Springer, 2008

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Successful completion of homework assignments during the semester.

CS4555-KP04 - Media Transmission (MediaTrans)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2014 (optional subject), media informatics, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2014 (compulsory), media informatics, 2nd semester

Classes and lectures:

- A/V Media on the Internet (lecture, 2 SWS)
- Implementation Streaming Services (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Audio and video compression
- Media transmission (broadcast / streaming)
- Communication protocols for multimedia
- Synchronization and adaptation
- Infrastructures (CDNs)
- Quality of Service (QoS)
- Applications (VoIP, IPTV, VoD)

Qualification-goals/Competencies:

- Students have a profound understanding of the complex challenges of transmitting audiovisual media in distributed systems.
- They are competent in applying appropriate means and techniques for A/V media on the Internet.
- They are able to estimate the effect of individual components, e.g. compressors and protocol, quantitatively and qualitatively.
- They can analyze, design, implement and evaluate media transmission systems.

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr.-Ing. Andreas Schrader

Teacher:

- Institute of Telematics
- Prof. Dr.-Ing. Andreas Schrader

Literature:

- Hans W. Barz, Gregory A. Bassett: Multimedia Networks. Protocols, Design and Applications - John Wiley & Sons, 1. Aufl., 2016

Language:

- English, except in case of only German-speaking participants

CS4630-KP08, CS4630 - Master Project Mobile Systems (MProMobSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	normally each year in the summer semester	8

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), media informatics, 2nd semester

Classes and lectures:

- Master Project Mobile Systems (project work, 6 SWS)

Workload:

- 180 Hours group work
- 40 Hours written report
- 20 Hours oral presentation (including preparation)

Contents of teaching:

- Implementation of Mobile Systems
- Analysis, Design, Implementation and Evaluation of Mobile Systems
- Project Management and Teamwork

Qualification-goals/Competencies:

- Students can effectively contribute to teamwork and critically assess their social skills.
- They have the methodological competence to analyze complex tasks, divide them into sub-tasks and implement them based on division of labor.
- They know the specific requirements of mobile systems and can apply this knowledge in software development.

Grading through:

- successful addressing of the project goals

Responsible for this module:

- Prof. Dr.-Ing. Nicole Jochems

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr.-Ing. Nicole Jochems
- MitarbeiterInnen des Instituts

Literature:

- M. Burhardt: Einführung in das Projektmanagement - Publicis Publ. 2013
- M. B. Rosson & J. M. Carroll: Usability engineering. Scenario-based development of human-computer interaction - Morgan Kaufmann series in interactive technologies, 1st ed. San Fancisco: Academic Press, 2002
- J. Nielsen: Mobile Usability: für iPhone, iPad, Android und Kindle - Heidelberg : mitp, Verl.-Gruppe Hüthig, Jehle, Rehm, 2013

Language:

- offered only in German

CS4670-KP04, CS4670 - Ambient Computing (AmbComp)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (compulsory), media informatics, 2nd semester

Classes and lectures:

- Ambient Computing (lecture, 3 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Current paradigms in computer technology
- Smart components
- Software architectures
- Context-sensitive systems
- Ambient Intelligence
- Interactive ambient media systems
- Ambient Computing Applications (AAL)
- Ethical, Legal and Social Implications (ELSI).

Qualification-goals/Competencies:

- The students are able to evaluate possibilities, concepts and challenges of Ambient Systems
- They have an overview about current technologies and systems for developing Ambient Systems
- They are able to follow and judge state-of-the-art research in the area of Ambient Computing

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr.-Ing. Andreas Schrader

Teacher:

- Institute of Telematics
- Prof. Dr.-Ing. Andreas Schrader

Literature:

- John Krumm: Ubiquitous Computing Fundamentals - CRC Press, 2009
- Stefan Poslad: Ubiquitous Computing: Smart Devices, Environments and Interactions - Wiley, 2009
- Uwe Hansman et al: Pervasive Computing - Springer, 2003

Language:

- English, except in case of only German-speaking participants

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- none

Module Examination(s):
- CS4670-L1: Ambient Computing, oral examination, 100% of module mark.

CS5680-KP04 - Master Seminar Media informatics (MSemMedien)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	normally each year in the summer semester	4 (Typ B)	15

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), interdisciplinary competence, 2nd semester
- Master Computer Science 2012 (optional subject), specialization field media informatics, 2nd or 3rd semester

Classes and lectures:

- Master Seminar Media Informatics (seminar, 2 SWS)

Workload:

- 60 Hours work on an individual topic with written and oral presentation
- 30 Hours in-classroom work
- 30 Hours private studies

Contents of teaching:

- Familiarize with a challenging academic topic of media informatics
- Self dependent work on a scientific problem and its solution methods
- Presentation and discussion of results

Qualification-goals/Competencies:

- Students can work up a scientific topic thoroughly.
- They are capable of presenting the results in a written documentation and an oral presentation.
- They can present and discuss a scientific problem in English.
- They can comment scientific work from a critical point of view.
- They can follow a scientific presentation and question it in an open discussion.

Grading through:

- term paper
- oral presentation

Responsible for this module:

- Prof. Dr.-Ing. Nicole Jochems

Teacher:

- Institute for Multimedia and Interactive Systems

- Prof. Dr. rer. nat. Michael Herczeg
- Prof. Dr.-Ing. Nicole Jochems
- MitarbeiterInnen des Instituts

Literature:

- : is selected individually

Language:

- German and English skills required

PY4710 - Social Psychology and Social Media (SozPsy)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), psychology, 2nd semester

Classes and lectures:

- Social Psychology and Social Media (lecture, 2 SWS)
- Social Psychology and Social Media (seminar, 1 SWS)

Workload:

- 75 Hours private studies and exercises
- 45 Hours in-classroom work

Contents of teaching:

- History of social psychology
- Methods in social psychology
- Social perception and attribution
- Socialization and social learning
- Social identity
- Attitude and attitude change
- Social behaviour (prosocial behaviour, affiliation, aggression)
- Interaction in groups and intergroup relations
- Use of social media
- Effects of social media on individuals and society

Qualification-goals/Competencies:

- The students are able to explain and to analyse relations and processes within and between groups with recourse to concepts from social psychology.
- They can determine impression management, social influence and behaviour in social media and can compare media with regard to relevant conditions and affordances.
- The students are able to reflect on their own behaviour and on group processes in interdisciplinary teams and to relate it to concepts from social psychology.
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Grading through:

- portfolio exam - the concrete examination elements and their weights will be published in the course

Responsible for this module:

- Prof. Dr. rer. nat. Thomas Franke

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. nat. Thomas Franke

Literature:

- K. Jonas, W. Stroebe, M. Hewstone: Sozialpsychologie (6. Auflage) - Heidelberg: Springer, 20014
- W. Herkner: Lehrbuch Sozialpsychologie (2. Auflage) - Bern: Hans Huber, 2008

Language:

- offered only in German

CS4650-KP04 - Augmented, Mixed and Virtual Reality (AMVReality)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), computer science, 3rd semester
- Master Computer Science 2012 (compulsory), specialization field media informatics, 3rd semester

Classes and lectures:

- Augmented, Mixed and Virtual Reality (lecture, 2 SWS)
- Augmented, Mixed and Virtual Reality (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- Historical developments
- Applications of augmented, mixed and virtual reality (AMVR)
- Theoretical principles of AMVR
- Interaction models for AMVR
- Implementation of AMVR systems
- Evaluation of AMVR systems
- Looking into the future of AMVR

Qualification-goals/Competencies:

- The students know the basic principles and system models of augmented, mixed and virtual reality.
- They are able to estimate the effort for the development of these types of systems.
- They understand the positive and negative effects of such systems.

Grading through:

- written exam

Responsible for this module:

- Dr. Thomas Winkler

Teacher:

- Institute for Multimedia and Interactive Systems
- Dr. Thomas Winkler

Literature:

- Dörner; Broll; Grimm; Jung (Hrsg.): Virtual und Augmented Reality (VR / AR): Grundlagen und Methoden der Virtuellen und Augmentierten Realität - Springer Vieweg, 2014

Language:

- offered only in German

CS4660-KP04, CS4660 - Process Control Systems (ProzFueSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Robotics and Autonomous Systems 2019 (optional subject), Module part Current Issues Robotics and Automation, Arbitrary semester
- Master Psychology 2016 (optional subject), interdisciplinary competence, 3rd semester
- Master psychology 2013 (optional subject), interdisciplinary competence, 3rd semester
- Master Media Informatics 2014 (compulsory), computer science, 3rd semester
- Master Computer Science 2012 (optional subject), specialization field robotics and automation, 2nd or 3rd semester
- Master Computer Science 2012 (compulsory), specialization field media informatics, 2nd semester

Classes and lectures:

- Process Control Systems (lecture, 2 SWS)
- Process Control Systems (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- Incidents and Accidents
- Error, Failure and Responsibility
- Human Factors
- Mental, conceptual and technical Models
- Task Analysis and Task Modelling
- Event Analysis and Event Modelling
- Task Allocation
- Situation Awareness
- Diagnoses und Contingency
- Interaction in real-time: Conception and Design
- Risk and Safety
- Operations and Safety

Qualification-goals/Competencies:

- The students know the most important theories, methods and systems for monitoring and controlling processes.
- They know the definitions of the terms risk and security and why they are applied in different ways.
- They can assess what needs to be considered in the development of mission- and safety-critical human-machine systems and how to proceed methodically.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. phil. André Calero Valdez

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. phil. André Calero Valdez

Literature:

- M. Herczeg: Prozessführungssysteme Sicherheitskritische Mensch-Maschine-Systeme und Interaktive Medien zur Überwachung und Steuerung von Prozessen in Echtzeit - München: de Gruyter - Oldenbourg-Verlag, 2014
- M. Herczeg: Software-Ergonomie: Theorien, Modelle und Kriterien für gebrauchstaugliche interaktive Computersysteme - 4. erweiterte und aktualisierte Auflage. De Gruyter Studium, 2018
- M. Herczeg: Interaktionsdesign - München: Oldenbourg-Verlag, 2006
- J. Reason: Human Error - Boston: Cambridge University Press, 1990
- J. Rasmussen, L. P. Goodstein, A. M. Peijtersen: Cognitive Systems Engineering - New York: Wiley, 1994

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Successful completion of homework assignments during the semester.

CS5160-KP08, CS5160 - Master Project Ambient Systems (MProAmbSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	8

Course of study, specific field and term:

- Master Media Informatics 2014 (compulsory), media informatics, 3rd semester

Classes and lectures:

- Master Project Ambient Systems (project work, 6 SWS)

Workload:

- 180 Hours group work
- 40 Hours written report
- 20 Hours oral presentation (including preparation)

Contents of teaching:

- Implementation of Ambient Systems
- Analysis, Design, Implementation and Evaluation of Ambient Systems
- Project Management and Teamwork

Qualification-goals/Competencies:

- Students can effectively contribute to teamwork and critically assess their social skills.
- They have the methodological competence to analyze complex tasks, divide them into sub-tasks and implement them based on division of labor.
- They know the specific requirements of ambient systems and can apply this knowledge in software development.

Grading through:

- successful addressing of the project goals

Responsible for this module:

- Prof. Dr.-Ing. Andreas Schrader

Teacher:

- Institute of Telematics
- MitarbeiterInnen des Instituts
- Prof. Dr.-Ing. Andreas Schrader

Literature:

- M. Burghardt: Einführung in das Projektmanagement - Publicis Publ. 2013
- : Project-specific literature will be announced during the course

Language:

- English, except in case of only German-speaking participants

PY5210-KP04, PY5210 - Motivational and Emotional Psychology (MotivPsy)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2014 (optional subject), interdisciplinary competence, 1st or 3rd semester
- Master Media Informatics 2014 (compulsory), psychology, 3rd semester

Classes and lectures:

- Motivational and Emotional Psychology (lecture, 2 SWS)
- Motivational and Emotional Psychology (seminar, 1 SWS)

Workload:

- 75 Hours private studies and exercises
- 45 Hours in-classroom work

Contents of teaching:

- History of motivation and emotion psychology
- Methods in motivation and emotion psychology
- Implicit and explicit motives
- Approach and avoidance
- Intrinsic motivation
- Goals, volition, and action control
- Classifications of emotions
- Emotion theories
- Development of emotions
- Emotion regulation

Qualification-goals/Competencies:

- The students are able to reproduce the basics of theories about motivational processes and to sketch different emotion theories in comparison.
- They are able to trace the effects and the dynamics of motivation in interacting with technical systems and in using media.
- They can judge and classify emotional processes in the use of technical systems and media and know about methods for measuring emotional reactions.

Grading through:

- written exam
- portfolio exam

Responsible for this module:

- Prof. Dr. rer. nat. Thomas Franke

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. nat. Thomas Franke

Literature:

- V. Brandstätter, J. Schüler, R. M. Puck & L. Lozo: Motivation und Emotion - Heidelberg: Springer, 2013
- K. Rothermund & A. Eder: Motivation und Emotion - Wiesbaden: VS Verlag, 2012

Language:

- offered only in German

CS5992 - Master Thesis Media Informatics (MScMedien)

Duration:	Turnus of offer:	Credit points:
1 Semester	each semester	30

Course of study, specific field and term:

- Master Media Informatics 2020 (compulsory), media informatics, 4th semester
- Master Media Informatics 2014 (compulsory), media informatics, 4th semester

Classes and lectures:

- Master Thesis Media Informatics (supervised self studies, 1 SWS)
- Colloquium (presentation (incl. preparation), 1 SWS)

Workload:

- 870 Hours research for and write up of a thesis
- 30 Hours oral presentation and discussion (including preparation)

Contents of teaching:

- Further qualifications required are subject to private studies.

Qualification-goals/Competencies:

- The students can solve a complex scientific problem with the means of their profession.
- They elaborate a sophisticated scientific work within a given time.
- They have expertise they can apply to problems.
- They are able to analyze, interpret and critically assess scientific literature.
- They possess the communication skills to write down and present their scientific results in an appropriate way.

Grading through:

- Written report
- colloquium

Responsible for this module:

- Studiengangsleitung Medieninformatik

Teacher:

- Institute for Multimedia and Interactive Systems
- Institutes of the Department of Computer Science/ Engineering
- Alle prüfungsberechtigten Dozentinnen/Dozenten des Studienganges

Literature:

- :

Language:

- thesis can be written in German or English

Notes:

Prerequisites for attending the module:
- see study programme regulations (e.g. at least 75 ECTS points have been acquired)

CS3115-KP04, CS5156-KP04, CS5156 - System Architectures for Multimeda (SysArchMM)

Duration:	Turnus of offer:	Credit points:
1 Semester	normally each year in the summer semester	4

Course of study, specific field and term:

- Bachelor Media Informatics 2020 (optional subject), computer science, 5th or 6th semester
- Bachelor Computer Science 2019 (optional subject), major subject informatics, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), computer science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum signal and image processing, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), specialization field software systems engineering, 3rd semester
- Master Computer Science 2012 (optional subject), advanced curriculum parallel and distributed system architecutres, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), specialization field media informatics, 2nd or 3rd semester
- Bachelor IT-Security 2016 (optional subject), specific, Arbitrary semester

Classes and lectures:

- System Architectures for Multimedia (lecture, 2 SWS)
- System Architectures for Multimedia (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Performance requirements of multimedia systems on computer and systems
- Instruction set extensions for x86 processors
- System architecture of game consoles and multimedia systems
- Hardware structures for the realization of basic image and video processing operations
- System integration of hardware accelerators
- Programming of multimedia applications with OpenGL
- Protection and authentication of multimedia data

Qualification-goals/Competencies:

- Students are able to categorize instruction set extensions of processors for multimedia applications.
- They are able to discuss the characteristics of the system structure of game consoles and multimedia systems.
- They are able to implement image and video processing algorithms in software by making best use of instruction set extensions.
- They are able to evaluate the usefulness of specific processor architectures and system structures for the realization of multimedia systems.
- They are able to determine appropriate hardware structures for the implementation of image and video processing algorithms.
- They are able to write simple graphic applications with OpenGL.

Grading through:

- see Notes

Responsible for this module:

- Prof. Dr.-Ing. Mladen Berekovic

Teacher:

- Institute of Computer Engineering
- Prof. Dr.-Ing. Mladen Berekovic

Literature:

- P. A. Henning: Taschenbuch Multimedia - München: Fachbuchverlag Leipzig 2007
- A. S. Tanenbaum: Moderne Betriebssysteme - München: Pearson 2009
- D. G. Bailey: Design for Embedded Image Processing on FPGAs - Wiley & Sons 2011
- D. Kusswurm: Modern x86 Assembly Language Programming - Apress 2015
- A. Nischwitz, M. Fischer, P. Haberäcker, G. Socher: Computergrafik und Bildverarbeitung - Vieweg + Teubner, 2011

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercise assignments as specified at the beginning of the semester

Module Exam(s):
- CS3115-L1: System Architectures for Multimeda, oral exam, 100% of the module grade

CS4020-KP06, CS4020SJ14 - Specification and Modelling (SpezMod14)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	6

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, 3rd semester
- Master Entrepreneurship in Digital Technologies 2020 (advanced module), technology field computer science, Arbitrary semester
- Master Computer Science 2019 (basic module), Theoretical computer science, 1st or 2nd semester
- Master Medical Informatics 2019 (optional subject), Theoretical computer science, 1st or 2nd semester
- Master IT-Security 2019 (compulsory), Theoretical computer science, 1st or 2nd semester
- Master Medical Informatics 2014 (basic module), computer science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (basic module), technology field computer science, 1st or 2nd semester
- Master Computer Science 2014 (optional subject), specialization field IT security and safety, 2nd or 3rd semester
- Master Computer Science 2014 (basic module), Theoretical computer science, 1st or 2nd semester

Classes and lectures:

- Specification and Modelling (lecture, 2 SWS)
- Specification and Modelling (exercise, 2 SWS)

Workload:

- 80 Hours private studies and exercises
- 60 Hours in-classroom work
- 20 Hours work on project
- 20 Hours exam preparation

Contents of teaching:

- Introduction to modelling and specification
- Modelling concepts (data, streams, traces, diagrams, tables)
- Modelling software components (state, behaviour, structure, interface)
- Modelling concurrency
- Algebraic specification
- Composing, refining, analysing and transforming specifications and models
- Specification languages and tools for specification and modelling

Qualification-goals/Competencies:

- The students can argue on the importance of specifications and models for software development.
- They can characterize, apply, adapt and extent important specification and modelling techniques.
- They can model and specify simple software/hardware system in an adequate way.
- They can describe a system from different views and on different levels of abstraction.
- They can apply specifications and modelsin software development.
- They can analyse specifications and models.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Martin Leucker

Teacher:

- Institute of Software Technology and Programming Languages
- Dr. Annette Stümpel
- Prof. Dr. Martin Leucker

Literature:

- V.S. Alagar, K. Periyasamy: Specification of Software Systems - Springer 2013
- M. Broy, K. Stølen: Specification and Development of Interactive Systems - Springer 2001
- J. Loeckx, H.-D. Ehrich, M. Wolf: Specification of Abstract Data Types - John Wiley & Sons 1997
- D. Bjorner: Software Enginneering 1-3 - Springer 2006
- U. Kastens, H. Kleine Büning: Modellierung - Grundlagen und formale Methoden - Hanser 2005

Language:

- German and English skills required

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercises as specified at the beginning of the semester.

Module Examination(s):
- CS4020-L1: Specification and Modeling, written exam, 90min, 100% of the module grade.

CS4130-KP06, CS4130 - Information Systems (InfoSys)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	6

Course of study, specific field and term:

- Master Computer Science 2019 (compulsory), Canonical Specialization Data Science and AI, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (basic module), technology field computer science, 1st or 2nd semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Medical Informatics 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Robotics and Autonomous Systems 2019 (optional subject), Elective, 1st or 2nd semester
- Master IT-Security 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Medical Informatics 2014 (basic module), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (basic module), technology field computer science, 1st or 2nd semester
- Master Computer Science 2014 (optional subject), specialization field software systems engineering, 2nd or 3rd semester
- Master Computer Science 2014 (basic module), Applied computer science, 1st or 2nd semester

Classes and lectures:

- Information Systems (lecture, 2 SWS)
- Information Systems (exercise, 2 SWS)

Workload:

- 100 Hours private studies
- 60 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Fundamentals of databases, conceptual modeling languages (ontologies), query languages, processes, and agents
- Ontology based data access (OBDA)
- Ontology evolution and ontology integration
- Data exchange and data integration (schema mappings, duplicate detection, inconsistency handling, integration with relational and ontological constraints as well as with incomplete data)
- Data stream processing (e.g., for sensor networks, robotics, web agents) with OBDA and complex event processing (CEP)
- Non-symbolic data and their symbolic annotations (e.g., for applications in bioinformatics/computational biology and for media interpretation), syntax, semantics, hybrid decision and computation problems and their complexity, (analysis of) algorithms
- Data- and ontology-oriented process analysis (e.g., for biological pathways) and process design (e.g., for non-trivial business processes)

Qualification-goals/Competencies:

- Knowledge: The module aims at introducing the students to the formal basics of databases and ontologies, so that they get an overview of concepts, methods, and theories for understanding, analyzing, and designing information systems in open large contexts, such as the web.
- Skills: The students get a basic understanding of logical and formal methods, which allows them to assess the possibilities and limitations of information systems, be it concrete ones or those that still have to be designed. Assessment parameters are correctness and completeness (Does the system produce what is expected? If so, does it produce all results?) as well as expressiveness (Is it possible to formulate all required queries? What are equivalent query languages?) and, last but not least, performance (How long does it take the system to come up with an answer? How much space does it need?). In addition to these analysis skills, students receive logical modeling skills using real application scenarios from industry (business processing, integration of data resources, processing of time-based and event data), and medicine (sensor networks, genomic ontologies, annotation). Based on these, the student not only acquires the ability to assess which logical model is suitable for which application scenario, but also the ability to construct their own logical models where necessary.
- Social Competence und Independent Work: Students work in groups to solve small exercises and project problems and sketch their solutions in short presentations. Independent work is promoted by exercises with practical ontology and database systems.

Grading through:

- Oral examination

Responsible for this module:

- PD Dr. Özgür Özçep

Teacher:

- Institute of Information Systems

- PD Dr. Özgür Özçep

Literature:

- S. Abiteboul, R. Hull, V. Vianu: Foundations of Databases - Addison-Wesley, 1995
- M. Arenas, P. Barcelo, L. Libkin, and F. Murlak: Foundations of Data Exchange - Cambridge University Press, 2014
- F. Baader, D. Calvanese, D.L. McGuinness, D. Nardi, and P.F. Patel-Schneider (Eds.): The Description Logic Handbook: Theory, Implementation, and Applications - Cambridge University Press, 2010
- S. Chakravarthy, Q. Jiang: Stream Data Processing A Quality of Service Perspective - Springer, 2009
- L. Libkin: Elements Of Finite Model Theory (Texts in Theoretical Computer Science. An Eatcs Series) - SpringerVerlag, 2004

Language:

- German and English skills required

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercises as specified at the beginning of the semester.

Module Exam(s):
- CS4130-L1: Information Systems, oral exam, 100% of module grade.

Previous name: Web Based Information Systems

Recommended previous modules:
- Algorithm and Data Structures (CS1001)
- Linear Algebra and Discrete Structures I+II (MA1000, MA1500)
- Databases (CS2700)
- Logic (CS1002)
- Bachelor Project Computer Science (CS3701), topic: logic programming
- Nonstandard Database Systems (CS3202)

Prerequisites for the exam:
- Successful completion of homework assignments during the semester.

CS4139-KP06, CS4139 - Runtime Verification and Testing (RVTesten)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	6

Course of study, specific field and term:

- Master MES 2020 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master IT-Security 2019 (optional subject), IT Safety and Reliability, 1st, 2nd, or 3rd semester
- Master MES 2014 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), computer science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2014 (optional subject), specialization field IT security and safety, 1st or 2nd semester

Classes and lectures:

- Runtime Verification and Testing (lecture, 3 SWS)
- Runtime Verification and Testing (exercise, 1 SWS)

Workload:

- 100 Hours private studies and exercises
- 60 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Quality aspects of software systems
- Analysis and verification techniques for software systems
- Testing levels
- Testing process
- Kinds of tests
- Test case generation
- Specification of correctness properties
- synthesis of monitors for the observation of software systems
- diagnosis of errors in software systems
- realization of monitoring frameworks

Qualification-goals/Competencies:

- The students can describe and compare analysis and verification techniques.
- They can construct, analyse and evaluate specifications of correctness and safety properties.
- They can illustrate different techniques for testing hardware and software systems and can select and apply suitable techniques.
- They can explain the operation process of test case generation tools and can clasify suitable applications.
- They can describe and apply techniques for the synthesis of monitors.
- With the acquired techniques they can develop software of higher quality.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Martin Leucker

Teacher:

- Institute of Software Technology and Programming Languages
- Prof. Dr. Martin Leucker

Literature:

- G.J. Myers: The Art of Software Testing - John Wiley, 1979
- B. Beizer: Software Testing Techniques - Van Nostrand Reinhold, 1999
- M. Broy, B. Jonsson, J.-P. Katoen, M. Leucker, A. Pretschner: Model-Based Testing of Reactive Systems - Springer, 2005
- A. Bauer, M. Leucker, C. Schallhart: Runtime Verification for LTL and TLTL - ACM TOSEM, 2011
- C. Baier, J.-P. Katoen: Principles of Model Checking - MIT Press, 2008
- D. Peled: Software Reliability Methods - Springer, 2001

Language:

- English, except in case of only German-speaking participants

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercises as specified at the beginning of the semester.

Module Exam(s):
- CS4139-L1: Runtime Verification and Testing, oral exam, 100% of the module grade.

CS4140-KP04, CS4140 - Mobile and Distributed Databases (MVDB)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum distributed information systems, 3rd semester
- Master Computer Science 2012 (compulsory), specialization field software systems engineering, 1st semester

Classes and lectures:

- Mobile and Distributed Databases (lecture, 2 SWS)
- Mobile and Distributed Databases (exercise, 1 SWS)

Workload:

- 65 Hours private studies
- 45 Hours in-classroom work
- 10 Hours exam preparation

Contents of teaching:

- The contents of the lecture covers query processing, transactions and replication in
- - centralised database management systems
- - parallel database management systems
- - distributed database management systems
- - mobile database management systems

Qualification-goals/Competencies:

- Students can explain the differences between centralised, parallel, distributed and mobile database management systems.
- They can judge about the practical suitability of different synchronization approaches for distributed and mobile transactions for a given problem.
- They can apply approaches for distributed and mobile query processing.
- They can choose suitable replication approaches for a given application and justify their choices.
- They can recognize and deal with the special difficulties and sources of error in distributed and mobile environments.

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr. Sven Groppe

Teacher:

- Institute of Information Systems
- Prof. Dr. Sven Groppe

Literature:

- A. Kemper, A. Eickler: Datenbanksysteme - 2006
- T. Conolly, C. Begg: Database Systems - A Practical Approach to Design, Implementation, and Management - Addison-Wesley 2005
- E. Rahm: Mehrrechner-Datenbanksysteme - Addison-Wesley 1994
- P. Dadam: Verteilte Datenbanken und Client/Server Systeme - Springer 1996
- H. Höpfner, C. Türker, B. König-Ries: Mobile Datenbanken und Informationssysteme - dpunkt.verlag 2005
- B. Mutschler, G. Specht: Mobile Datenbanksysteme - Springer 2004
- V. Kumar: Mobile Database Systems - Wiley-Interscience 2006

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Active participation in lecture and tutorial

Module Examination(s):
- CS4140-L1: Mobile and Distributed Databases, oral exam, 100% of module grade.

CS4150-KP06, CS4150SJ14 - Distributed Systems (VertSys14)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6

Course of study, specific field and term:

- Master Computer Science 2019 (compulsory), Canonical Specialization SSE, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (basic module), technology field computer science, 1st or 2nd semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Medical Informatics 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Robotics and Autonomous Systems 2019 (optional subject), Elective, 1st or 2nd semester
- Master IT-Security 2019 (basic module), Applied computer science, 1st or 2nd semester
- Master Medical Informatics 2014 (basic module), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (basic module), technology field computer science, 1st or 2nd semester
- Master Computer Science 2014 (optional subject), specialization field software systems engineering, 2nd or 3rd semester
- Master Computer Science 2014 (basic module), Applied computer science, 1st or 2nd semester

Classes and lectures:

- Distributed Systems (lecture, 2 SWS)
- Distributed Systems (exercise, 2 SWS)

Workload:

- 60 Hours private studies
- 60 Hours in-classroom work
- 40 Hours e-learning
- 20 Hours exam preparation

Contents of teaching:

- Introduction and motivation
- Protocols and layered models
- Message representations
- Realization of network services
- Communication mechanisms
- Addresses, names and directory services
- Synchronisation
- Replication and consistency
- Fault tolerance
- Distributed transactions
- Security

Qualification-goals/Competencies:

- The participants will accquire a deep understanding for problems to be solved in distributed systems, such as synchronization, error handling, naming etc.
- They know the most important services in distributed systems such as name service, distributed file systems etc.
- They are able to program simple distributed applications and systems themselves.
- They know the most important algorithms in distributed systems, for instance for time synchronization, for leader election, or for mutual exclsuion.
- They have a good feeling for when it makes sense to use distributed instead of centralized systems.
- They have a good feeling for what kind of solutions could best be used for what kind of problems in distributed Internet applications.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. Stefan Fischer

Teacher:

- Institute of Telematics

- Prof. Dr. Stefan Fischer
- Dr. rer. nat. Florian-Lennert Lau

Literature:

- A. Tanenbaum, M. van Steen: Distributed Systems: Principles and Paradigms - Prentice Hall 2006
- G. Coulouris, J. Dollimore, T. Kindberg, G. Blair: Distributed Systems - Concepts and Design - Addison Wesley 2012

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- None

Module Exam(s):
- CS4150-L1 Distributed Systems, written exam, 90min, 100% of module grade.

CS4151-KP04, CS4151 - Architectures for Distributed Applications (SVA)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master MES 2020 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master MES 2014 (optional subject), computer science / electrical engineering, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum distributed information systems, 2nd semester
- Master Computer Science 2012 (optional subject), advanced curriculum parallel and distributed system architecutres, 2nd or 3rd semester
- Master Computer Science 2012 (compulsory), specialization field software systems engineering, 2nd semester
- Master Computer Science 2012 (compulsory), advanced curriculum enterprise IT, 2nd semester

Classes and lectures:

- Architectures for Distributed Applications (lecture, 2 SWS)
- Architectures for Distributed Applications (exercise, 1 SWS)

Workload:

- 45 Hours private studies
- 45 Hours in-classroom work
- 30 Hours exam preparation

Contents of teaching:

- Motivation
- Software Architectures
- Basics: HTTP, XML & Co
- N-Tier Applications
- Service-Oriented and Event-Driven Architectures (SOA and EDA)
- Web-Oriented Architectures (Web 2.0)
- Overlay Networks
- Peer-to-Peer
- Grid and Cloud Computing
- Internet of Things

Qualification-goals/Competencies:

- The students are able to name the most important archiectures for distributed systems, explain them, and compare them to each other.
- For each architecture, they know the most prominent and important implementation platforms and basically know how to use them.
- For a given problem, they can analyze which architecture is best suited to solve it, and they can design a plan for the solution's realization.

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr.-Ing Horst Hellbrück

Teacher:

- Institute of Telematics
- Prof. Dr.-Ing Horst Hellbrück

Literature:

- J. Dunkel, A. Eberhart, S. Fischer, C. Kleiner, A. Koschel: Systemarchitekturen für verteilte Anwendungen - Hanser-Verlag 2008
- I. Melzer et.al.: Service-Orientierte Architekturen mit Web Services - Spektrum-Verlag 2010

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercises as specified at the beginning of the semester.

Module Exam(s):
- CS4151-L1 System Architectures for Distributed Applications, oral exam, 100% of module grade.

CS4160-KP06, CS4160SJ14 - Real-Time Systems (Echtzeit14)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	6

Course of study, specific field and term:

- Master MES 2020 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (advanced module), technology field computer science, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2019 (basic module), technical computer science, 1st or 2nd semester
- Master Medical Informatics 2019 (optional subject), technical computer science, 1st or 2nd semester
- Master IT-Security 2019 (basic module), technical computer science, 1st or 2nd semester
- Master MES 2014 (optional subject), computer science / electrical engineering, 1st semester
- Master Medical Informatics 2014 (basic module), computer science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (basic module), technology field computer science, 1st or 2nd semester
- Master Computer Science 2014 (basic module), technical computer science, 1st or 2nd semester

Classes and lectures:

- Real-Time Systems (lecture, 2 SWS)
- Real-Time Systems (exercise, 2 SWS)

Workload:

- 100 Hours private studies
- 60 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Real-time processing (definitions, requirements)
- Process automation systems
- Real-time programming
- Process connectivity and networking
- Modelling of discrete event systems (automata, state charts)
- Modelling of continuous systems (differential equations, Laplace transformation)
- Application of design tools (Matlab/Simulink, Stateflow)

Qualification-goals/Competencies:

- The students are able to describe the fundamental problems of real-time processing.
- They are able to explain real-time computer systems for process automation, in particular SPS.
- They are able to program real-time systems in the IEC languages.
- They are able to elucidate process interfaces and real-time bus system.
- They are able to model, analyze and implement event discrete systems, in particular process control systems.
- They are able to model, analyze and implement continuous systems, in particular feedback control systems.
- They are able to make use of design tools for real-time systems.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr.-Ing. Mladen Berekovic

Teacher:

- Institute of Computer Engineering
- Prof. Dr.-Ing. Mladen Berekovic

Literature:

- R. C. Dorf, R. H. Bishop: Modern Control Systems - Prentice Hall 2010
- L. Litz: Grundlagen der Automatisierungstechnik - Oldenbourg 2012
- M. Seitz: Speicherprogrammierbare Steuerungen - Fachbuchverlag Leipzig 2012
- H. Wörn, U. Brinkschulte: Echtzeitsysteme - Berlin: Springer 2005
- S. Zacher, M. Reuter: Regelungstechnik für Ingenieure - Springer-Vieweg 2014

Language:

- offered only in English

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercise assignments as specified at the beginning of the semester

Module Exam(s):
- CS4160-L1: Real-Time Systems, written exam, 90min, 100% of the module grade

CS4250-KP04, CS4250 - Computer Vision (CompVision)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master CLS 2023 (optional subject), computer science, 2nd or 3rd semester
- Master MES 2020 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Computer Science 2019 (optional subject), Elective, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Biophysics 2019 (optional subject), Elective, 2nd semester
- Master Biomedical Engineering (optional subject), advanced curriculum, 2nd semester
- Master CLS 2016 (optional subject), computer science, 2nd or 3rd semester
- Master MES 2014 (optional subject), computer science / electrical engineering, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum imaging systems, 2nd or 3rd semester
- Master CLS 2010 (compulsory), computational life science / imaging, 2nd semester
- Master MES 2011 (advanced curriculum), imaging systems, signal and image processing, 2nd semester
- Master Computer Science 2012 (optional subject), advanced curriculum signal and image processing, 2nd or 3rd semester
- Master Computer Science 2012 (compulsory), specialization field robotics and automation, 2nd semester
- Master Computer Science 2012 (compulsory), specialization field bioinformatics, 2nd semester
- Master Computer Science 2012 (optional subject), advanced curriculum intelligent embedded systems, 2nd semester

Classes and lectures:

- Computer Vision (lecture, 2 SWS)
- Computer Vision (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction to human and computer vision
- Sensors, cameras, optics and projections
- Image features: edges, intrinsic dimension, Hough transform, Fourier descriptors, snakes
- Range imaging and 3-D cameras
- Motion and optical flow
- Object recognition
- Example applications

Qualification-goals/Competencies:

- Students can understand the basics of computer vision.
- They can explain and perform camera choice and calibration.
- They can explain and apply the basic methods for feature extraction, motion estimation, and object recognition.
- They can indicate appropriate methods for different kinds of computer-vision applications.

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr.-Ing. Erhardt Barth

Teacher:

- Institute for Neuro- and Bioinformatics
- Prof. Dr.-Ing. Erhardt Barth

Literature:

- Richard Szeliski: Computer Vision: Algorithms and Applications - Springer, Boston, 2011
- David Forsyth and Jean Ponce: Computer Vision: A Modern Approach - Prentice Hall, 2003

Language:

- English, except in case of only German-speaking participants

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Regular participation in the exercises as specified at the beginning of the semester
- Successful completion of exercise slips as specified at the beginning of the semester

Module exam(s):
- CS4250-L1: Computer Vision, oral exam, 100% of module grade

Is identical to module XM2330 of the University of Applied Sciences Lübeck

CS4508-KP12, CS4508 - Data Management (DatManag)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	12

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2020 (advanced module), technology field computer science, Arbitrary semester
- Master Computer Science 2019 (optional subject), advanced module, Arbitrary semester
- Master IT-Security 2019 (advanced module), Elective Computer Science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (advanced module), technology field computer science, 2nd or 3rd semester
- Master Computer Science 2014 (advanced module), advanced curriculum, 2nd or 3rd semester

Classes and lectures:

- CS4140 T: Mobile and distributed information systems (lecture with exercises, 3 SWS)
- CS5140 T: Semantic Web (lecture with exercises, 3 SWS)
- Seminar data management (seminar, 2 SWS)

Workload:

- 130 Hours private studies
- 120 Hours in-classroom work
- 90 Hours work on an individual topic with written and oral presentation or group work
- 20 Hours exam preparation

Contents of teaching:

- see module parts

Qualification-goals/Competencies:

- see module parts

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr. Sven Groppe

Teacher:

- Institute of Information Systems
- Prof. Dr. Sven Groppe

Literature:

- : see module parts

Language:

- German and English skills required

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of the project assignment as specified at the beginning of the semester or
- Seminar lecture with elaboration according to the requirements at the beginning of the semester.

Module Exam(s):
- CS4508-L1: Data Management, oral exam, 100% of the module grade.

Instead of the seminar, an internship can also be offered.

(Consists of CS4140 T, CS5140 T)

CS4509-KP12, CS4509 - Internet Structures and Protocols / Internet Technologies (Internet)

Duration:	Turnus of offer:	Credit points:
2 Semester	not available anymore	12

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2020 (advanced module), technology field computer science, Arbitrary semester
- Master Computer Science 2019 (optional subject), advanced module, Arbitrary semester
- Master IT-Security 2019 (advanced module), Elective Computer Science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2014 (advanced module), technology field computer science, 2nd and 3rd semester
- Master Computer Science 2014 (advanced module), advanced curriculum, 2nd and 3rd semester

Classes and lectures:

- Architectures for Distributed Applications (lecture with exercises, 3 SWS)
- Advanced Internet Technologies (lecture with exercises, 3 SWS)
- Software Architectures (project work, 3 SWS)

Workload:

- 120 Hours in-classroom work
- 105 Hours private studies
- 45 Hours exam preparation
- 45 Hours group work
- 45 Hours work on project

Contents of teaching:

- see module parts

Qualification-goals/Competencies:

- see module parts

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr. Stefan Fischer

Teacher:

- Institute of Telematics
- Prof. Dr.-Ing Horst Hellbrück
- Prof. Dr.-Ing. habil. Dennis Pfisterer

Literature:

- : see module parts

Language:

- German and English skills required

Notes:

(Consists of CS5158 T, CS4151 T).

As of winter semester 2019/20, the module has been renamed from Internet Technologies to Internet Structures and Protocols.

As of winter semester 2020/21, the module is no longer offered to new students.

Admission requirements for taking the module:
- None

Admission requirements for taking module examination(s):
- Successful participation in lab

CS4701-KP06 - Communication and System Security (KoSyS)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2020 (advanced module), technology field computer science, Arbitrary semester
- Master MES 2020 (optional subject), computer science / electrical engineering, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master IT-Security 2019 (compulsory), IT-Security, 1st or 2nd semester

Classes and lectures:

- Communication and System Security (lecture, 2 SWS)
- Communication and System Security (seminar-style lectures with exercises, 2 SWS)

Workload:

- 100 Hours private studies
- 60 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Cryptographic procedures and protocols, security analyses
- IT security at system level, security mechanisms
- Security, privacy and trust of special systems such as Cloud and IoT
- Code analysis
- Security management, legal framework conditions
- Security problems in IT systems

Qualification-goals/Competencies:

- Students can explain the basic methods in the field of cybersecurity and apply them to case studies.
- They can demonstrate a deeper understanding of cryptographic methods and their applications in communication systems.
- They can analyze the entire spectrum of the security of a system.
- They can explain modelling techniques and describe experiences with their use.
- They can apply a variety of standard techniques to increase the security of a system.

Grading through:

- Viva Voce or test
- written homework

Is requisite for:

- Current Topics in IT Security (CS5195-KP04)

Requires:

- Cybersecurity (CS2250-KP04)
- Cryptology (CS3420-KP04, CS3420)

Responsible for this module:

- Prof. Dr. Thomas Eisenbarth

Teacher:

- Institute for IT Security

- Prof. Dr. Thomas Eisenbarth
- Prof. Dr. Rüdiger Reischuk
- Prof. Dr. Esfandiar Mohammadi

Literature:

- Stallings, Brown: Computer Security: Principles and Practice - 4th ed., Pearson, 2018
- Katz, Lindell: Introduction to Modern Cryptography - 2nd ed., CRC Press, 2014
- Stinson: Cryptography: Theory and Practice - 4th ed., CRC Press, 2018

Language:

- English, except in case of only German-speaking participants

Notes:

Admission requirements for taking the module:
- None (the competencies of the modules listed under

CS5120-KP04 - Digital Government (DigGov)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester

Classes and lectures:

- Digital Government (lecture, 2 SWS)
- Digital Government (seminar, 1 SWS)

Workload:

- 45 Hours in-classroom work
- 35 Hours private studies
- 20 Hours written report
- 20 Hours oral presentation (including preparation)

Contents of teaching:

- This seminar deals with digital transformation in the public sector. It provides insight into practice and research. The spectrum of topics ranges from traditional E-Government applications to solutions in public disaster management and information and participation opportunities in the context of Open Government. Current topics such as agile software development in the public sector or AI and automated decisions are also covered.

Qualification-goals/Competencies:

- The students are familiar with the basic definitions of Digital Government, its application in various areas of politics and administration, and principles of the design, development and use of digital government applications
- The students are able to evaluate the potential applications of digital government as a contribution to achieving political and administrative goals as well as the challenges and limitations.
- The students are able to consider and integrate the perspectives, models and theories of the various disciplines related to Digital Government
- The students are able to present and discuss their work results
- The students can present and discuss their work results

Grading through:

- Oral presentation and written report

Responsible for this module:

- Prof. Dr. rer. pol. Moreen Heine

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. pol. Moreen Heine

Literature:

- Wirtz, B. W. (Ed.). (2010): E-Government: Grundlagen, Instrumente, Strategien
- Bogumil, J., & Jann, W. (2009).: Verwaltung und Verwaltungswissenschaft in Deutschland. Einführung in die Verwaltungswissenschaft. - 2., völlig überarbeitete Auflage

Language:

- offered only in German

CS5130-KP04, CS5130 - Foundations of Ontologies and Databases for Information Systems (OntoDB)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master CLS 2010 (optional subject), computer science, Arbitrary semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester

Classes and lectures:

- Foundations of Ontologies and Databases in Information Systems (lecture, 2 SWS)
- Foundations of Ontologies and Databases in Information Systems (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- Fundamentals of databases, conceptual modeling languages (ontologies), query languages, processes, and agents
- Ontology based data access (OBDA)
- Ontology evolution and ontology integration
- Data exchange and data integration (schema mappings, duplicate detection, inconsistency handling, integration with relational and ontological constraints as well as with incomplete data)
- Data stream processing (e.g., for sensor networks, robotics, web agents) with OBDA and complex event processing (CEP)
- Non-symbolic data and their symbolic annotations (e.g., for applications in bioinformatics/computational biology and for media interpretation), syntax, semantics, hybrid decision and computation problems and their complexity, (analysis of) algorithms
- Data- and ontology-oriented process analysis (e.g., for biological pathways) and process design (e.g., for non-trivial business processes)

Qualification-goals/Competencies:

- Knowledge: The module aims at introducing the students to the formal basics of databases and ontologies, so that they get an overview of concepts, methods, and theories for understanding, analyzing, and designing information systems in open large contexts, such as the web.
- Skills: The students get a basic understanding of logical and formal methods, which allows them to assess the possibilities and limitations of information systems, be it concrete ones or those that still have to be designed. Assessment parameters are correctness and completeness (Does the system produce what is expected? If so, does it produce all results?) as well as expressiveness (Is it possible to formulate all required queries? What are equivalent query languages?) and, last but not least, performance (How long does it take the system to come up with an answer? How much space does it need?). In addition to these analysis skills, students receive logical modeling skills using real application scenarios from industry (business processing, integration of data resources, processing of time-based and event data), and medicine (sensor networks, genomic ontologies, annotation). Based on these, the student not only acquires the ability to assess which logical model is suitable for which application scenario, but also the ability to construct their own logical models where necessary.
- Social Competence und Independent Work: Students work in groups to solve small exercises and project problems and sketch their solutions in short presentations. Independent work is promoted by exercises with practical ontology and database systems.

Grading through:

- written exam

Is requisite for:

- Web-Mining Agents (CS5131-KP08, CS5131)

Responsible for this module:

- Prof. Dr. rer. nat. habil. Ralf Möller

Teacher:

- Institute of Information Systems
- Prof. Dr. rer. nat. habil. Ralf Möller
- PD Dr. Özgür Özçep

Literature:

- S. Abiteboul, R. Hull, V. Vianu: Foundations of Databases - Addison-Wesley, 1995
- M. Arenas, P. Barcelo, L. Libkin, and F. Murlak: Foundations of Data Exchange - Cambridge University Press, 2014
- F. Baader, D. Calvanese, D.L. McGuinness, D. Nardi, and P.F. Patel-Schneider (Eds.): The Description Logic Handbook: Theory, Implementation, and Applications - Cambridge University Press, 2010
- S. Chakravarthy, Q. Jiang: Stream Data Processing A Quality of Service Perspective - Springer, 2009
- L. Libkin: Elements Of Finite Model Theory (Texts in Theoretical Computer Science. An Eatcs Series) - SpringerVerlag, 2004

Language:

- offered only in English

Notes:

Prerequisites for this module are:
- Algorithm and Data Structures (CS1001)
- Linear Algebra and Discrete Structures I+II (MA1000, MA1500)
- Databases (CS2700)

Recommended additional modules:
- Logic (CS1002)
- Bachelor Project Computer Science (CS3701), topic: logic programming
- Nonstandard Database Systems (CS3202)

CS5131-KP08, CS5131 - Web-Mining Agents (WebMining)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	8

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master CLS 2010 (optional subject), computer science, Arbitrary semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester

Classes and lectures:

- Web-Mining Agents (lecture, 4 SWS)
- Web-Mining Agents (exercise, 1 SWS)
- Web-Mining Agents (practical course, 1 SWS)

Workload:

- 120 Hours private studies
- 90 Hours in-classroom work
- 30 Hours exam preparation

Contents of teaching:

- Probabilities and generative models for discrete data
- Gaussian models, Bayesian and frequentist statistics, regression,
- Probabilistic graphical models (e.g., Bayesian networks), learning parameters and structures of probabilistic graphical models (BME, MAP, ML, EM algorithm), probabilistic classification, probabilistic relational models
- Probabilistic reasoning over time (dynamic Bayesian networks, Markov assumption, transition model, sensor model, inference problems: filtering, prediction, smoothing, most-likely explanation, hidden Markov models, Kalman filters, exact inferences and approximations, learning dynamic Bayesian networks)
- Structural Causal Networks (Intervention, instrumental Variables, counterfactuals)
- Mixture models, latent linear models (LDA, LSI, PCA), sparse linear models,
- Decision making under uncertainty (utility theory, decision networks, value of information, sequential decision problems, value iteration, policy iteration, MDPs, decision-theoretic agents, POMDPs, reduction to multidimensional continuous MDPs, dynamic decision networks)
- Game theory, decisions with multiple agents (Nash equilibrium, Bayes-Nash equilibrium), social choice (voting, preferences, paradoxes, Arrow's Theorem, mechanism design (controlled autonomy), rules of encounter
- Multimedia interpretation for web (re-)search (probabilistic ranking of interpretations, link analysis (e.g., citations), social network analysis)
- Building and exchanging symbolic annotations for web data (from named entity recognition to discourse representations)
- Information association, retrieval, query answering and recommendation

Qualification-goals/Competencies:

- Knowledge:Students can explain the agent abstraction, define web mining of rational behavior, and give details about the design of mining agents (goals, utilities, environments). They can describe the main features of environments. The notion of adversarial agent cooperation can be discussed in terms of decision problems and algorithms for solving these problems. For dealing with uncertainty in real-world scenarios, students can summarize how Bayesian networks can be employed as a knowledge representation and reasoning formalism in static and dynamic settings. In addition, students can define decision making procedures in simple and sequential settings, with and with complete access to the state of the environment. In this context, students can describe techniques for solving (partially observable) Markov decision problems, and they can recall techniques for measuring the value of information. Students can identify techniques for simultaneous localization and mapping, and can explain planning techniques for achieving desired states. Students can explain coordination problems and decision making in a multi-agent setting in term of different types of equilibria, social choice functions, voting protocol, and mechanism design techniques.Students can explain the difference between instance-based and model-based learning approaches, and they can enumerate basic machine learning technique for each of the two basic approaches, either on the basis of static data, or on the basis of incrementally incoming data . For dealing with uncertainty, students can describe suitable representation formalisms, and they explain how axioms, features, parameters, or structures used in these formalisms can be learned automatically with different algorithms. Students are also able to sketch different clustering techniques. They depict how the performance of learned classifiers can be improved by ensemble learning, and they can summarize how this influences computational learning theory. Algorithms for reinforcement learning can also be explained by students.
- Skills:Students can select an appropriate agent architecture for concrete agent application scenarios. For simplified agent application students can derive decision trees and apply basic optimization techniques. For those applications they can also create Bayesian networks/dynamic Bayesian networks and apply Bayesian reasoning for simple queries. Students can also name and apply different sampling techniques for simplified agent scenarios. For simple and complex decision making students can compute the best action or policies for concrete settings. In multi-agent situations students will apply techniques for finding different equilibria states, e.g., Nash

equilibria. For multi-agent decision making students will apply different voting protocols and compare and explain the results.Students derive decision trees and, in turn, propositional rule sets from static data as well and temporal or streaming data. Students present and apply the basic idea of first-order inductive leaning. They apply the BME, MAP, ML, and EM algorithms for learning parameters of Bayesian networks and compare the different algorithms. They also know how to carry out Gaussian mixture learning. Students can describe basic clustering techniques and explain the basic components of those techniques. Students compare related machine learning techniques, e.g., k-means clustering and nearest neighbor classification. They can distinguish various ensemble learning techniques and compare the different goals of those techniques.

- Social competence: Students work in groups in order to solve small exercise and project assignments and present them in short talks in the plenum. In the associated project lab the students the develop a larger project using up-to-date programing languages and software tools for data science applications.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. rer. nat. habil. Ralf Möller

Teacher:

- Institute of Information Systems

- Prof. Dr. rer. nat. habil. Ralf Möller
- PD Dr. Özgür Özçep

Literature:

- M. Hall, I. Witten and E. Frank: Data Mining: Practical Machine Learning Tools and Techniques - Morgan Kaufmann, 2011
- D. Koller, N. Friedman: Probabilistic Graphical Models: Principles and Techniques - MIT Press, 2009
- K. Murphy: Machine Learning: A Probabilistic Perspective - MIT Press, 2012
- S. Russel, P. Norvig: Artificial Intelligence: A Modern Approach - Pearson Education, 2010
- Y. Shoham, K. Leyton-Brown: Multiagent-Systems: Algorithmic, Game-Theoretic, and Logical Foundations - Cambridge University Press, 2009

Language:

- offered only in English

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercises as specified at the beginning of the semester.

Module Exam(s):
- CS5131-L1: Web Mining Agents, oral exam, 100% of module grade.

Competencies from the following modules are required for this module (not a hard entry requirement):
- Algorithms and Data Structures (CS1001).
- Linear Algebra and Discrete Structures I + II (MA1000, MA1500)
- Databases (CS2700)
- Stochastics 1 (MA2510) or Fundamentals of Statistics (PY1800)
- Introduction to Logic (CS1002)
- Artificial Intelligence 1 (CS3204)
- Information Systems (CS4130)

CS5140-KP04, CS5140 - Semantic Web (SemWeb)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum distributed information systems, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), specialization field software systems engineering, 2nd or 3rd semester

Classes and lectures:

- Semantic Web (lecture, 2 SWS)
- Semantic Web (exercise, 1 SWS)

Workload:

- 65 Hours private studies
- 45 Hours in-classroom work
- 10 Hours exam preparation

Contents of teaching:

- Introduction with overview of the W3C Semantic Web family of languages
- Data management for Semantic Web data, in particular indexing approaches
- Query processing for Semantic Web queries (central, parallel, and distributed, in particular in the cloud)
- Processing strategies for Semantic Web rules and ontologies

Qualification-goals/Competencies:

- Students can judge about the possibilities and limits of the Semantic Web.
- They can evaluate the consequences of the Semantic Web approach for data modelling, adminstration and processing, and finally for applications.
- They can develop Semantic Web applications.
- They can explain and apply specialized approaches for Semantic Web databases.
- They can discuss about open research questions in the area of the Semantic Web.

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr. Sven Groppe

Teacher:

- Institute of Information Systems
- Prof. Dr. Sven Groppe

Literature:

- P. Hitzler, M. Krötzsch, S. Rudolph: Foundations of Semantic Web Technologies - Chapman & Hall / CRC, 2009
- T. Segaran, J. Taylor, C. Evans: Programming the Semantic Web - O'Reilly, 2009
- F. Bry, J. Maluszynski: Semantic Techniques for the Web - Springer, 2009
- J. T. Pollock: Semantic Web for Dummies - Wiley, 2009
- J. Hebeler, M. Fisher, R. Blace, A. Perez-Lopez, M. Dean: Semantic Web Programming - Wiley, 2009
- G. Antoniou, F. van Harmelen: A Semantic Web Primer - MIT Press, 2008
- V. Kashyap, C. Bussler, M. Moran: The Semantic Web - Springer, 2008
- S. Groppe: Data Management and Query Processing in Semantic Web Databases - Springer, 2011

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Active participation in lecture and tutorial

Module Exam(s):
- CS5140-L1: Semantic Web, oral exam, 100% of module grade.

CS5158-KP04, CS5158 - Advanced Internet Technologies (AdInternet)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Medical Informatics 2014 (optional subject), ehealth / infomatics, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), advanced curriculum enterprise IT, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), specialization field software systems engineering, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), advanced curriculum distributed information systems, 2nd or 3rd semester

Classes and lectures:

- Advanced Internet Technologies (lecture, 2 SWS)
- Advanced Internet Technologies (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- Introduction and fundamentals
- Fundamental Internet design principles
- Problems of today's Internet architecture
- Backbone Technologies
- Mobile Internet
- IPv6 und related topics
- Delay Tolerant Networks (DTN)
- Internet of Services / Internet of Things
- Peer-To-Peer networks
- Big Data
- Goals, architectures, algorithms, and protocols for the future Internet

Qualification-goals/Competencies:

- Understand the fundamental design decisions that have led to today's Internet architecture
- Understand the original design goals of the Internet and realize the implications that the emphasis on certain of them has on today's networks
- Learn about essential, universally valid criteria for the design of networks and applications (e.g., end-to-end argument, fate sharing, etc.)
- Know technological as well as societal developments that have led to massive changes in the Internet's infrastructure (growth, innovations, mobile communications,)
- Identify problems of the Internet's architecture and understand potential solutions by comparing different approaches
- Become acquainted with the Future Internet research field and learn about novel approaches to research and shape the Internet of the future

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Stefan Fischer

Teacher:

- Institute of Telematics
- Dr. Mohamed Hail

Literature:

- Olivier Hersent, David Boswarthick, Omar Elloumi: The Internet of Things: Key Applications and Protocols - Wiley, 2012
- Athanasios V. Vasilakos, Yan Zhang, Thrasyvoulos Spyropoulos: Delay Tolerant Networks: Protocols and Applications - CRC Press, 2012
- E. Pacitti, R. Akbarinia, M. El-Dick: P2P Techniques for Decentralized Applications - Morgan & Claypool Publishers

Language:

- German and English skills required

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- None

Module Examination(s):
- CS5158-L1: Advanced Internet Technologies, oral examination, 100% of module mark.

(Is also part of CS4518-KP12)

CS5170-KP04, CS5170 - Hardware/Software Co-Design (HWSWCod)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Computer Science 2019 (compulsory), Canonical Specialization SSE, Arbitrary semester
- Master Computer Science 2019 (optional subject), Elective, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Robotics and Autonomous Systems 2019 (optional subject), Elective, 1st or 2nd semester
- Master Computer Science 2014 (compulsory), specialization field software systems engineering, 1st or 2nd semester
- Master MES 2011 (advanced curriculum), imaging systems, signal and image processing, 1st or 3rd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), specialization field robotics and automation, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), advanced curriculum parallel and distributed system architecutres, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), advanced curriculum intelligent embedded systems, 2nd or 3rd semester
- Master Computer Science 2012 (compulsory), specialization field software systems engineering, 2nd semester

Classes and lectures:

- Hardware/Software Co-Design (lecture, 2 SWS)
- Hardware/Software Co-Design (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- System design flow
- Basic architectures for HW/SW systems
- System design and modelling
- System synthesis
- Algorithms for scheduling
- System partitioning
- Algorithms for system partitioning
- Design systems
- Performance analysis
- System design and specification with SystemC
- Application examples

Qualification-goals/Competencies:

- Students are able to determine a suitable hardware/software architecture for a given system description
- They are able to determine and describe the pros and cons of implementation alternatives
- They are able to apply methods for system partitioning
- They are able to translate non-formal system descriptions into formal models
- They are able to explain the different steps in system synthesis
- They are able to estimate the quality of system designs
- They are able to create system descriptions in SystemC

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr.-Ing. Mladen Berekovic

Teacher:

- Institute of Computer Engineering
- Prof. Dr.-Ing. Mladen Berekovic

Literature:

- F. Kesel: Modellierung von digitalen Systemen mit SystemC - Oldenbourg Verlag 2012
- Teich, J., Haubelt, C.: Digital Hardware/Software-Systeme. Synthese und Optimierung - Berlin: Springer 2007

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercise assignments as specified at the beginning of the semester

Module Exam(s):
- CS5170-L1: Hardware/Software Co-Design, oral exam, 100% of the module grade

CS5180-KP04 - Open Data Hackathon (OpDaHa)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester

Classes and lectures:

- Open Data Hackathon (lecture, 1 SWS)
- Open Data Hackathon (exercise, 2 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Fundamentals of Open Government, Open Data, Open Innovation and Data Driven Government
- Hackathons - Fundamentals and Case Studies
- Open-Data-Plattforms
- Open-Data-Applications
- Methods and Tools
- Presenting and Pitching

Qualification-goals/Competencies:

- Students know the fundamental definitions, concepts and forms of Open Data in context of Open Government, as well as Open Innovation in the public sector.
- Students can discuss and evaluate the challenges and limits of Open Data and Open Innovation.
- Students are able to design Open-Data-Applications and develop prototypes. They know the general conditions and strategies for their utilization.
- Students are able to present and discuss their work results.

Grading through:

- see Notes
- presentation
- successful addressing of the project goals

Responsible for this module:

- Prof. Dr. rer. pol. Moreen Heine

Teacher:

- Institute for Multimedia and Interactive Systems

- Prof. Dr. rer. pol. Moreen Heine
- Dr. rer. nat. Daniel Wessel
- Jan Hedtfeld

Literature:

- Schroll, W.: Kollaborative Innovationsprozesse Hackathons in Theorie und Praxis. In Veranstaltungen 4.0 (pp. 135-154) - Springer Gabler, Wiesbaden. 2017
- Johnson, P., & Robinson, P.: Civic hackathons: Innovation, procurement, or civic engagement? - Review of policy research, 31(4), 349-357. 2014

Language:

- German, except in case of only English-speaking participants

CS5210 - Electronic Business Processes (EGeschProz)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	4

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Computer Science 2012 (optional subject), specialization field media informatics, 2nd or 3rd semester

Classes and lectures:

- Electronic Business Processes (lecture, 2 SWS)
- Electronic Business Processes (practical course, 1 SWS)

Workload:

- 60 Hours private studies
- 30 Hours in-classroom work
- 15 Hours exam preparation
- 15 Hours group work

Contents of teaching:

-
-
-
-

Qualification-goals/Competencies:

-
-
-
-
-

Grading through:

- Oral examination

Responsible for this module:

- Prof. Dr. Stefan Fischer

Teacher:

- Institute of Telematics
- Prof. Dr. Stefan Fischer

Language:

- offered only in German

CS5260-KP04, CS5260SJ14 - Speech and Audio Signal Processing (SprachAu14)

Duration:	Turnus of offer:	Credit points:
1 Semester	every second semester	4

Course of study, specific field and term:

- Master MES 2020 (optional subject), medical engineering science, Arbitrary semester
- Master Media Informatics 2020 (optional subject), computer science, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), Medical Data Science / Artificial Intelligence, 1st or 2nd semester
- Master MES 2014 (optional subject), medical engineering science, Arbitrary semester
- Master CLS 2010 (optional suject), computer science, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), computer science, 1st or 2nd semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester
- Master Robotics and Autonomous Systems 2019 (optional subject), Elective, Arbitrary semester

Classes and lectures:

- Speech and Audio Signal Processing (lecture, 2 SWS)
- Speech and Audio Signal Processing (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Speech production and human hearing
- Physical models of the auditory System
- Dynamic compression
- Spectral analysis: Spectrum and cepstrum
- Spectral perception and masking
- Vocal tract models
- Linear prediction
- Coding in time and frequency domains
- Speech synthesis
- Noise reduction and echo compensation
- Source localization and spatial reproduction
- Basics of automatic speech recognition

Qualification-goals/Competencies:

- Students are able to describe the basics of human speech production and the corresponding mathematical models.
- They are able to describe the process of human auditory perception and the corresponding signal processing tools for mimicing auditory perception.
- They are able to present basic knowledge of statistical speech modeling and automatic speech recognition.
- They can describe and use signal processing methods for source separation and room-acoustic measurements.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr.-Ing. Alfred Mertins

Teacher:

- Institute for Signal Processing
- Prof. Dr.-Ing. Alfred Mertins

Literature:

- L. Rabiner, B.-H. Juang: Fundamentals of Speech Recognition - Upper Saddle River: Prentice Hall 1993
- J. O. Heller, J. L. Hansen, J. G. Proakis: Discrete-Time Processing of Speech Signals - IEEE Press

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Successful completion of assignments during the semester.

Modul exam:
- CS5260-L1: Speech and Audio Signal Processing, written or oral exam, 100% of modul grade

Mentioned in SGO MML under CS5260 (without SJ14).

CS5630-KP04 - Safety-critical man-machine cooperation (SkMMK)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2014 (optional subject), computer science, Arbitrary semester

Classes and lectures:

- Safety-critical man-machine cooperation (lecture, 2 SWS)
- Safety-critical man-machine cooperation (exercise, 1 SWS)

Workload:

- 75 Hours private studies
- 45 Hours in-classroom work

Contents of teaching:

- Introduction
- Safety, Security, Usable Safety
- Usable Safety Engineering
- Resilience Engineering
- Ethical, legal and social implications (ELSI)
- International and intercultural aspects
- Artificial intelligence
- Voice assistants
- Human-robot-cooperation
- Industry 4.0 and Business Continuity Management
- Future of safety-critical human-machine cooperation

Qualification-goals/Competencies:

- The students know the most important theories, models and scenarios of human-machine cooperation
- The students can explain the particular challenges regarding designing secure and usable cooperative systems
- The students are able to analyze, design, implement and evaluate safety-critical cooperation systems

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. rer. pol. Moreen Heine

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. pol. Moreen Heine

Literature:

- :

Language:

- offered only in German

CS5640-KP04 - Sociology of Media Networks (SozioNMed)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2014 (optional subject), media informatics, Arbitrary semester
- Master Computer Science 2012 (optional subject), specialization field media informatics, 2nd or 3rd semester

Classes and lectures:

- Sociology of Media Networks (lecture, 2 SWS)
- Sociology of Media Networks (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- Sociology and Computer Science
- Social structures in network societies
- Society in media networks
- Sociological basics of the network society
- Ethics in media networks

Qualification-goals/Competencies:

- The students can use the sociological basics, theories and statistics for orientation in the informational network society.
- They are able to understand and predict moral conflicts arising due to technological developments and can explain the resulting advantages and disadvantages concerning society.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. rer. nat. Michael Herczeg

Teacher:

- Institute for Multimedia and Interactive Systems
- Prof. Dr. rer. nat. Michael Herczeg
- MitarbeiterInnen des Instituts

Literature:

- :
- :
- :

Language:

- offered only in German

CS5650-KP04 - Computer and Media Art (CMKunst)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), media informatics, Arbitrary semester
- Master Media Informatics 2014 (optional subject), media informatics, Arbitrary semester
- Master Computer Science 2012 (optional subject), specialization field media informatics, 2nd or 3rd semester

Classes and lectures:

- Computer- and Media-Art (lecture, 2 SWS)
- Computer- and Media-Art (exercise, 1 SWS)

Workload:

- 55 Hours private studies
- 45 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Introduction and Overview
- History of Technology and Art
- Digital Technology as a Tool of Art
- Digital Technology as a Medium of Art
- Topics of Digital Art
- Summary and Outlook

Qualification-goals/Competencies:

- The students know the importance of computers and interactive media for the arts.
- hey are able to understand and judge media art technologically and artistically in the cultural context.
- They understand the mutual importance of technology and art in a historical reflection.

Grading through:

- Regular attendance at seminars
- written homework

Responsible for this module:

- Dr. Thomas Winkler

Teacher:

- Institute for Multimedia and Interactive Systems
- Dr. Thomas Winkler

Literature:

- Sönke Dinkla, Hrsg: Pioniere Interaktiver Kunst von 1970 bis heute - Edition ZKM : Cranz Verlag, 1997.

Language:

- offered only in German

EC4001-KP04, EC4001 - General Business Administration (ABWL)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Computer Science 2019 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Psychology 2016 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester
- Master psychology 2013 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Media Informatics 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Computer Science 2014 (optional subject), interdisciplinary competence, Arbitrary semester

Classes and lectures:

- General Business Administration (lecture, 2 SWS)
- General Business Administration (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- Theories in business administration
- Organisational forms
- Legal forms
- Accounting basics
- Theories on leaderhip and motivation

Qualification-goals/Competencies:

- The students get an important and in-depth overview of the single parts of business administration.
- Within this lecture, the students are empowered to identify and classify the different theoretical areas of business administration.
- Furthermore, students will be able to evaluate the different approaches and apply them to specific situations.

Grading through:

- portfolio exam

Responsible for this module:

- Prof. Dr. Christian Scheiner

Teacher:

- Institute for Entrepreneurship and Business Development
- Dr. Stefan Becker

Literature:

- Wöhe: Einführung in die Allgemeine Betriebswirtschaftslehre - Vahlen-Verlag, 24. Auflage, 2010
- Hungenberg, Wulf: Grundlagen der Unternehmensführung - Gabler-Verlag, 4. Auflage, 2011

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- none

Prerequisites for participation in module exam(s):
- none
- Prerequisites for admission to the (written) examination may be scheduled at the beginning of the semester. When prerequisites are defined, they should be completed and positively evaluated before the initial (written) examination.

Module exam(s):
- EC4001-L1: General Business Administration, (online) tests, 100 % of module grade

Students for whom this course is a compulsory module have priority.

Registration takes place at the beginning of the semester via Moodle. Further registration and exam-related questions will be clarified during the first lectures.

(Is equal to EC4001 T-KP04)

EC4002 - E-Business (EBusiness)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	4

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), interdisciplinary competence, Arbitrary semester

Classes and lectures:

- E-Business (lecture, 2 SWS)
- E-Business (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- Foundations and development trends of e-business technologies and processes in electronic commerce, information economy - trends and target groups, management and implementation of e-business models

Qualification-goals/Competencies:

- The students will be able to understand and assess the importance of e-business for companies in the context of overall economic and social developments, to understand the electronic value chain and how additional value can be created by the use of information and communication technologies (ICT) and how to use it conceptually.
- They are taught to know the basic technologies (hardware, software and networks) that are needed to build an e-business infrastructure, to understand their functioning and to assess their potential.
- In addition, they are capable of knowing and explaining trends in the Internet, especially the web 2.0, to understand and utilize the role of users in Web 2.0, to develop social media strategies in planned manner, to penetrate and understand the emergence of e-business projects and the associated change processes and challenges and also the role of IT, to understand and competently apply the analysis and selection process of e-business systems.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Christian Scheiner

Teacher:

- Institute for Entrepreneurship and Business Development
- Prof. André Köhler

Literature:

- T. Kollmann: E-Business: Grundlagen elektronischer Geschäftsprozese in der Net Economy - 4. Ausgabe, Verlag Springer, 2010
- T. Kollmann: Online Marketing: Grundlagen der Absatzpolitik in der Net Economy - 2. Auflage, Stuttgart, 2013
- Bernd W. Wirtz: Medien- und Internetmanagement - Gabler Verlag, 7. Auflage, 2011
- Christian Maaß: E-Business Management-Gestaltung von Geschäftsmodellen in der digitalen Wirtschaft - UTB Stuttgart, 2008

Language:

- offered only in German

EC4003 - Start-Up Management (GruendMan)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	4

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), interdisciplinary competence, Arbitrary semester

Classes and lectures:

- Start-Up Management (lecture, 2 SWS)
- Start-Up Management (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- Introduction founding management (definition, need, functions and objectives) and start-up process:
- From idea to concept
- Businessplan
- Production and / or the Service preparation, growth and internationalization strategies for start-ups, financing strategies
- Reasons for financing and shapes
- Analysis of the effects of financing

Qualification-goals/Competencies:

- Through this lecture, students will gain a basic understanding of the formation process and are also in a position to make a selection decision for a specific application based on different growth and internationalization strategies.
- They can meter the time factor an appropriate importance in the context of market entry decisions, to make the right decision respective to the situation and to deal critically with with the topic
- With regard to the topic complex financing strategies, students can outline the key funding sources and occasions, identify financing effects of venture capital under application of an analytical instrument and independently make an informed selection decision, based on a holistic evaluation approach of financing alternatives.

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Christian Scheiner

Teacher:

- Institute for Entrepreneurship and Business Development
- Hagen Goldbeck

Literature:

- M. Dowling: Gründungsmanagement. Vom erfolgreichen Unternehmensstart zu dauerhaftem Wachstum - Verlag Springer, Berlin, Heidelberg, 2003
- T.L. Koch, C. Zacharias: Gründungsmanagement. Mit Aufgaben und Lösungen - Verlag Oldenbourg, München, 2001
- U. Fueglistaller, C. Müller, T. Volery: Entrepreneurship. Modelle - Umsetzung - Perspektiven - Gabler Verlag, Wiesbaden, 2004

Language:

- offered only in German

EC4008-KP04 - Entrepreneurship & Innovation (EI)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Computer Science 2019 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), interdisciplinary competence, 1st or 2nd semester
- Master Computer Science 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Media Informatics 2014 (optional subject), Interdisciplinary modules, Arbitrary semester
- Master Medical Informatics 2014 (optional subject), interdisciplinary competence, 1st or 2nd semester
- Master Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester

Classes and lectures:

- Entrepreneurship and Innovation (lecture, 2 SWS)
- Entrepreneurship and Innovation (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- This course deals with fundamental theories, concepts and tools for the entrepreneurship and innovation management.
- The content is also linked to practical and current topics thus covering relevant applications.
- Individual aspects of the event will be studied on selected case studies.

Qualification-goals/Competencies:

- Students are able to master and apply scientific foundations and develop predominantly fundamental expertise in entrepreneurship and innovation.
- Students are able to structure and solve problems in innovation and technology management predominantly in a familiar be to some extent also even in a new, unfamiliar and multidisciplinary context.
- Students are able to define goals for their own development and reflect their own strengths and weaknesses, plan their own development and reflect the societal impact.
- Students can work cooperatively and responsibly in groups and reflect and enhance their own cooperative behavior in groups critical.

Grading through:

- portfolio exam

Responsible for this module:

- Prof. Dr. Christian Scheiner

Teacher:

- Institute for Entrepreneurship and Business Development
- Prof. Dr. Christian Scheiner

Literature:

- Nichols: Social Entrepreneurship - Oxford University Press 1. Auflage 2008
- Bessant & Tidd: Innovation and Entrepreneurship - Wiley-Verlag 2. Auflage 2013
- Fisch & Roß: Fallstudien zum Innovationsmanagement - Gabler-Verlag 1. Auflage 2009
- Bessant & Tidd: Managing Innovation: Integrating Technological, Market and Organizational Change - Wiley-Verlag: 5. Auflage 2013

Language:

- German and English skills required

Notes:

Prerequisites for attending the module:
- none

Prerequisites for participation in module exam(s):
- none
- Prerequisites for admission to the (written) examination may be scheduled at the beginning of the semester. When prerequisites are defined, they should be completed and positively evaluated before the initial (written) examination.

Module exam(s):
- EC4008-L1: Entrepreneurship and Innovation, portfolio exam, 100% of module grade

The portfolio exam consists of the following:
-Individual written assignment, 15 %
-Group work (Presentation), 45 %
-(Online)exams, 40 %

The commercial rounding is used to determine the overall grade.

Students for whom this course is a compulsory module have priority.

Registration takes place at the beginning of the semester via Moodle. Further registration and exam-related questions will be clarified during the first lectures.

(Is equal to EC4008 T-KP04)
(Replaces PS5830-KP04)

EC5010-KP04, EC5010 - Entrepreneurship in the digital economy (EEntre)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Entrepreneurship in Digital Technologies 2020 (compulsory), entrepreneurship, 3rd semester
- Master Media Informatics 2014 (optional subject), Interdisciplinary modules, Arbitrary semester
- Master Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester
- Master Robotics and Autonomous Systems 2019 (optional subject), interdisciplinary competence, 1st or 2nd semester
- Master Entrepreneurship in Digital Technologies 2014 (compulsory), entrepreneurship, 3rd semester

Classes and lectures:

- Entrepreneurship in the digital economy (lecture, 2 SWS)
- Entrepreneurship in the digital economy (exercise, 1 SWS)

Workload:

- 60 Hours private studies
- 45 Hours in-classroom work
- 15 Hours exam preparation

Contents of teaching:

- In this class students obtain a key insight into the entrepreneurial processes, the identification of business opportunities as well as the shaping and changing of young companies. In addition, students are able to understand business models on a basic level. At the same time, this class will include strategy development, fundamental aspects of corporate marketing, growth forms and strategies, entrepreneurship in the context of established enterprises and social entrepreneurship.
- Special emphasize will be on start-ups in the digital economy.

Qualification-goals/Competencies:

- Students are able to identify the central issues in the process of founding a new company and have a broad Knowledge including the scientific basis as well as the practical application of the importance of entrepreneurship in economic and in a business context. Students are able to apply this knowledge to their own examples and in a changing context.
- Students are able to develop features and factors of successful start-ups and independently develop, visualize and submit business concepts based oncriteria and methods acquired. This knowledge is also linked to practicaland current topics and representable applications.
- Individual aspects of the event will be studied on selected case studies.
- Students master the scientific foundations and have specialized and in-depth expertise in innovation and technology management.
- Students know how to structure and solve problems even in new, unfamiliarand multidisciplinary contexts of innovation and technology management.
- Students are able to define goals for their own development and canreflect their own strengths and weaknesses, plan their individualdevelopment and reflect the societal impact.
- Students can work cooperatively and responsibly in groups and reflect and enhance their own cooperative behavior in groups critical.

Grading through:

- portfolio exam

Responsible for this module:

- Prof. Dr. Christian Scheiner

Teacher:

- Institute for Entrepreneurship and Business Development
- Prof. Dr. Christian Scheiner

Literature:

- Bygrave & Zacharakis: The Portable MBA in Entrepreneurship - Wiley-Verlag: 2010
- Bygrave & Zacharakis: Entrepreneurship - Wiley-Verlag: 3. Auflage 2013
- Hisrich, Peters & Shepherd: Entrepreneurship - McGraw-Hill: International Edition 2010

Language:

- English, except in case of only German-speaking participants

Notes:

Prerequisites for attending the module:
- none

Prerequisites for participation in module exam(s):
- none
- Prerequisites for admission to the (written) examination may be scheduled at the beginning of the semester. When prerequisites are defined, they should be completed and positively evaluated before the initial (written) examination.

Module exam(s):
- EC5010-L1: Entrepreneurship in the Digital Economy, portfolio exam, 100 % of module grade

The portfolio exam consists of the following:
-Group work(s) (Presentation), 40 %
-(Online)exams, 60 %

The commercial rounding is used to determine the overall grade.

Students for whom this course is a compulsory module have priority.

Registration takes place at the beginning of the semester via Moodle. Further questions related to registration and exam will be clarified during the first lectures.

(Formerly EC5010-KP04)

PS5810-KP04, PS5810 - Scientific Teaching and Tutoring (WLehrKP04)

Duration:	Turnus of offer:	Credit points:
1 Semester	irregularly	4 (Typ B)

Course of study, specific field and term:

- Bachelor Interdisciplinary Courses for health sciences (optional subject), interdisciplinary competence, Arbitrary semester
- Master Computer Science 2019 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester
- Bachelor Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester
- Master CLS 2016 (optional subject), Interdisciplinary modules, 3rd semester
- Master Entrepreneurship in Digital Technologies 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Master Media Informatics 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Master MES 2014 (optional subject), no specific field, 1st or 2nd semester
- Bachelor MES 2014 (optional subject), no specific field, Arbitrary semester
- Master Computer Science 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Master CLS 2010 (optional suject), interdisciplinary competence, 3rd semester
- Master Computer Science 2012 (optional subject), interdisciplinary competence, Arbitrary semester

Classes and lectures:

- Theory and Practice of Good Teaching (seminar, 1 SWS)
- Work as a tutor in a lecture (practical course, 2 SWS)

Workload:

- 60 Hours private studies and exercises
- 45 Hours oral presentation (including preparation)
- 15 Hours in-classroom work

Contents of teaching:

- Organizing and running a scientific lecture
- Basic didactics of scientific teaching
- Practical work in tutorials

Qualification-goals/Competencies:

- The participants are able to lead a student working group and to communicate technical issues to it appropriately.
- Basic pedagogical and didactical skills

Grading through:

- continuous participation in all courses of the module

Responsible for this module:

- Prof. Dr. rer. nat. Nico Bunzeck
- Prof. Dr. rer. nat. Jürgen Prestin

Teacher:

- Institute for Mathematics
- Dr. rer. nat. Jörn Schnieder
- Alle prüfungsberechtigten Dozentinnen/Dozenten des Studienganges
- Corinna Lütsch

Language:

- depends on the chosen courses

Notes:

The seminar must be attended before working as a tutor. This activity cannot be remunerated.

The course instructor in charge of the respective course will issue a certificate of achievement for the module.

PS5830-KP04, PS5830 - Start-up and New Business (StartUp)

Duration:	Turnus of offer:	Credit points:
1 Semester	not available anymore	4 (Typ B)

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), Interdisciplinary modules, Arbitrary semester
- Bachelor Robotics and Autonomous Systems 2016 (optional subject), interdisciplinary competence, 5th or 6th semester
- Master Medical Informatics 2014 (optional subject), interdisciplinary competence, 1st or 2nd semester
- Master MES 2014 (optional subject), no specific field, 1st or 2nd semester
- Bachelor MES 2014 (optional subject), no specific field, Arbitrary semester
- Master Computer Science 2014 (optional subject), interdisciplinary competence, Arbitrary semester
- Bachelor MES 2011 (optional subject), interdisciplinary competence, Arbitrary semester
- Bachelor Computer Science 2014 (optional subject), central topics of computer science, 5th or 6th semester
- Master CLS 2010 (optional suject), interdisciplinary competence, 2nd or 3rd semester
- Master Computer Science 2012 (optional subject), interdisciplinary competence, 2nd or 3rd semester

Classes and lectures:

- Start-up and New Business (seminar, 1 SWS)
- Start-up and New Business (practical course, 1 SWS)

Workload:

- 45 Hours private studies
- 30 Hours in-classroom work
- 30 Hours written report
- 15 Hours oral presentation (including preparation)

Contents of teaching:

- Entre-/ Intrapreneurship
- Business Modelling
- Technology product, value propositions, and customer benefit
- Target groups, customer segments, and customer relations
- Sales channels, marketing and sources of income
- Key ressources / activities / partners
- costs and financing, including funding programs
- special subjects: quality, acceptance for trading, legal form of organization, a.o.

Qualification-goals/Competencies:

- The students have gained basic insights in the field of Start-up, new product development and new business development.
- They have acquired a sound knowledge of business modelling and planing.
- They are able to develop a business plan based on a particular project.
- They are able to assess the chances and risks of a start-up and new product / new business development.

Grading through:

- contributions to the discussion

Responsible for this module:

- Prof. Dr. Martin Leucker

Teacher:

- Institute of Software Technology and Programming Languages
- Dr. Raimund Mildner

Literature:

- Aktuelle Forschungsartikel werden in der Veranstaltung bekanntgegeben.:

Language:

- offered only in German

PY1100-KP07 - Developmental Psychology (EP)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	7

Course of study, specific field and term:

- Bachelor Psychology 2016 (compulsory), psychology, 1st semester
- Master Media Informatics 2020 (optional subject), psychology, Arbitrary semester
- Bachelor Occupational Therapy 2018 (optional subject), psychology, 3rd or 5th semester
- Master Media Informatics 2014 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2020 (compulsory), psychology, 1st semester

Classes and lectures:

- lecture in Developmental Psychology (lecture, 2 SWS)
- course in Developmental Psychology (seminar, 2 SWS)

Workload:

- 150 Hours private studies and exercises
- 60 Hours in-classroom work

Contents of teaching:

- Core concepts, theories and methods in developmental psychology
- Physical development, cognitive development, Piaget, information processing theory, attachment theories, psychosocial development, moral
- Basic scientific approaches and empirical findings on selected aspects of lifespan development and contextual factors
- Prenatal development
- Infancy and toddlerhood
- Early and middle childhood
- Adolescence
- Early and middle adulthood
- Old age and death

Qualification-goals/Competencies:

- Students will know how to explain and interpret findings in developmental psychology on the basis of different theoretical views
- Students will be able to infer expert knowledge to specific developmental issues
- Students will be able to generate hypotheses in order to explain and predict research questions in developmental psychology
- Students will learn how to assess the validity of empirical studies concerning a variety of problems in developmental psychology

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:

- Institute for Psychology I

- Prof. Dr. rer. nat. Nico Bunzeck
- Dr. rer. biol.hum. Tineke Steiger

Literature:

- Laura E. Berk: Entwicklungspsychologie - 2020
- ●Martin Pinquart, Gudrun Schwarzer, Peter Zimmermann: Entwicklungspsychologie Kindes- und Judendalter - 2019

Language:

- offered only in German

Notes:

The module examination is considered passing if it was graded as at least sufficient.

PY2300-KP06 - Basics in statistics 2 (Statistik2)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6

Course of study, specific field and term:

- Master Media Informatics 2020 (optional subject), mathematics, Arbitrary semester
- Master Media Informatics 2014 (optional subject), mathematics, Arbitrary semester
- Bachelor Psychology 2020 (compulsory), psychology, 2nd semester
- Bachelor Psychology 2016 (compulsory), psychology, 3rd semester

Classes and lectures:

- Basics of statistics 2 (lecture, 2 SWS)
- Basics of statistics 2 (seminar, 2 SWS)

Workload:

- 110 Hours private studies and exercises
- 70 Hours in-classroom work

Contents of teaching:

- Analysis of Variance (ANOVA)
- General linear model, incl.simple and multiple regression, outlier testing
- Relationship of ANOVA and Regression
- Robust testing
- Basics of non-parametric testing
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Qualification-goals/Competencies:

- Mastering and judging basic concepts and techniques in analysis of variance and regression
- Applying this new knowledge in solving statistical problems and in interpreting statistical results
- Experience in working with statistical software packages
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-

Grading through:

- written exam

Is requisite for:

- Experimental Psychology (PY2800-KP06)

Requires:

- Statistics 1 (PY1800-KP06)

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser

Teacher:

- Institute for Psychology I

- Prof. Dr. rer. nat. Jonas Obleser
- Dr. phil. Sarah Tune
- Dr. rer. nat. Malte Wöstmann

Literature:

- Eid, M., Gollwitzer, M. & Schmitt, M.: Statistik und Forschungsmethoden - Beltz. 1. Auflage, 2010
- Wirtz, M., Nachtigall, C.: Wahrscheinlichkeitsrechnung und Inferenzstatistik. Statistische Methoden für Psychologen Teil 2 - Beltz Juventa. 6. Auflage, 2012

Language:

- offered only in German

Notes:

The module examination is considered passing if it was graded as at least sufficient.

PY2905-KP04, PY2905 - Emotion Regulation (Emreg)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Media Informatics 2014 (optional subject), psychology, Arbitrary semester
- Master Media Informatics 2020 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2016 (optional subject), psychology
- Bachelor Psychology 2020 (optional subject), psychology

Classes and lectures:

- course in emotion regulation (seminar, 2 SWS)

Workload:

- 90 Hours private studies and exercises
- 30 Hours in-classroom work

Contents of teaching:

- Emotion regulation: Basics and theoretical models
- Clinical diagnostics of skills for regulating emotions
- Stress management and emotion regulation
- Comparison of different strategies for regulating emotions
- Relevance of emotion regulation for various mental disorders
- Therapeutic interventions to enhance the levels of adaptive emotion regulation skills

Qualification-goals/Competencies:

- Students are able to define basic concepts of emotion regulation.
- They are able to explain current theoretical models of emotion regulation.
- They are able to compare different strategies of emotion regulation.
- They are able to transfer research findings in the field of emotion regulation to clinical and therapeutic practice.
- They are able to judge original research papers on emotion regulation
- They are able to create a poster for a written and an oral presentation of clinical research findings.

Grading through:

- active participation in the exercises

Responsible for this module:

- Prof. Dr. rer. nat., Dipl.-Psych. Frieder Paulus

Teacher:

- Clinic of Psychiatry and Psychotherapy
- P.Pth. Alena Senft

Literature:

- Gross, J.J. (Hrsg.). (2013): Handbook of emotion regulation. New York - The Guilford Press

Language:

- offered only in German

Notes:

A successful participation requires the student s performance to be judged at least