



Module description

Bachelor in Media Design Computing, PO Version of 2015 (WT)

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Module MDI-100 Mathematics 1

Subheading	(MDI-MAT1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-100-01 Mathematics 1, Compulsory
Person in Charge	Sprengel, Frauke, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and work on tasks as experimental work

Learning Outcomes

Formal skills: Knowledge of logics and familiarization with mathematical formalisms to describe facts

Algorithmic skills: Getting to know algorithms and their complexity

Mathematical skills: Selection and implementation of suitable solutions for elementary problems in mathematics and computer science

Interdisciplinary skills: Communicative skills (presentation and discussion of solution proposals)

Submodule BIN-100-01 Mathematics 1

Subheading	(BIN-MAT1)
Person in Charge	Sprengel, Frauke, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	1
Suggestions for Independent Study	see literature
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and work on tasks as experimental work

Learning Outcomes

Formal skills: Knowledge of logics and familiarization with mathematical formalisms to describe facts

Algorithmic skills: Getting to know algorithms and their complexity

Mathematical skills: Selection and implementation of suitable solutions for elementary problems in mathematics and computer science

Interdisciplinary skills: Communicative skills (presentation and discussion of solution proposals)

Content

The basic principles taught in higher mathematics include topics in the following fields:

- Logics, Boolean algebra
- Set theory
- Number systems
- Functions and relations
- Graph theory
- Elementary number theory The corresponding standard software is used to illustrate terms and processes.

Requirements for Contact Hours

Active participation, individual task-solving, discussion

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature, individual task-solving, assessment of the solutions, individual discussion

Bibliography

Lecture notes

Teschl, G., Teschl, S.: Mathematik für Informatiker, Springer - Verlag

Hartmann, P.: Mathematik für Informatiker, Vieweg - Verlag

Module MDI-101 Start Project

Subheading	(MDI-STP)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-101-01 Start Project, Compulsory
Person in Charge	Garmann, Robert, Prof. Dr.
ECTS Credits	4
Contact Hours / Independent Study Hours	90 h / 30 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Examination (written or oral) and experimental work

Learning Outcomes

Personal skills: The students identify successful strategies of self-organization, self-initiative, research and knowledge acquisition

Social skills: The students have tried teamwork and know the importance of communication and presentation skills for project success.

Project management skills: The students know simple methods for project planning and project control and can apply them in a small project.

Professional skills: The students are familiar with the large number of applications of the discipline computer science. They are able to purposefully debate, analyze and discuss a specific problem and can develop a solution over several weeks.

Submodule BIN-101-01 Start Project

Subheading	(BIN-STP)
Person in Charge	Garmann, Robert, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Project, 4 SWS
ECTS Credits	4
Contact Hours / Independent Study Hours	90 h / 30 h
Semester	1
Suggestions for Independent Study	Specific to project
Recommended Prerequisites	none
Examination	Examination (written or oral) and experimental work

Learning Outcomes

Personal skills: The students identify successful strategies of self-organization, self-initiative, research and knowledge acquisition

Social skills: The students have tried teamwork and know the importance of communication and presentation skills for project success.

Project management skills: The students know simple methods for project planning and project control and can apply them in a small project.

Professional skills: The students are familiar with the large number of applications of the discipline computer science. They are able to purposefully debate, analyze and discuss a specific problem and can develop a solution over several weeks.

Content

Working on a problem and developing its solution in a given topic such as game development, robotics, algorithms. Trying out methods that are taught during individual coaching talks in the project's context.

Requirements for Contact Hours

Active, self-responsible development of project results. Active participation in project planning and organization, in introductory workshops and team meetings. Presentation and discussion of results.

Requirements for Independent Study Hours

Active development of project results. Preparation and follow-up of team meetings.

Bibliography

Specific to project

Module MDI-102 Programming 1

Subheading	(MDI-PR1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-102-01 Programming 1, Compulsory
Person in Charge	Dunkel, Jürgen, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Algorithmic skills: Ability to analyze a concrete problem and solve it using basic algorithms and data structures.

Realization skills: Mastering the object-oriented and the imperative programming paradigm, creating and testing programs using the corresponding tools.

Programming with Python.

Submodule MDI-102-01 Programming 1

Subheading	(MDI-PR1)
Person in Charge	Dunkel, Jürgen, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	1
Suggestions for Independent Study	see literature
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Algorithmic skills: Ability to analyze a concrete problem and solve it using basic algorithms and data structures.

Realization skills: Mastering the object-oriented and the imperative programming paradigm, creating and testing programs using the corresponding tools.

Programming with Python.

Content

Introduction to the basic principles of object-oriented programming using Python. Many practical examples provide more insight into this subject area. Specific topics are:

- basic principles of programming: problem, algorithm, program
- basic principles of object-oriented programming
- simple and structured data types
- Control structures
- functions
- recursion
- dealing with exceptions
- principles of object-oriented programming: inheritance and polymorphism

Requirements for Contact Hours

Active participation, solving exercises

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

- B. Klein: Einführung in Python 3, Für Ein- und Umsteiger, Hanser Verlag
D. Phillips: Python 3 Object-Oriented Programming, Packed Publishing

Module MDI-103 Fundamentals of Computer Science

Subheading	(MDI-GDI)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-103-01 Fundamentals of Computer Science, Compulsory
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Computer science competencies: Understand structure and operation of computers. Efficiently use UNIX systems from the console. Assembler programming. Understand structure and operation of networks such as the Internet. General competencies: Read and understand computer science topics by using appropriate (scientific) literature.

Submodule BIN-103-01 Fundamentals of Computer Science

Subheading	(BIN-GDI)
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Suggestions for Independent Study	
Recommended Prerequisites	none
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Computer science competencies: Understand structure and operation of computers. Efficiently use UNIX systems from the console. Assembler programming. Understand structure and operation of networks such as the Internet. General competencies: Read and understand computer science topics by using appropriate (scientific) literature.

Content

Structure of computers, CPU architectures, Storage structures, low level programming with assembler; information encoding (ASCII, UTF), representation of numbers and characters, Structure and functionality of operating systems; management of CPU, RAM and persistent storage; using bash on UNIX systems; Internet basics, DNS, HTTP.

Requirements for Contact Hours

Preparation and postprocessing of all lectures and exercises. Notes-taking in lecture. Active participation.

Requirements for Independent Study Hours

Study all provided material; deepen knowledge using additional literature; successfully work on all exercises

Bibliography

Helmut Herold, Bruno Lutz, Jürgen Wohlrab; Grundlagen der Informatik; Pearson Studium; 2012

Module MDI-104 Animation 1

Subheading	(MDI-AN1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-104-01 Animation 1, Compulsory
Person in Charge	Schnitt, Timo, Prof.
ECTS Credits	3
Contact Hours / Independent Study Hours	34 h / 56 h
Semester	1
Duration of Module	1 semester
Prerequisites	keine
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Assignment 3D modeling
Learning Outcomes	Students are able to design, move and relate three-dimensional objects.

Submodule MDI-104-01 Animation 1

Subheading	(MDI-AN1)
Person in Charge	Schnitt, Timo, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	3
Contact Hours / Independent Study Hours	34 h / 56 h
Semester	1
Suggestions for Independent Study	Preparation of the course based on own projects
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Assignment 3D modeling

Learning Outcomes

Students are able to design, move and relate three-dimensional objects.

Content

Students can apply basic modeling, texturing, animation and rendering techniques in contemporary 3D software. This is practiced on the basis of exemplary problems.

Requirements for Contact Hours

Regular and active participation.

Requirements for Independent Study Hours

Pre- and post-processing of the courses, self-reflection, deepening of the conveyed approaches, independent development.

Bibliography

<https://knowledge.autodesk.com/support/maya>
Kelly L. Murdock: Autodesk Maya 2018 Basics Guide

Module MDI-105 Image Editing 1

Subheading	(MDI-BB1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-105-01 Image Editing 1, Compulsory
Person in Charge	Gädtker, Christian, Dipl. Des. (FH)
ECTS Credits	3
Contact Hours / Independent Study Hours	34 h / 56 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Draft (Practical homework)

Learning Outcomes

The students master basic techniques and principles of digital image processing. You are able to independently solve simple problems in the field of image retouching and image manipulation.

Submodule MDI-105-01 Image Editing 1

Subheading	(MDI-BB1)
Person in Charge	Gädtker, Christian, Dipl. Des. (FH)
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	3
Contact Hours / Independent Study Hours	34 h / 56 h
Semester	1
Suggestions for Independent Study	Watching video tutorials, working on small, self-chosen projects
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Draft (Practical homework)

Learning Outcomes

The students master basic techniques and principles of digital image processing. You are able to independently solve simple problems in the field of image retouching and image manipulation.

Content

Practical handling of image processing programs using the example of current software. Introduction into the basic operation based on practical exercises. Possibilities of transfer conceptual approaches to stepstones of technical realization. Selection of useful tools to solve different tasks.

Requirements for Contact Hours

Regular and active participation

Requirements for Independent Study Hours

Preparation and follow-up of the lecture

Bibliography

Photoshop CC 2017 Basics

Autor: Alker, Thomas

Publication disclosures: Bodenheim Herdt 2016

Campus-wide access: <https://herdt-campus.de/product/PHSCC2017>

Module MDI-106 Mathematics 2

Subheading	Linear Algebra and Analytic Geometry (MDI-MAT2)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-105-01 Mathematics 2, Compulsory
Person in Charge	Pigors, Adrian, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Duration of Module	1 semester
Prerequisites	None
Recommended Prerequisites	MDI-100 Mathematical foundations of computer science (MDI-MAT1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and mathematical skills: knowing the concepts, algorithms and techniques of linear algebra that are required to understand applications in numerical analysis, computer graphics, image processing and animation; being able to use the methods of linear algebra in other areas of applied computer science. General skills: acquiring communicative competence (presenting and discussing proposed solutions).

Submodule BIN-105-01 Mathematics 2

Subheading	Linear Algebra and Analytic Geometry (BIN-MAT2)
Person in Charge	Pigors, Adrian, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Suggestions for Independent Study	See literature
Recommended Prerequisites	BIN-100 Mathematical foundations of computer science (BIN-MAT1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and mathematical skills: knowing the concepts, algorithms and techniques of linear algebra that are required to understand applications in numerical analysis, computer graphics, image processing and animation; being able to use the methods of linear algebra in other areas of applied computer science. General skills: acquiring communicative competence (presenting and discussing proposed solutions).

Content

The essentials of linear algebra as part of higher mathematics, including selected topics from the areas:

- vectors and vector spaces,
- matrices and
- systems of linear equations, each with numerical methods and application examples. To illustrate the concepts and techniques, appropriate standard software is used.

Requirements for Contact Hours

Participating actively, solving exercise problems

Requirements for Independent Study Hours

Preparing and following up lectures, solving exercise problems, discussing material

Bibliography

Lecture notes

Teschl, G., Teschl, S.: Mathematik für Informatiker, Springer

Hartmann, P.: Mathematik für Informatiker, Vieweg

Locher, F.: Numerische Mathematik für Informatiker, Springer

Schwarz, H. R.: Numerische Mathematik, Teubner

Module MDI-107 Database Systems 1

Subheading	(MDI-DBS1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-106-01 Database Systems 1, Compulsory
Person in Charge	Heine, Felix, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Duration of Module	1 semester
Prerequisites	None
Recommended Prerequisites	MDI-102 Programming 1 (MDI-PR1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Be able to become acquainted with an application domain, extract requirements, understand and structure a complex domain using ER diagrams

Design skills: Derive a database design from requirements

Technological skills: Database design as a process

Interdisciplinary skills: Social skills (team work), ability to transfer

Submodule BIN-106-01 Database Systems 1

Subheading	(BIN-DBS1)
Person in Charge	Heine, Felix, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Suggestions for Independent Study	See literature
Recommended Prerequisites	BIN-102 Programming 1 (BIN-PR1) or MDI-102 Programming 1 (MDI-PR1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Be able to become acquainted with an application domain, extract requirements, understand and structure a complex domain using ER diagrams
Design skills: Derive a database design from requirements
Technological skills: Database design as a process
Interdisciplinary skills: Social skills (team work), ability to transfer

Content

In this module, important elements and concepts like data modeling and relational data models are presented. Among others, the following topics are dealt with:

- Creation of a database design and translation into a database schema
- Data manipulation in the relational model
- SQL
- Introduction to database programming
- Normalization The topics are trained practically and deepened using a database system.

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing

Bibliography

R. Elmasri, S. Navathe; Grundlagen von Datenbanksystemen; Pearson Education, 2009
A. Heuer, G. Saake; Datenbanken: Konzepte und Sprachen; mitp, 2013
A. Kemper, A. Eickler; Datenbanksysteme; Oldenburg, 2015
Kudraß, T. (Hrsg.): Taschenbuch Datenbanken, Hanser, 2015

Module MDI-108 Statistics

Subheading	(MDI-STAT)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-107-01 Statistics, Compulsory
Person in Charge	Ahlers, Volker, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	MDI-100 Mathematical Foundations of Computer Science (MDI-MAT1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Algorithmic and mathematical skills: Getting to know, using, comparing, and evaluating stochastic terms and methods for the description and analysis of large datasets. Interpretation and evaluation of results of stochastic methods and statistical analysis.

Interdisciplinary skills: Communicative skills (presentation and discussion of solution approaches).

Submodule BIN-107-01 Statistics

Subheading	(BIN-STAT)
Person in Charge	Ahlers, Volker, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Suggestions for Independent Study	see literature
Recommended Prerequisites	BIN-100 Mathematical Foundations of Computer Science (BIN-MAT1) or MDI-100 Mathematical Foundations of Computer Science (MDI-MAT1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Algorithmic and mathematical skills: Getting to know, using, comparing, and evaluating stochastic terms and methods for the description and analysis of large datasets. Interpretation and evaluation of results of stochastic methods and statistical analysis.

Interdisciplinary skills: Communicative skills (presentation and discussion of solution approaches).

Content

Fundamental terms and methods of probability theory and statistics, such as:

- Descriptive statistics: mean, standard deviation, median, quantile, histogram, regression and correlation analysis
- Combinatorics
- Probability theory: event, probability, Bayes' theorem, random variable, expectation value, variance, discrete and continuous distributions, fundamental theorem of statistics, limit theorems
- Pseudorandom numbers
- Inferential statistics: estimation, tests, significance levels, type I and type II errors The methods are practised using well-established statistics software.

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and review of the lectures, reading literature

Bibliography

Lecture notes

Sachs, M.: Wahrscheinlichkeitsrechnung und Statistik, Hanser

Teschl, G., Teschl, S.: Mathematik für Informatiker, Band 2, Springer

Module MDI-109 Programming 2

Subheading	(MDI-PR2)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-109-01 Programming 2, Compulsory
Person in Charge	Dunkel, Jürgen, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	MDI-102 Programming I (MDI-PR2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Profound algorithmic skills: design and implementation of complex algorithms.

Analytical skills: Ability to describe an informally presented problem in a modeling language (UML)

Design skills: Implementing UML models in runnable programs taking the basic rules of the software architecture into account.

Realization skills: learning the Java programming language basics.

Submodule MDI-109-01 Programming 2

Subheading	(MDI-PR2)
Person in Charge	Dunkel, Jürgen, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	2
Suggestions for Independent Study	see literature
Recommended Prerequisites	MDI-102 Programming I (MDI-PR2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Profound algorithmic skills: design and implementation of complex algorithms.

Analytical skills: Ability to describe an informally presented problem in a modeling language (UML)

Design skills: Implementing UML models in runnable programs taking the basic rules of the software architecture into account.

Realization skills: learning the Java programming language basics.

Content

On the base of the programming concepts presented in the lecture 'Programming I' the programming language Java is introduced. Specific topics include:

- object-oriented programming with in Java, in particular: inheritance and polymorphism,
- exception handling,
- basic Java data types control structures
- UML modeling, especially class diagrams
- Java libraries (I/O, Collections,...) and further advanced concepts

Requirements for Contact Hours

Active participation, solving exercises, project work

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

G. Krüger: Handbuch der Java-Programmierung. Addison-Wesley,

C. Ullmann: Java ist auch eine Insel, Galileo Press

B. Eckel: Thinking in Java, Prentice Hall, ? ?

Module MDI-110 Animation 2

Subheading	(MDI-AN2)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-110-01 Animation 2, Compulsory
Person in Charge	Schnitt, Timo, Prof.
ECTS Credits	2
Contact Hours / Independent Study Hours	34 h / 26 h
Semester	2
Duration of Module	1 semester
Prerequisites	keine
Recommended Prerequisites	Animation 1, Basic knowledge of computer operation, safe operation of the Maya UI
Examination	Assignment 3D Animation

Learning Outcomes

The students know the 12 basic principles of animation and can reflect on them systematically and apply them to their own problems.

Submodule MDI-110-01 Animation 2

Subheading	(MDI-AN2)
Person in Charge	Schnitt, Timo, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	2
Contact Hours / Independent Study Hours	34 h / 26 h
Semester	2
Suggestions for Independent Study	Preparation of the course based on own projects
Recommended Prerequisites	MDI-104 Animation 1 (MDI-AN1), basic knowledge of computer operation, safe operation of the Maya UI
Examination	Assignment 3D animation

Learning Outcomes

The students know the 12 basic principles of animation and can reflect on them systematically and apply them to their own problems.

Content

By incorporating the knowledge and skills already acquired in Animation 1, students are able to stage the movement of objects in 3D space. They are also able to use camera and light in a 3D space in a creative and solution-oriented way.

Requirements for Contact Hours

Regular and active participation.

Requirements for Independent Study Hours

Pre- and post-processing of the courses, self-reflection, deepening of the conveyed approaches, independent development.

Bibliography

<https://knowledge.autodesk.com/support/maya>
Kelly L. Murdock: Autodesk Maya 2018 Basics Guide
Richard Williams: The Animators Survival Kit

Module MDI-111 Authoring Systems

Subheading	(MDI-AUT)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-111-01 Authoring Systems, Compulsory
Person in Charge	Löcher, Jan, Dipl.Des. (FH)
ECTS Credits	2
Contact Hours / Independent Study Hours	34 h / 26 h
Semester	2
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Design (practical homework)

Learning Outcomes

Students master basic techniques and principles of creating interactive content using authoring systems. They are able to find solutions for simple problems of interactive media creation on their own.

Submodule MDI-111-01 Authoring Systems

Subheading	(MDI-AUT)
Person in Charge	Löcher, Jan, Dipl.-Des. (FH)
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	2
Contact Hours / Independent Study Hours	34 h / 26 h
Semester	2
Suggestions for Independent Study	Working on small projects on your own, watching corresponding video tutorials
Recommended Prerequisites	Basic knowledge of computer operation
Examination	Design (practical homework)

Learning Outcomes

Students master basic techniques and principles of creating interactive content using authoring systems. They are able to find solutions for simple problems of interactive media creation on their own.

Content

Practical usage of authoring systems for the creation of interactive content by means of current software tools. Introduction to basic operation using practical exercises. Options to transform conceptual approaches to stepstones of technical realization. Usage of scripts in the interaction of the software with the end user. Selection and preprocessing of media assets for use in an authoring system.

Requirements for Contact Hours

Regular and active participation

Requirements for Independent Study Hours

Preparation and postprocessing of the class content.

Bibliography

Digital Tutors, Unity3D Referenz

Module MDI-112 Programming 3

Subheading	(MDI-PR3)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-112-01 Programming 3, Compulsory
Person in Charge	Dunkel, Jürgen, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	MDI-102 Programming I (MDI-PR1), MDI-109 Programming II (MDI-PR2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Design skills:

- learning advanced concepts of software developments, e.g. Graphical User Interfaces
- learning the essential concepts of the C programming language
- implementing the presented concepts with Java
- programming in C
- using development tools (IDE, debugger,..)

Submodule MDI-112-01 Programming 3

Subheading	(MDI-PR3)
Person in Charge	Dunkel, Jürgen, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Suggestions for Independent Study	siehe Literatur
Recommended Prerequisites	MDI-102 Programming I (MDI-PR1), MDI-109 Programming II (MDI-PR2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Design skills:

- learning advanced concepts of software developments, e.g. Graphical User Interfaces
- learning the essential concepts of the C programming language
- implementing the presented concepts with Java
- programming in C
- using development tools (IDE, debugger,..)

Content

On the base of the programming concepts presented in the lecture 'Programming II' the Java programming skills are extended and deepened. Specific topics include:

- development of Graphical User Interfaces
 - concepts of parallel programming in Java: Threads
- The C programming language is introduced. The basic language constructs are presented, in particular concepts of memory management are discussed.

Requirements for Contact Hours

Active participation, solving exercises, project work

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

- G. Krüger: Handbuch der Java-Programmierung. Addison-Wesley,
- C. Ullmann: Java ist auch eine Insel, Galileo Press
- B. Eckel: Thinking in Java, Prentice Hall, ??
- C. Vogt: C für Java Programmier, Hansa
- B.W. Kernighan, D.M. Ritchie: The C Programming Language, Prentice Hall

Module MDI-113 Mobile Computing

Subheading	(MDI-MC)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-113-01 Mobile Computing, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Duration of Module	1 semester
Prerequisites	keine
Recommended Prerequisites	MDI-102 Programming 1 (MDI-PR1), MDI-109 Programming 2 (MDI-PR2), MDI-203 Web Technologies (MDI-WT)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Specification of functionality and of algorithms for simple Implementation on different platforms or using different programming languages, modeling of user interactions

Analytic, design and implementation skills: The knowledge and the ability to use different programming languages and development environments, to know about specific functionalities of mobile devices and being able to use these abilities efficiently and appropriately to solve problems; to conceptualize and implement integration of mobile functionality in comprehensive software systems,

Technological skills: Ability to use and compare different development platforms for mobile devices, to compare and select appropriate realization technology

Social skills: Learning how to work together in teams, implementation of user interfaces, realizing device-specific and target-group-specific solutions

Submodule MDI-113-01 Mobile Computing

Subheading	(MDI-MC)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Suggestions for Independent Study	Lecture slides and literature, working with different programming languages, development environments and Software development for various mobile device platforms
Recommended Prerequisites	MDI-102 Programming 1 (MDI-PR1), MDI-109 Programming 2 (MDI-PR2), MDI-203 Web Technologies (MDI-WT)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Specification of functionality and of algorithms for simple implementation on different platforms or using different programming languages, modeling of user interactions

Analytic, design and implementation skills: The knowledge and the ability to use different programming languages and development environments, to know about specific functionalities of mobile devices and being able to use these abilities efficiently and appropriately to solve problems; to conceptualize and implement integration of mobile functionality in comprehensive software systems

Technological skills: Ability to use and compare different development platforms for mobile devices, to compare and select appropriate realization technology

Social skills: Learning how to work together in teams, implementation of user interfaces, realizing device-specific and target-group-specific solutions

Content

Special aspects of software development for mobile devices: Development on different hardware platforms and cross-platform development, use of sensors and other specifics of mobile devices, use of specific user interfaces, design of user interfaces for different device classes

Requirements for Contact Hours

Lectures: Attending to presentations, sample programs and devices, discussion, comprehension of execution and visualization by means of teaching software

Exercises: independent handling of tasks in exercises, programming tasks (different devices, cross-platform programming), theoretical tasks, presentation of solutions and project outcomes.

Requirements for Independent Study Hours

Preparation and follow-up of lectures and exercises, independent processing of tasks, submitting homework in small groups, processing of a long-running project task in small groups, preparation and follow-up of exams

Bibliography

F. Maurice: Mobile Webseiten, Hanser-Verlag, ISBN 978-3446431188

J. Nielsen, R. Budi: Mobile Usability, mitp, ISBN 978-3826695032

D. Koller: Android-Apps programmieren, Franzis, ISBN 9783645600507

Module MDI-114 Operating Systems and Networks 1

Subheading	(MDI-BSN1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-112-01 Operating Systems and Networks 1, Compulsory
Person in Charge	Hovestadt, Matthias, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	MDI-103 Fundamentals of Computer Science (MDI-GDI), MDI-102 Programming 1 (MDI-PR1) MDI-109 Programming 2 (MDI-PR2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills: Students have knowledge on basics on architecture, structure and operation of operating systems and computer networks, particularly the concept of processes, file management and network layers.

Design, implementation and methodic skills: Students are able to analyze typical issues at the system level, generating appropriate programming based solutions. Students are able to work in a UNIX-based environment with a core set of UNIX commands.

Comprehensive: social skills (team work), transfer skills.

Submodule BIN-112-01 Operating Systems and Networks 1

Subheading	(BIN-BSN1)
Person in Charge	Hovestadt, Matthias, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	3
Suggestions for Independent Study	Using a Linux-based environment for tasks on exercise sheets is highly recommended. Linux may be executed in a virtual machine, using any available virtualization platform.
Recommended Prerequisites	BIN-103 Fundamentals of Computer Science (BIN-GDI), BIN-102 Programming 1 (BIN-PR1) BIN-108 Programming 2 (BIN-PR2) resp. MDI-103 Fundamentals of Computer Science (MDI-GDI), MDI-102 Programming 1 (MDI-PR1) MDI-109 Programming 2 (MDI-PR2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills: Students have knowledge on basics on architecture, structure and operation of operating systems and computer networks, particularly the concept of processes, file management and network layers.

Design, implementation and methodic skills: Students are able to analyze typical issues at the system level, generating appropriate programming based solutions. Students are able to work in a UNIX-based environment with a core set of UNIX commands.

Comprehensive: social skills (team work), transfer skills.

Content

Fundamentals of modern operating systems, history of UNIX operating systems, using bash, interrupts, processes, file operation, network access, network layer model, physical layer, data link layer, network layer, transport layer

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

Helmut Herold: Linux- Unix Grundlagen. Kommandos und Konzepte, Addison-Wesley

H. Herold: Linux- Unix- Systemprogrammierung, Addison-Wesley

Silberschatz, Abraham; Peter Galvin, Greg Gagne: Operating System Concepts, John Wiley & Sons Inc.

Tanenbaum, Andrew S.: Moderne Betriebssysteme, Pearson Studium

Module MDI-115 Concept Design

Subheading	(MDI-115)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-115-01 Concept Design, Compulsory
Person in Charge	Schnitt, Timo, Prof.
ECTS Credits	6
Contact Hours / Independent Study Hours	51 h / 129 h
Semester	3
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	MDI-105 Image Editing 1 (MDI-BB)
Examination	Experimental work (presentation of a media concept)

Learning Outcomes

The students master basic techniques and principles of visual conceptual work. They are able to create simple visual concepts and read complex visual concepts and interpret them for implementation.

Submodule MDI-115-01 Concept Design

Subheading	MDI-115
Person in Charge	Schnitt, Timo, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 3 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	51 h / 129 h
Semester	3
Suggestions for Independent Study	Work on the skills of visual representation (drawing, painting, collage)
Recommended Prerequisites	MDI-105 Image Editing 1 (MDI-BB)
Examination	Experimental work (presentation of a media concept)

Learning Outcomes

The students master basic techniques and principles of visual conceptual work. They are able to create simple visual concepts and read complex visual concepts and interpret them for implementation.

Content

Introduction to the basic techniques of concept art using the example of a manageable concept in the form of a practical exercise. Analysis and comparison of concept art and media realization.

Requirements for Contact Hours

Regular and active participation.

Requirements for Independent Study Hours

Pre- and post-processing of the courses, self-reflection, deepening of the conveyed approaches, independent development.

Bibliography

Amid Amidi: The Art of Pixar: 25th Anniversary Edition

Ramin Zahed: DreamWorks Animation: Celebrating 20 Years of Art:

Frank Thomas, Ollie Johnston: The Illusion of Life: Disney Animation

Walt Stanchfield: Drawn to Life: 20 Golden Years of Disney Master Classes: The Walt Stanchfield Lectures: 1

Walt Stanchfield: Drawn to Life: 20 Golden Years of Disney Master Classes: The Walt Stanchfield Lectures: 2

Module MDI-116 Project (Design)

Subheading	(MDI-PD)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-116-01 Project (Design), Compulsory
Person in Charge	Schnitt, Timo, Prof.
ECTS Credits	6
Contact Hours / Independent Study Hours	51 h / 129 h
Semester	3
Duration of Module	1 semester
Prerequisites	keine
Recommended Prerequisites	keine
Examination	Experimental work (design / presentation)

Learning Outcomes

The students are able to control the production processes in a specific media project independently. They are able to handle creative means of the respective medium sensitively and efficiently.

Submodule MDI-116-01 Project (Design)

Subheading	(MDI-PD)
Person in Charge	Schnitt, Timo, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 3 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	51 h / 129 h
Semester	3
Suggestions for Independent Study	Intensive preparation of the course
Recommended Prerequisites	none
Examination	Experimental work (design / presentation)

Learning Outcomes

The students are able to control the production processes in a specific media project independently. They are able to handle creative means of the respective medium sensitively and efficiently.

Content

Planning and execution of a media project

- Economic fundamentals
- Project planning
- Create concept visualizations
- Creating the necessary technical and design subproducts
- Definition of the look
- Animation
- Compositing
- Editing
- Digital finishing

Requirements for Contact Hours

Regular and active participation.

Requirements for Independent Study Hours

Pre- and post-processing of the courses, self-reflection, deepening of the mediated approaches, independent development.

Bibliography

Jeffery A. Okun: The VES Handbook of Visual Effects
Ron Brinkmann: The Art and Science of Digital Compositing
Steve Wright: Digital Compositing for Film and Video
Jon Gress: [digital] Visual Effects and Compositing
Richard Williams: The Animators Survival Kit

Module MDI-117 Business Administration

Subheading	(BIN-BW)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-115-01 Business Administration, Compulsory
Person in Charge	Peine, Holger, Prof. Dr.
ECTS Credits	2
Contact Hours / Independent Study Hours	17 h / 43 h
Semester	3
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Written or oral exam, experimental work

Learning Outcomes

Students have a basic understanding of an entrepreneur's economic challenges. Students have a good command of business definitions and are able to use them selectively. They can create an advance turnover tax return, maintain a simple bookkeeping as well as analyze a simple annual financial statement.

Submodule BIN-115-01 Business Administration

Subheading	(BIN-BW)
Person in Charge	Peine, Holger, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	2
Contact Hours / Independent Study Hours	17 h / 34 h
Semester	3
Suggestions for Independent Study	See literature
Recommended Prerequisites	none
Examination	Written or oral exam, experimental work

Learning Outcomes

Students have a basic understanding of an entrepreneur's economic challenges. Students have a good command of business definitions and are able to use them selectively. They can create an advance turnover tax return, maintain a simple bookkeeping as well as analyze a simple annual financial statement.

Content

Business goals, legal forms of companies, tax law, financial reporting, company organization, operating process, operational cost structure, management accounting, operational cost and activity accounting.

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

- 1) Einführung in die Allgemeine Betriebswirtschaftslehre, 4. September 2013 von Günter Wöhe und Ulrich Döringmax
- 2) .Grundzüge der Betriebswirtschaftslehre, 22. August 2012 von Henner Schierenbeck und Claudia B Wöhle
- 3) Buchführung 2 DATEV-Kontenrahmen 2014: Abschlüsse nach Handels- und Steuerrecht Betriebswirtschaftliche Auswertung 24. Februar 2015 von Manfred Bornhofen und Martin C. Bornhofen
- 4) Praxisleitfaden Steuerrecht für Existenzgründer von Karin Nickening (erscheint voraussichtlich Aug./Sept. 2015, Springer-Verlag)
- 5) Vorlesungsskript für internes und externes Rechnungswesen, Mai 2015

Module MDI-118 English

Subheading	(MDI-EN)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-116-01 English, Compulsory
Person in Charge	Peine, Holger, Prof. Dr.
ECTS Credits	2
Contact Hours / Independent Study Hours	17 h / 43 h
Semester	1
Duration of Module	1 semester
Prerequisites	none
Recommended Prerequisites	none
Examination	Written or oral exam, experimental work

Learning Outcomes

Extension of basic subject vocabulary and of general word power. Acquiring knowledge of creating subject-specific texts in English. Discussion and presentation skills. Subject-specific presentation.

Submodule BIN-116-01 English

Subheading	(BIN-EN)
Person in Charge	Peine, Holger, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Tutorial, 2 SWS
ECTS Credits	2
Contact Hours / Independent Study Hours	17 h / 43 h
Semester	1
Suggestions for Independent Study	See literature
Recommended Prerequisites	none
Examination	Written or oral exam, experimental work

Learning Outcomes

Extension of basic subject vocabulary and of general word power. Acquiring knowledge of creating subject-specific texts in English. Discussion and presentation skills. Subject-specific presentation.

Content

Working through the chapters of the employed literature including learning of subject-specific vocabulary, discussion of grammar issues with corresponding exercises, discussion of subject-specific and general issues like software development, customer care, dealing with customers and complaints, after sales service, business travel and business dinners, small talk, presentations.

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the sessions, reading literature

Bibliography

English for IT Professionals, Cornelsen Verlag
In Company, MacMillan Verlag
Log On - English for IT Professions, Hueber Verlag

Module MDI-200 Computer Graphics 1

Subheading	(MDI-CG1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-200-01 Computer Graphics 1, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Duration of Module	1 semester
Prerequisites	All module examinations from 1st semester
Recommended Prerequisites	MDI-100 Mathematics 1 (MDI-MAT1), MDI-106 Mathematics 2 (MDI-MAT2), MDI-102 Programming 1 (MDI-PR1), MDI-109 Programming 2 (MDI-PR2), MDI-112 Programming 3 (MDI-PR3)
Examination	Written or oral examination, experimental work

Learning Outcomes

Mathematical, algorithmic, multidisciplinary skills: students know the mathematical-geometric and physical foundations on graphical representations and illumination of spatial objects and apply this knowledge in practice.

Analysis, design and implementation skills: students apply acquired skills to smaller projects using a game engine library

Submodule MDI-200-01 Computer Graphics 1

Subheading	(MDI-CG1)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Suggestions for Independent Study	see Literature
Recommended Prerequisites	MDI-100 Mathematics 1 (MDI-MAT1), MDI-106 Mathematics 2 (MDI-MAT2), MDI-102 Programming 1 (MDI-PR1), MDI-109 Programming 2 (MDI-PR2), MDI-112 Programming 3 (MDI-PR3)
Examination	Written or oral examination, experimental work

Learning Outcomes

Mathematical, algorithmic, multidisciplinary skills: students know the mathematical-geometric and physical foundations on graphical representations and illumination of spatial objects and apply this knowledge in practice.

Analysis, design and implementation skills: students apply acquired skills to smaller projects using a game engine library

Content

Basic concepts, geometric transformations and projections, hierarchical modelling, scene graph, curves and surfaces, visibility, transparency, lighting models, textures, introduction to a game engine, programming examples

Requirements for Contact Hours

Active participation, independent working on exercises, possibly project work in groups

Requirements for Independent Study Hours

Preparation and follow-up, independent processing of project tasks, possibly in groups

Bibliography

Lecture scripts

Alan Watt: 3D-Computergraphik, Pearson Studium

Foley, van Dam, Feiner, Hughes: Computer Graphics: Principles and Practice, Addison Wesley

Alfred Nischwitz, Peter Haberäcker: Computergraphik und Bildverarbeitung, Vieweg

Module MDI-201 Software Engineering 1

Subheading	(MDI-SE1)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-201-01 Software Engineering 1, Compulsory
Person in Charge	Bruns, Ralf, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Duration of Module	1 semester
Prerequisites	All module examinations from 1st semester
Recommended Prerequisites	Programming 1-3, databases 1, programming project
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Analytical skills: Ability to familiarize oneself in an area of application, extract requirements, record, structure and model a complex domain, knowledge of standard situations in the field of modeling (pattern, architecture)

Design skills: Ability to derive a system concept from requirements (from the knowledge of standard architectures), transfer a system concept into a productively functional implementation, understanding quality control as an integral element of the development project

Interdisciplinary skills: Setting up and implementing projects, social skills (teamwork), transfer skills, independent processing of new methods

Submodule BIN-201-01 Software Engineering 1

Subheading	(BIN-SE1)
Person in Charge	Bruns, Ralf, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Suggestions for Independent Study	See literature
Recommended Prerequisites	Programming 1-3, databases 1, programming project
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Analytical skills: Ability to familiarize oneself in an area of application, extract requirements, record, structure and model a complex domain, knowledge of standard situations in the field of modeling (pattern, architecture)

Design skills: Ability to derive a system concept from requirements (from the knowledge of standard architectures), transfer a system concept into a productively functional implementation, understanding quality control as an integral element of the development project

Interdisciplinary skills: Setting up and implementing projects, social skills (teamwork), transfer skills, independent processing of new methods

Content

Software development models, processes and methods to develop large-scale software systems, patterns. The different phases and work steps are presented in detail for a standard software development process. This means

- the basic principles, results and procedure are dealt with for each phase of the software development,
- modeling (with UML) is practiced in the project context,
- an introduction to analysis, design and architecture patterns, and
- basic methods for quality control are presented.

Requirements for Contact Hours

Active participation, solving exercises

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

Grechenig, T., Bernhart, M., Breiteneder, R., Kappel, K.: Softwaretechnik, Pearson Studium.
Jacobson, I., G. Booch, J. Rumbaugh: The Unified Software Development Process, Addison Wesley.
Gamma, E. R., Helm, R. Johnson, J. Vlissides: Design Patterns, Reading, MA, Addison Wesley.

Module MDI-202 Algorithms and Data Structures

Subheading	(BIN-AD)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	BIN-109-01 Algorithms and Data Structures, Compulsory
Person in Charge	Kleiner, Carsten, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Duration of Module	1 semester
Prerequisites	All modules of semester 1 of MDI course successfully completed
Recommended Prerequisites	MDI-109
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Knowing expense estimates with the help of O notation and using them on algorithms, ability to compare algorithms with respect to their runtime, knowing and comparing good algorithms for important standard problems (e.g. sorting)

Analysis, design and realization skills: Knowing important linear and non-linear data structures and using them sensibly for a given problem, ability to know, compare and select different implementation variants for important data structures, ability to develop efficient data structures and algorithms for new problems, knowing and efficiently applying data structures from standard libraries

Submodule BIN-109-01 Algorithms and Data Structures

Subheading	(BIN-DA)
Person in Charge	Kleiner, Carsten, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Suggestions for Independent Study	Work on slides and literature, reflection and self-contained application of content
Recommended Prerequisites	BIN-102 (BIN-PR1) or MDI-109 (MDI-PR1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Knowing expense estimates with the help of O notation and using them on algorithms, ability to compare algorithms with respect to their runtime, knowing and comparing good algorithms for important standard problems (e.g. sorting)

Analysis, design and realization skills: Knowing important linear and non-linear data structures and using them sensibly for a given problem, ability to know, compare and select different implementation variants for important data structures, ability to develop efficient data structures and algorithms for new problems, knowing and efficiently applying data structures from standard libraries

Content

Basic knowledge of structured and efficient software development: analysis of algorithm efficiency, linear and non-linear data structures (lists, trees, heaps), sorting algorithms, paradigms of efficient algorithms

Requirements for Contact Hours

Lecture: Following presentations and examples, discussion, following executions and visualizations in learning software, reflection of content, self-contained application of subjects

Exercise: Self-contained work on problems on paper and by using learning software, theoretical problems, presentation of problem solutions and project results

Requirements for Independent Study Hours

Preparation and post-processing of lectures and exercises, self-contained work on problems, turning in homework in small groups, self-contained work on a project task in small groups, exam preparation, reading literature

Bibliography

M. Goodrich/R. Tamassia: Data Structures and Algorithms in Java, 4th edition, Wiley
T.H. Cormen, C.E. Leiserson, R.L. Rivest; Introduction to Algorithms; MIT Press

Module MDI-203 Web Technologies

Subheading	(MDI-WT)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	BIN-203-01 Web Technologies, Compulsory
Person in Charge	Dunkel, Jürgen, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Duration of Module	1 semester
Prerequisites	All module examinations from 1st semester
Recommended Prerequisites	MDI-102 Programming I (MDI-PR1), MDI-109 Programming II (MDI-PR2) MDI-112 Programming III (MDI-PR3) MDI-114 Operating systems and networks 1 (MDI-BSN1)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Technological skills: knowledge about the essential components of websystems, in particular how they interact using specific protocols

Design skills: ability to design of websystems taking user ergonomics into account.

Choosing and applying an appropriate software architecture.

Realization skills: implementation of websystems applying current technologies.

Submodule BIN-203-01 Web Technologies

Person in Charge	Dunkel, Jürgen, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Suggestions for Independent Study	see literature
Recommended Prerequisites	BIN-102 Programming I (BIN-PR1), BIN-108 Programming II (BIN-PR2) BIN-110 Programming III (BIN-PR3) BIN-112 Operating systems and networks 1 (BIN-BSN1)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Technological skills: knowledge about the essential components of websystems, in particular how they interact using specific protocols

Design skills: ability to design of websystems taking user ergonomics into account.

Choosing and applying an appropriate software architecture.

Realization skills: implementation of websystems applying current technologies.

Content

Basic concepts and technologies of websystems.

- websystem architecture and network protocols (HTTP)
- markup languages (HTML, CSS , XML, JSON)
- Responsive design
- Serverside technologies (e.g. servlets, JSPs, PHP, ..)
- clientside technologies (JavaScript, Ajax)
- selected frameworks (bspw. JSF, Angular,..)
- web project

Requirements for Contact Hours

Active participation, solving exercises, project work

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

A. Tannebaum: Computernetzwerke, Pearson.

P. Müller: Webseiten gestalten mit HTML und CSS, galileo.

A. Ertel, K. Laborenz: Responsive Web Design

M. Kurz: JavaServer Faces, dpunkt.

C. Wentz: JavaScript, gaileo.

further literature to special topics

Module MDI-204 Interdisciplinary Project

Subheading	(MDI-PR)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-204-01 Interdisciplinary Project, Compulsory
Person in Charge	Fischmann, Markus, Prof.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Duration of Module	1 semester
Prerequisites	All modules from semester 1
Recommended Prerequisites	MDI-116 (Project (design))
Examination	Design / presentation

Learning Outcomes

Students are able to solve practical problems from the area of animation/VFX using their conceptual, design and technical abilities. Projects with commercial companies or public institutions (e.g. museums) are appreciated.

Submodule MDI-204-01 Interdisciplinary Project

Subheading	(MDI-PR)
Person in Charge	Fischmann, Markus, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Project, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	4
Suggestions for Independent Study	
Recommended Prerequisites	MDI-116 (Project (design))
Examination	Experimental work (design / presentation)

Learning Outcomes

Students are able to solve practical problems from the area of animation/VFX using their conceptual, design and technical abilities. Projects with commercial companies or public institutions (e.g. museums) are appreciated.

Content

Building on the previous semesters, the acquired knowledge and abilities are applied and practically developed in a team. Problems from practice are solved under realistic conditions. Starting from an idea, a marketable media product is designed and realized.

Requirements for Contact Hours

Regular and active participation

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reflection, deepening the presented approaches, further development on your own

Bibliography

Available secondary literature

Module MDI-205 Supplementary Subjects (varying offer of electives, at least one business subject has to be selected)

Subheading	(MDI-EF)
Level of Module	Specific module
Type of Module	Compulsory module
Person in Charge	Hovestadt, Matthias, Prof. Dr.
ECTS Credits	4
Contact Hours / Independent Study Hours	68 h / 52 h
Semester	4
Duration of Module	3 semester
Prerequisites	All module examinations from 1st semester.
Recommended Prerequisites	Depending on the specific subject
Examination	Written or oral examination, presentation, experimental work

Learning Outcomes

Students broaden their knowledge by building competencies in a general subject.
(Varying courses are offered resp. can be accepted; two courses must be chosen)

Module MDI-206 Usability

Subheading	(MDI-US)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-206-01 Usability, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	6
Duration of Module	1 semester
Prerequisites	All module examinations from 1st, 2nd and 3rd semester
Recommended Prerequisites	none
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Analysis and description of software and user interface requirements

Design and methodological skills: design of usable software and user interfaces;

Planning and conducting of usability tests

Comprehensive: Understanding the basics of human-computer interaction and transferring them to software development

Submodule MDI-206-01 Usability

Subheading	(MDI-US)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	6
Suggestions for Independent Study	see Literature
Recommended Prerequisites	none
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Analysis and description of software and user interface requirements

Design and methodological skills: design of usable software and user interfaces;

Planning and conducting of usability tests

Comprehensive: Understanding the basics of human-computer interaction and transferring them to software development

Content

Basics of human-computer interaction (HCI), software ergonomics, usability of user interfaces, user experience (UX), implementation and evaluation of usability tests

Requirements for Contact Hours

Active participation, independent working on exercises, possibly project work in groups

Requirements for Independent Study Hours

Preparation and follow-up, independent processing of project tasks, possibly in groups

Bibliography

Lecture script

J. Johnson: Designing with the Mind in Mind. Morgan Kaufmann

Module MDI-207 Seminar

Subheading	(MDI-BSEM)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	BIN-204-01 Seminar, Compulsory
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
ECTS Credits	4
Contact Hours / Independent Study Hours	34 h / 86 h
Semester	6
Duration of Module	1 semester
Prerequisites	All module examinations from 1st, 2nd, and 3rd semester, i.e. passed first study phase
Recommended Prerequisites	none
Examination	Term paper, presentation, compulsory attendance

Learning Outcomes

Computer Science Competencies: Students deepen the contents of some modules of semesters 1, 2, and 3 or complete it. By working with literature and working on new topics students increase their analysing competencies and technological competencies. Social Competencies: Students learn to work with literature on their own. They can present scientific contents written and orally. They use correct language and present convincingly. In discussions they learn to critically reflect the contents of the seminar.

Submodule BIN-204-01 Seminar

Subheading	(BIN-BSEM)
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Seminar, 4 SWS
ECTS Credits	4
Contact Hours / Independent Study Hours	34 h / 86 h
Suggestions for Independent Study	
Recommended Prerequisites	All modules of semesters 1, 2, and 3
Examination	Term paper, presentation, compulsory attendance

Learning Outcomes

Computer science competencies: Students deepen the contents of some modules of semesters 1, 2, and 3 or complete it. By working with literature and working on new topics students increase their analytical competencies and technological competencies. Social competencies: Students learn to work with literature on their own. They can present scientific contents written and orally. They use correct language and present convincingly. In discussions they learn to critically reflect the contents of the seminar.

Content

Requirements for Contact Hours

Give presentation about assigned topic. Listen to all other presentations. Ask questions and participate in discussions. (compulsory attendance)

Requirements for Independent Study Hours

Search literature about assigned topic using the library and the Digital Libraries of ACM, IEEE. Prepare a presentation about the topic and write a paper (report) about it.

Bibliography

Module MDI-208 Practical Project 1

Subheading	(MDI-BPR1)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-208-01 Practical Project 1, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	10
Contact Hours / Independent Study Hours	300 h / 0 h
Semester	6
Duration of Module	1 semester
Prerequisites	All modules from 1st to 3rd semester
Recommended Prerequisites	Specific to project
Examination	Experimental work

Learning Outcomes

Analytical skills: Ability to independently analyze a given question using scientific methods and findings, ability to familiarize oneself with problems in different areas of application

Design/realization skills: Developing solution strategies and implementing them using the knowledge and skills acquired

Technological skills: Combining and specifically applying knowledge from different fields

Methodological skills: Ability to use different innovative methods to solve practical problems

Project management skills: Skills required for project planning, to set up an organizational structure and to steer projects

Social skills: Application of conflict-solving strategies, teamwork, communication

Submodule MDI-208-01 Practical Project 1

Subheading	(MDI-BPR1)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Project, 8 SWS
ECTS Credits	10
Contact Hours / Independent Study Hours	300 h / 0 h
Semester	6
Suggestions for Independent Study	Specific to project
Recommended Prerequisites	Specific to project
Examination	Experimental work

Learning Outcomes

Analytical skills: Ability to independently analyze a given question using scientific methods and findings, ability to familiarize oneself with problems in different areas of application

Design/realization skills: Developing solution strategies and implementing them using the knowledge and skills acquired

Technological skills: Combining and specifically applying knowledge from different fields

Methodological skills: Ability to use different innovative methods to solve practical problems

Project management skills: Skills required for project planning, to set up an organizational structure and to steer projects

Social skills: Application of conflict-solving strategies, teamwork, communication

Content

Working through a complex task in a practical field of application in a project group. The work is characterized by the project-specific organization, planning and execution. The project is usually continued in module MDI-211 Practical Project 2 (MDI-BPR2).

Requirements for Contact Hours

Active participation in the project

Requirements for Independent Study Hours

Autonomous solving of given problems

Bibliography

Specific to project

Module MDI-209 Media Design

Subheading	(MDI-MD)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-209-01 Media Design, Compulsory
Person in Charge	Fischmann, Markus, Prof.
ECTS Credits	4
Contact Hours / Independent Study Hours	34 h / 86 h
Semester	6
Duration of Module	1 semester
Prerequisites	All modules from semesters 1 to 3.
Recommended Prerequisites	All modules of the media design part of the curriculum.
Examination	Design
Learning Outcomes	Deepening of knowledge and abilities in advanced topics of media design.

Submodule MDI-209-01 Media Design

Subheading	(MDI-MD)
Person in Charge	Fischmann, Markus, Prof.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture, 2 SWS
ECTS Credits	4
Contact Hours / Independent Study Hours	34 h / 86 h
Semester	6
Suggestions for Independent Study	
Recommended Prerequisites	All modules of the media design part of the curriculum.
Examination	Design

Learning Outcomes

Deepening of knowledge and abilities in advanced topics of media design.

Content

Choice of topics depending on current criteria, e.g. regarding the practical project

Requirements for Contact Hours

Regular and active participation

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reflection, deepening the presented approaches, further development on your own

Bibliography

depends on the chosen topics

Module MDI-210 Computer Graphics 2

Subheading	Digital Image Processing (MDI-CG2)
Level of Module	Basic module
Type of Module	Compulsory module
Submodules	MDI-210-01 Computer Graphics 2, Compulsory
Person in Charge	Ginkel, Ingo, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	7
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 4th semester
Recommended Prerequisites	MDI-100 / MDI-106 (Mathematics 1/2) MDI-108 (Statistics) MDI-105 (Image Editing) MDI-200 (Computer Graphics 1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Algorithmic and mathematic competence: Understanding basic algorithms of digital image processing and image editing

Design competence: Architecture and humane machine interfaces of image processing systems

Social competences: Teamwork, presentation and discussion of proposed solutions for selected exercises

Submodule MDI-210-01 Computer Graphics 2

Subheading	Digital Image Processing (MDI-CG2)
Person in Charge	Ginkel, Ingo, Prof.Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	7
Suggestions for Independent Study	See Literature
Recommended Prerequisites	MDI-100 / MDI-106 (Mathematics 1/2) MDI-108 (Statistics) MDI-105 (Image Editing) MDI-200 (Computer Graphics 1)
Examination	Written or oral exam, experimental work

Learning Outcomes

Algorithmic and mathematic competence: Understanding basic algorithms of digital image processing and image editing

Design competence: Architecture and humane machine interfaces of image processing systems

Social competences: Teamwork, presentation and discussion of proposed solutions for selected exercises

Content

Basic concepts of digital images and their representation in position space and frequency domain, color models and color management, methods for image enhancement in position space and frequency domain, basic knowledge of internal structure and operation principle of digital image processing systems, implementation of image processing algorithms

Requirements for Contact Hours

Active participation, solving exercises

Requirements for Independent Study Hours

preparation and postprocessing of the lecture

Bibliography

lecture slides,

Burger, w., Burge, M.J.: Digitale Bildverarbeitung, x.media.press, Springer Verlag

Gonzalez,R.C., Woods,R.E.: Digital Image Processing, Prentice Hall

Module MDI-211 Practical Project 2

Subheading	(MDI-BPR2)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-211-01 Practical Project 2, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	5
Contact Hours / Independent Study Hours	150 h / 0 h
Semester	7
Duration of Module	1 semester
Prerequisites	All modules from 1st to 4th semester
Recommended Prerequisites	Specific to project
Examination	Experimental work

Learning Outcomes

Analytical skills: Ability to independently analyze a given question using scientific methods and findings, ability to familiarize oneself with problems in different areas of application

Design/realization skills: Developing solution strategies and implementing them using the knowledge and skills acquired

Technological skills: Combining and specifically applying knowledge from different fields

Methodological skills: Ability to use different innovative methods to solve practical problems

Project management skills: Skills required for project planning, to set up an organizational structure and to steer projects

Social skills: Application of conflict-solving strategies, teamwork, communication

Submodule MDI-211-01 Practical Project 2

Subheading	(MDI-BPR2)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Project, 4 SWS
ECTS Credits	5
Contact Hours / Independent Study Hours	150 h / 0 h
Semester	7
Suggestions for Independent Study	Specific to project
Recommended Prerequisites	Specific to project
Examination	Experimental work

Learning Outcomes

Analytical skills: Ability to independently analyze a given question using scientific methods and findings, ability to familiarize oneself with problems in different areas of application

Design/realization skills: Developing solution strategies and implementing them using the knowledge and skills acquired

Technological skills: Combining and specifically applying knowledge from different fields

Methodological skills: Ability to use different innovative methods to solve practical problems

Project management skills: Skills required for project planning, to set up an organizational structure and to steer projects

Social skills: Application of conflict-solving strategies, teamwork, communication

Content

Continuation of the project work from previous semester's module MDI-208 Practical Project 1 (MDI-BPR1).

Requirements for Contact Hours

Active participation in the project

Requirements for Independent Study Hours

Autonomous solving of given problems

Bibliography

Specific to project

Module MDI-212 Bachelor Thesis with Colloquium

Subheading	(MDI-BAA)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-212-01 Bachelor Thesis with Colloquium, Compulsory
Person in Charge	Kleiner, Carsten, Prof. Dr.
ECTS Credits	15
Contact Hours / Independent Study Hours	0 h / 450 h
Semester	7
Duration of Module	1 semester
Prerequisites	All modules of semesters 1 to 4 of MDI course; at least 166 CP in MDI course
Recommended Prerequisites	All modules of semesters 4 and 6 in the chosen specialization, MDI-207 (MDI-BSEM), MDI-208 (MDI-BPR1)
Examination	Written thesis, colloquium

Learning Outcomes

Analysis, design and realization skills: Ability to independently analyze and use scientific methods to treat a topic area from the group of subjects selected, conceiving and realizing solutions

Technological skills: Ability to select technologies from the chosen subject area and use them to solve the problem at hand
Interdisciplinary skills: The topic selected may be worked through in cooperation with an industrial company; the conditions in that company are to be included in the solution

Methodological skills: Developing state-of-the-art knowledge on the topic chosen using scientific methods, ability to adapt and expand known solutions for the given topic

Project management skills: Ability to complete the task in the time given, planning of the delegation of tasks required and keeping to the time schedule, employing self organization and meeting deadlines

Personal skills: Ability to properly present the topic selected along with the solution developed, ability to answer specific questions on the topic, ability to discuss and assess alternative solutions

Submodule MDI-212-01 Bachelor Thesis with Colloquium

Subheading	(MDI-BAA)
Person in Charge	Kleiner, Carsten, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Final Thesis
ECTS Credits	15
Contact Hours / Independent Study Hours	0 h / 450 h
Semester	7
Suggestions for Independent Study	Scientific treatment of the individual topic, parallel work on subjects and thesis document, regular meetings and discussion of work with supervisor
Recommended Prerequisites	All modules of semesters 4 and 6 in the chosen specialization, MDI-207 (MDI-BSEM), MDI-208 (MDI-BPR1)
Examination	Written thesis, colloquium

Learning Outcomes

Analysis, design and realization skills: Ability to independently analyze and use scientific methods to treat a topic area from the group of

subjects selected, conceiving and realizing solutions

Technological skills: Ability to select technologies from the chosen subject area and use them to solve the problem at hand
Interdisciplinary skills: The topic selected may be worked through in cooperation with an industrial company; the conditions in that company are to be included in the solution

Methodological skills: Developing state-of-the-art knowledge on the topic chosen using scientific methods, ability to adapt and expand

known solutions for the given topic

Project management skills: Ability to complete the task in the time given, planning of the delegation of tasks required and keeping to the

time schedule, employing self organization and meeting deadlines

Personal skills: Ability to properly present the topic selected along with the solution developed, ability to answer specific questions on the topic, ability to discuss and assess alternative solutions

Content

Self-contained work on an individual topic from media design computing, preparation of a written thesis document, oral presentation and critical discussion of results; the topic should be selected in close cooperation with external enterprises or design studios

Requirements for Contact Hours

None

Requirements for Independent Study Hours

Self-contained scientific work, writing a thesis document, preparation and execution of a presentation

Bibliography

Depends on specific topic

Module MDI-213 Work Placement/Study Abroad Seminar

Subheading	(MDI-PPS)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-213-01 Work Placement/Study Abroad Seminar, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	10
Contact Hours / Independent Study Hours	34 h / 266 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st and 2nd semester
Recommended Prerequisites	none
Examination	Seminar paper (homework plus presentation/lecture)

Learning Outcomes

Comprehensive skills: Students acquire in-depth knowledge of the industry culture of their internship or the national culture and the higher education system of their target country. They learn to research and evaluate interdisciplinary information. They reflect on experiences of their practical or international phase for themselves and in discussions with other students and lecturers.

Submodule MDI-213-01 Work Placement/Study Abroad Seminar

Subheading	(MDI-PPS)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Internship Phase, 2 SWS
ECTS Credits	10
Contact Hours / Independent Study Hours	34 h / 266 h
Semester	5
Suggestions for Independent Study	Independent literature research and preparation of a report
Recommended Prerequisites	none
Examination	Seminar paper (homework plus presentation/lecture)

Learning Outcomes

Comprehensive skills: Students acquire in-depth knowledge of the industry culture of their internship or the national culture and the higher education system of their target country. They learn to research and evaluate interdisciplinary information. They reflect on experiences of their practical or international phase for themselves and in discussions with other students and lecturers

Content

Research of information to prepare for the practical/international phase; preparation of a report; Final presentation to other students and lecturers.

Requirements for Contact Hours

Collaboration in practice

Requirements for Independent Study Hours

Preparation and follow-up

Bibliography

Depends on the focus of an internship or the target country of an international phase

Module MDI-214 Work Placement Phase

Subheading	(MDI-PPH)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-214-01 Work Placement Phase, Compulsory
Person in Charge	Schild, Jonas, Prof. Dr.
ECTS Credits	20
Contact Hours / Independent Study Hours	600 h / 0 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st and 2nd semester
Recommended Prerequisites	none
Examination	Implementation of the practical phase according to prior written agreement

Learning Outcomes

Comprehensive skills: Students exemplarily experience essential tasks and activities of their future professional field from their own point of view and through instructed cooperation. At the same time, they gain deepened practical knowledge and skills in a sub-area of computer science or media design.

Submodule MDI-214-01 Work Placement Phase

Subheading	(MDI-PPH)
Person in Charge	Schild, Jonas, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Internship Phase, NaN SWS
ECTS Credits	20
Contact Hours / Independent Study Hours	600 h / 0 h
Suggestions for Independent Study	Practical / international phase seminar
Recommended Prerequisites	All module examinations from 1st to 4th semester
Examination	Implementation of the practical phase according to prior written agreement

Learning Outcomes

Comprehensive skills: Students exemplarily experience essential tasks and activities of their future professional field from their own point of view and through instructed cooperation. At the same time, they gain deepened practical knowledge and skills in a sub-area of computer science or media design.

Content

Working on tasks from the field of computer science or media design in a company or in a comparable practical position

Requirements for Contact Hours

Collaboration in practice

Requirements for Independent Study Hours

Preparation and follow-up

Bibliography

Depends on the task area

Module MDI-215 Study Abroad Phase

Subheading	(MDI-PPH)
Level of Module	Specific module
Type of Module	Compulsory module
Submodules	MDI-215-01 Study Abroad Phase, Compulsory
Person in Charge	Ahlers, Volker, Prof. Dr.
ECTS Credits	20
Contact Hours / Independent Study Hours	600 h / 0 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 2nd semester
Recommended Prerequisites	All modules from 1st to 4th semester
Examination	Examinations at the guest university of at least 20 credits

Learning Outcomes

Technical skills: The students acquire knowledge and skills on topics that are not offered or taught with different focus at Hochschule Hannover.

Interdisciplinary skills: The students experience a different university system and improve their intercultural competence as well as their foreign language skills.

Submodule MDI-215-01 Study Abroad Phase

Subheading	(MDI-PPH)
Person in Charge	Ahlers, Volker, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	MDI
Course Type, Contact Hours per Week	Internship Phase
ECTS Credits	20
Contact Hours / Independent Study Hours	600 h / 0 h
Suggestions for Independent Study	
Recommended Prerequisites	All modules from 1st to 4th semester
Examination	Examinations at the guest university of at least 20 credits

Learning Outcomes

Technical skills: The students acquire knowledge and skills on topics that are not offered or taught with different focus at Hochschule Hannover.

Interdisciplinary skills: The students experience a different university system and improve their intercultural competence as well as their foreign language skills.

Content

At the guest university the students select modules of at least 20 credits on topics from computer science or media design according to their own interests.

Requirements for Contact Hours

Active participation, depending on selected modules

Requirements for Independent Study Hours

Preparation and review of the lectures, reading literature

Bibliography

Depending on selected modules

Module MDI-216 Computer Graphics 3

Subheading	Animation (MDI-CG3)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-211-01 Computer Graphics 3, Compulsory
Person in Charge	Ginkel, Ingo, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 2nd semester
Recommended Prerequisites	MDI-200 Computer Graphics 1 (MDI-CG1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Algorithmic and mathematic competence: Exploring, using, evaluating and comparing methods and techniques for computer-based animation and simulation. Implementation and practical evaluation of different methods.

Communicative competence: Presentation and discussion of proposed solutions

Submodule BIN-211-01 Computer Graphics 3

Subheading	Animation (BIN-CG3)
Person in Charge	Ginkel, Ingo, Prof.Dr.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Suggestions for Independent Study	See Literature
Recommended Prerequisites	BIN-200 Computer Graphics 1 (BIN-CG1)
Examination	Written or oral exam, experimental work

Learning Outcomes

Algorithmic and mathematic competence: Exploring, using, evaluating and comparing methods and techniques for computer-based animation and simulation. Implementation and practical evaluation of different methods.

Communicative competence: Presentation and discussion of proposed solutions

Content

Principles of Computer Animation, Descripton of trajectories for camera movement using splines, Orientation in space and interpolation using quaternions, physically based animation using particle systems, mass-spring-systems, bounding boxes and space partitioning techniques, hierarchical animation, kinematic chains

Requirements for Contact Hours

Active participation, solving exercises

Requirements for Independent Study Hours

preparation and postprocessing of the lecture

Bibliography

lecture slides,

Ericson,C.: Real-Time Collision Detection, Elsevier

Witkin,A.:Physically Based Modeling - Principles and Practice, Siggraph Course Notes

Module MDI-217 Software Engineering 2

Subheading	(MDI-SE2)
Level of Module	Basic module
Type of Module	Optional module
Submodules	BIN-205-01 Software Engineering 2, Compulsory
Person in Charge	Bruns, Ralf, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	6
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 3rd semester
Recommended Prerequisites	Software Engineering 1
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Project management skills: Ability to plan, manage and control projects; knowing and being able to evaluate basic economic conditions and their effects; understanding HR management as a success factor
Design skills: Ability to transfer a system concept into a productively functional implementation, understanding quality assurance and usability engineering as integral elements in the development project
Technological skills: Sound knowledge in the selected subject area of software technology
Interdisciplinary skills: Setting up and implementing projects, social skills (teamwork), transfer skills, independent processing of new methods, conflict management

Submodule BIN-205-01 Software Engineering 2

Subheading	(BIN-SE2)
Person in Charge	Bruns, Ralf, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	6
Suggestions for Independent Study	See literature
Recommended Prerequisites	Software Engineering 1
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Project management skills: Ability to plan, manage and control projects; knowing and being able to evaluate basic economic conditions and their effects; understanding HR management as a success factor
Design skills: Ability to transfer a system concept into a productively functional implementation, understanding quality assurance and usability engineering as integral elements in the development project
Technological skills: Sound knowledge in the selected subject area of software technology
Interdisciplinary skills: Setting up and implementing projects, social skills (teamwork), transfer skills, independent processing of new methods, conflict management

Content

Advanced design patterns, classical and agile software development processes, project management, quality management, usability engineering, other selected topics in the field of software technology

Requirements for Contact Hours

Active participation, solving exercises

Requirements for Independent Study Hours

Pre- and post-preparation of the content

Bibliography

Grechenig, T., Bernhart, M., Breiteneder, R., Kappel, K.: Softwaretechnik, Pearson Studium.
Gamma, E. R., Helm, R. Johnson, J. Vlissides: Design Patterns, Reading, MA, Addison Wesley.
Balzert, H.: Lehrbuch der Softwaretechnik, Spektrum Akade. Verlag

Module MDI-218 Software Engineering 3

Subheading	(MDI-SE3)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-212-01 Software Engineering 3, Compulsory
Person in Charge	Koschel, Arne, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 3rd semester
Recommended Prerequisites	MDI-201 (MDI-SE1), MDI-203 (MDI-WT)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills: Having an understanding of the way in which distributed systems and applications work

Design skills: Knowing and being able to apply the basic construction principles of complex software architectures. Using suitable design patterns to develop distributed systems

Realization skills: Ability to configure and use complex infrastructures

Submodule BIN-212-01 Software Engineering 3

Subheading	(BIN-SE3)
Person in Charge	Koschel, Arne, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Suggestions for Independent Study	See literature
Recommended Prerequisites	BIN-201 (BIN-SE1), BIN-203 (BIN-WT) or MDI-201 (MDI-SE1), MDI-203 (MDI-WT)
Examination	Written or oral examination, experimental work

Learning Outcomes

- Technological skills: Having an understanding of the way in which distributed systems work, for example, distributed component based systems.
- Design skills: Knowing and being able to apply the basic construction principles of complex software architectures. Using suitable design patterns to develop distributed systems
- Realization skills: Ability to configure and use complex infrastructures

Content

Basic concepts of software architectures, particularly for the development of distributed systems.

- The development of frameworks is presented on the basis of a simple persistence framework.
- Basic concepts of distributed systems, distributed software architectures, multi-layer architecture, middleware
- Implementation of distributed systems: sockets, RMI, MoM, Web services
- Architecture and development of Internet-based systems: Java EE (JSPs, EJBs etc.)
- potentially selected additional current topics in distributed systems

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

J. Dunkel, A. Holitschke: Softwarearchitektur für die Praxis, Springer Verlag
G. Bengel: Grundkurs verteilte Systeme, vieweg
M. Boger: Java in verteilten Systemen, dpunkt.verlag
A. Eberhart, S. Fischer: Web Services, Hanser Verlag
Current literature, e.g., on Java EE, Cloud C.

Module MDI-219 Operating Systems and Networks 2

Subheading	(MDI-BSN2)
Level of Module	Basic module
Type of Module	Optional module
Submodules	BIN-202-01 Operating Systems and Networks 2, Compulsory
Person in Charge	Hovestadt, Matthias, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st and 2nd semester.
Recommended Prerequisites	MDI-103 Fundamentals of Computer Science (MDI-GDI), MDI-102 Programming 1 (MDI-PR1) MDI-109 Programming 2 (MDI-PR2), MDI-114 Operating Systems and Networks I (MDI-BSN1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills: Students have advanced knowledge on computer networks, particularly dynamic routing protocols and IPv6. Students also have advanced knowledge on operating systems including parallel computing and signals.

Design, implementation and methodic skills: Students are able to analyze typical issues at system level, generating appropriate programming based solutions. Students are able to work in a UNIX-based environment with a core set of UNIX commands.

Comprehensive: social skills (team work), transfer skills.

Submodule BIN-202-01 Operating Systems and Networks 2

Subheading	(BIN-BSN2)
Person in Charge	Hovestadt, Matthias, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Suggestions for Independent Study	Using a Linux-based environment for tasks on exercise sheets is highly recommended. Linux may be executed in a virtual machine, using any available virtualization platform.
Recommended Prerequisites	BIN-103 Fundamentals of Computer Science (BIN-GDI), BIN-102 Programming 1 (BIN-PR1) BIN-108 Programming 2 (BIN-PR2), BIN-112 Operating Systems and Networks I (BIN-BSN1) resp. MDI-103 Fundamentals of Computer Science (MDI-GDI), MDI-102 Programming 1 (MDI-PR1) MDI-109 Programming 2 (MDI-PR2), MDI-114 Operating Systems and Networks I (MDI-BSN1)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills: Students have advanced knowledge on computer networks, particularly dynamic routing protocols and IPv6. Students also have advanced knowledge on operating systems including parallel computing and signals.

Design, implementation and methodic skills: Students are able to analyze typical issues at system level, generating appropriate programming based solutions. Students are able to work in a UNIX-based environment with a core set of UNIX commands.

Comprehensive: social skills (team work), transfer skills.

Content

File programming, forking of processes, threads, inter-process communication, signals, network programming, routing algorithms, IPv6, network security

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

Helmut Herold: Linux- Unix Grundlagen. Kommandos und Konzepte, Addison-Wesley

H. Herold: Linux- Unix- Systemprogrammierung, Addison-Wesley

Silberschatz, Abraham; Peter Galvin, Greg Gagne: Operating System Concepts, John Wiley & Sons Inc.

Tanenbaum, Andrew S.: Moderne Betriebssysteme, Pearson Studium

Module MDI-220 Operating Systems and Networks 3

Subheading	(MDI-BSN3)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-213-01 Operating Systems and Networks 3, Compulsory
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All modules examination of 1st and 2nd semester.
Recommended Prerequisites	All modules examination of 1st and 2nd semester. Operating Systems and Networks 1 (MDI-BSN1), Operating Systems and Networks 2 (MDI-BSN2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Technological competencies: Architecture, functionality and implementation of operating systems and networks. Latest trends and technologies in this area. Analysis and implementation competencies: Students learn to evaluate the properties and application areas of these technologies.

Submodule BIN-213-01 Operating Systems and Networks 3

Subheading	(BIN-BSN3)
Person in Charge	Wohlfeil, Stefan, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Suggestions for Independent Study	Practical exercises use a Linux environment. Students may use a virtual machine on their laptop.
Recommended Prerequisites	All modules of semesters 1, 2, and 3. BIN-202 Operating Systems and Networks 2 (BIN-BSN2)
Examination	Examination (written or oral examination) and experimental work

Learning Outcomes

Technological competencies: Architecture, functionality and implementation of operating systems and networks. Latest trends and technologies in this area. Analysis and implementation competencies: Students learn to evaluate the properties and application areas of these technologies.

Content

New trends and technologies in operating systems and computer Networks

Requirements for Contact Hours

Preparation and postprocessing of all lectures and exercises. Notes-taking in lecture. Active participation.

Requirements for Independent Study Hours

Study all provided material; deepen knowledge using additional literature; successfully work on all exercises

Bibliography

provided by lecturer

Module MDI-221 Database Systems 2

Subheading	(MDI-DBS2)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-113-01 Database Systems 2, Compulsory
Person in Charge	Koschel, Arne, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68h h / 112 h
Semester	3
Duration of Module	1 semester
Prerequisites	All modules from semesters 1 and 2 of the MDI programme.
Recommended Prerequisites	MDI-107 (MDI-DBS1), MDI-109 Programming 2 (MDI-PR2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Ability to derive for an area of application requirements with respect to data access, ability to compare, evaluate and select DB access technologies based on the application, have knowledge of standard situations in the field of data access (pattern, Web and enterprise architectures).

Methodological skills: Transfer skills for existing data access technologies to introduce new IT methods into an IT infrastructure that has often evolved over time.

Technological skills: Understanding for the concepts and functioning of: DBS programming, O/R mapping, persistence frameworks, DBS transactions

Submodule BIN-113-01 Database Systems 2

Subheading	(BIN-DBS2, MDI-DBS2)
Person in Charge	Koschel, Arne, Prof. Dr.
Language of Instruction	German
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Suggestions for Independent Study	See literature
Recommended Prerequisites	BIN-106 (BIN-DBS1), BIN-108 (BIN-PR2) or MDI-107 (MDI-DBS1), MDI-109 (MDI-PR2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Analytical skills: Ability to derive for a given application area requirements with respect to data access, ability to compare, evaluate and select DB access technologies based on the application, have knowledge of standard situations in the field of data access (pattern, Web and enterprise architectures).

Methodological skills: Transfer skills for existing data access technologies to introduce new IT methods into an IT infrastructure that has often evolved over time.

Technological skills: Understanding for the concepts and functioning of: DBS programming, O/R mapping, persistence frameworks, DBS transactions

Content

Data access and data management in software and/or information systems - concepts, technologies, architectures, evaluation. Topics include:

- DB-internal programming (stored procedures, trigger)
- Relational DB integration (static, dynamic) client-DB server
- Persistence frameworks. O/R mapping
- DBS transactions
- potentially selected additional advanced topics in DBS such as Key Value stores or embedded OO-DBS

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

Lecture notes (script)

Conrad, S. et al.: Enterprise Application Integration - Grundlagen, Konzepte, Entwurfsmuster, Praxisbeispiele., Spektrum/Elsevier, 2005.

Heuer, A., Saake G., Sattler, K.: Datenbanken: Konzepte und Sprachen, mitp, newest release.

Kudraß, T. (Hrsg.): Taschenbuch Datenbanken, Hanser, newest release.

Current (Web) sources , for example, about the Java Persistence API.

Module MDI-222 Database Systems 3

Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-214-01 Database Systems 3, Compulsory
Person in Charge	Kleiner, Carsten, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All modules of semester 1 and 2 of MDI course
Recommended Prerequisites	MDI-202 (MDI-AD), MDI-221 (MDI-DBS2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Knowledge and implementation competency of modeling techniques for database systems, knowledge and judgement competency of processing, execution and optimization of database queries, knowledge and application competency of standard as well as novel data organization strategies in database systems

Analysis, design and implementation skills: Knowledge, application and implementation of principles of data logging and recovery as well as database optimization

Technological skills: knowledge of internal organization and memory management of database systems, knowledge and application of methods for transaction integrity, knowledge and application of novel relational database's internal memory organization

Submodule BIN-214-01 Database Systems 3

Person in Charge	Kleiner, Carsten, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture with exercise, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Suggestions for Independent Study	Work on slides and literature, reflection and self-contained application of content
Recommended Prerequisites	BIN-113 (BIN-DBS2) or MDI-221 (MDI-DBS2), BIN-109 or MDI-202
Examination	Written or oral examination, experimental work

Learning Outcomes

Formal and algorithmic skills: Knowledge and implementation competency of modeling techniques for database systems, knowledge and judgement competency of processing, execution and optimization of database queries and according algorithms, knowledge and application competency of standard as well as novel data organization strategies in database systems
Analysis, design and implementation skills: Knowledge, application and implementation of principles of data logging and recovery as well as database optimization
Technological skills: knowledge of internal organization and memory management of database systems, knowledge and implementation skills for database recovery operations, knowledge and application of novel relational database's internal memory organization

Content

Internal database and memory organization, processing, execution and optimization of database queries, effort estimation for query execution, query execution algorithms, backup and recovery of database systems, novel relational database memory organization (main memory, column-oriented, parallel query execution)

Requirements for Contact Hours

Lecture: Following presentations and examples, discussion, following executions and visualizations in learning software, reflection of content, self-contained application of subjects
Exercise: Self-contained work on problems on paper and by using learning software, theoretical problems, presentation of problem solutions and project results

Requirements for Independent Study Hours

Preparation and post-processing of lectures and exercises, self-contained work on problems, turning in homework in small groups, self-contained work on a project task in small groups, exam preparation, reading literature

Bibliography

R. Elmasri, S. Navathe: Grundlagen von Datenbanksystemen, Pearson Studium
T. Härder, E. Rahm: Datenbanksysteme. Konzepte und Techniken der Implementierung, Springer

Module MDI-223 Parallel Programming

Subheading	(MDI-PAR)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-215-01 Parallel Programming, Compulsory
Person in Charge	Peine, Holger, Prof. Dr.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 3rd semester
Recommended Prerequisites	MDI-311 Introduction to Programming (MDI-PR1), MDI-313 Object-oriented Programming (MDI-PR2)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills:

Students are able to use the core means of the Java programming language and its library for the development of parallel applications.

Design, implementation and methodic skills:

Students can decompose applications into concurrent parts; can recognize and avoid data races, deadlocks and unnecessary performance bottlenecks; can distinguish programming models with and without shared data.

Submodule BIN-215-01 Parallel Programming

Subheading	(BIN-PAR)
Person in Charge	Peine, Holger, Prof. Dr.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Suggestions for Independent Study	See literature
Recommended Prerequisites	BIN-102 Introduction to Programming (BIN-PR1) or MDI-102 Introduction to Programming (MDI-102), BIN-108 Object-oriented Programming (BIN-PR2) or MDI-109 Object-oriented Programming (MDI-109)
Examination	Written or oral examination, experimental work

Learning Outcomes

Technological skills:

Students are able to use the core means of the Java programming language and its library for the development of parallel applications.

Design, implementation and methodic skills:

Students can decompose applications into concurrent parts; can recognize and avoid data races, deadlocks and unnecessary performance bottlenecks; can distinguish programming models with and without shared data.

Content

Processes and threads, data races, data consistency, concurrency, causal dependency,(conditional) critical sections, visibility, semaphores, deadlocks, nonblocking synchronisation, structuring as concurrent tasks and other design patterns, actor model, parallelization by compilers, cluster programming

Requirements for Contact Hours

Active participation, solving exercise problems

Requirements for Independent Study Hours

Preparation and postprocessing of the lectures, reading literature

Bibliography

Urs Gleim, Tobias Schüle: Multicore-Software, dpunkt 2012

Brian Goetz: Java Concurrency in Practice, Addison -Wesley 2006

Thomas Rauber, Gudula Rünger: Multicore -Parallele Programmierung, Springer 2008

Peter S. Pacheco: Parallel programming with MPI, Kaufmann 199

Module MDI-224 Current Aspects of Computer Science

Subheading	(MDI-AAI)
Level of Module	Specific module
Type of Module	Optional module
Submodules	BIN-216-01 Current Aspects of Computer Science, Compulsory
Person in Charge	Salzwedel, Jussi, M. Sc.
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Duration of Module	1 semester
Prerequisites	All module examinations from 1st to 2nd semester
Recommended Prerequisites	All required modules from semesters 1 through 5
Examination	Written or oral examination, experimental work
Learning Outcomes	Specific to topic

Submodule BIN-216-01 Current Aspects of Computer Science

Subheading	(BIN-AAI)
Person in Charge	Salzwedel, Jussi, M. Sc.
Language of Instruction	by agreement
Curriculum Allocation	BIN, MDI
Course Type, Contact Hours per Week	Lecture, 4 SWS
ECTS Credits	6
Contact Hours / Independent Study Hours	68 h / 112 h
Semester	5
Suggestions for Independent Study	Specific to topic
Recommended Prerequisites	All required modules from semesters 1 through 5
Examination	Written or oral examination, experimental work
Learning Outcomes	Specific to topic
Content	An advanced topic in computer science of current interest
Requirements for Contact Hours	Active participation, solving exercise problems
Requirements for Independent Study Hours	Preparation and postprocessing of the lectures, reading literature
Bibliography	Specific to topic