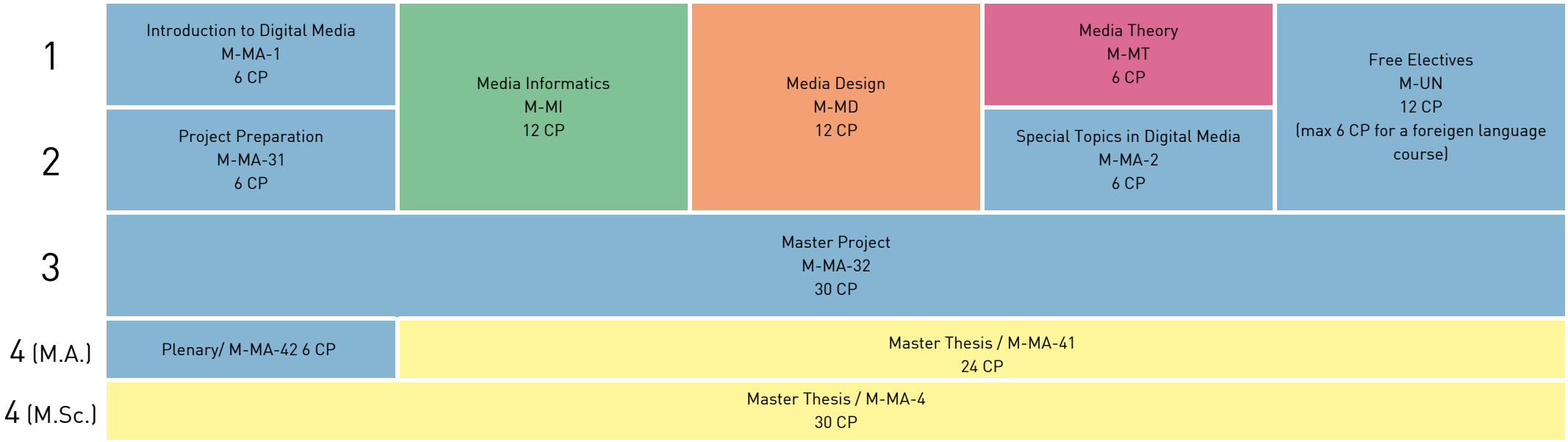
Media Informatics + Media Design

Master

Modul scheme



05.4 Modulbeschreibungen Master

05.4.1 Medienwissenschaft

Media Theory

1st semester

Degree program
Media Informatics and Media Design

Module type
Compulsory optional

Module number
M-MT

Lecturer in charge of the module
Prof. Dr. Andrea Sick

Lecturers
Prof. Dr. Andrea Sick
Dr. Mona Schieren
Lecturers from department 9 from the University of Bremen
structural lectureships

Contents
The course provides an introduction to technical and aesthetic, as well as to symbolic and communicative qualities of a wide range of media. The historical development and changes of media in correlation with scientific, economic, political and social processes, as well as media's contribution to modes of perception and forms of knowledge will be discussed from a perspective primarily built on cultural studies. The scope of this inquiry includes an exploration of media art based on specific works. Current developments will be of special interest in this regard.

Types of examination
presentation and paper

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Frequency
winter term

Language
English

Workload
Attendance 60 h | Individual Preparation and Recapitulation: 120 h | 180 h

05.4.2 Gestaltung

Media Design

1st/2nd semester

Degree program
Media Informatics and Media Design

Module type
Required

Module number
M-MD

Lecturer in charge of the module
Prof. Dennis Paul

Lecturers
All lecturers from Media Design

Contents
The objective of the course is to provide the students with an overview of the most relevant methods, tools, materials, mechanics and strategies of media-related design. The students will be introduced to the University's facilities and laboratories relevant to the study of digital media.

Aims
Apart from further developing and deepening the students' design skills, this course also aims to bridge or negotiate the differences between the students' understanding of design and its manifold purposes.
By discussing and developing smaller design projects, the course will help to evolve a common vocabulary to foster communication in the following master project and master thesis.

List of references
If applicable literatur lists will be handed out according to the topics at the beginning of each course.

Number of weekly semester hours
8

Workload [ECTS]
12

Formal requirements
none

Requirements as regards content
none

Frequency
any term

Language
English

Workload
Attendance 120 h | Individual Preparation and Recapitulation: 240 h | 360 h

05.4.3 Informatik

Media Informatics

1st / 2nd semester

Degree program
Media Informatics and Media Design

Module type
compulsory optional

Module number
M-MI

Lecturer in charge of the module
Prof. Dr. R. Malaka

Lecturers
Various

Comment
Two courses with usually 6 CP each. If less than 6 CP then the missing CP need to be added to »Free Electives«. If more than 6 CP then »Free Electives« comprises less CP, accordingly

Contents
The contents are depending on the chosen alternatives. Examples:
M-MI/1 Entertainment Computing
M-MI/2 Embodied Interaction
M-MI/3 Current Topics of Interactive Systems
M-MI/4 Cognitive Modeling
M-MI/5 Design of Information Systems
M-MI/6 Advanced Computer Graphics
M-MI/7 Virtual Reality and Physically-Based Simulation
M-MI/8 Massively-Parallel Algorithms
M-MI/9 Computational Geometry
M-MI/10 IT-Management 2

Aims
The courses offer a spectrum of relevant areas in Digital Media. The students can select from these courses in order to develop an individual profile of expertise. The courses are advanced courses that also introduce students to research questions in Digital Media.

List of references
depending on chosen alternatives

Types of examination
depending on chosen alternatives

Number of weekly semester hours
depending on the chosen alternatives

Workload [ECTS]
12 CP – see comments

Frequency
any term

Language
English / Deutsch

Workload
depending on chosen alternatives

/

Entertainment Computing

1st / 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/1

Lecturer in charge of the module
Prof. Dr. R. Malaka

Lecturer
Prof. Dr. R. Malaka

Contents
Entertainment computing is a multifaceted and complex field of application, which involves, beside the creative aspects, many subareas of informatics. Therefore, learning subjects include interaction design, graphic design and dramaturgy relating to the entertainment computing applications as well as technical basics from the fields of HCI, 3D computer graphics, game AI and game engine design.

Aims
Application-oriented contents from different sectors of entertainment computing are taught. This includes design aspects (e.g., game/story design, interaction design, etc.) and technological knowledge (e.g., game engines, real-time rendering or digital content creation tools). We deal with the application fields of entertainment technologies, e.g., serious games or mixed reality for performances. Participants shall gain further practical experiences with established tools.

Types of examination
regular processing of exercises and a technical discussion

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Frequency
generally every 2nd term

Language
English

Workload
Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

Embodied Interaction

1st / 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/2

Lecturer in charge of the module
Prof. Dr. R. Malaka

Lecturers
Prof. Dr. R. Malaka
Dr. R. Porzel

Contents
In human-computer interaction, we know interfaces such as keyboards, mice and joysticks. In spite of technological progress, the basic patterns of interaction and input devices did not change much during the last few decades. But new trends postulate a radical change towards the »invisible computer« with naturally usable interfaces, so that they are literally invisible. The corresponding interaction artifacts are immediately usable, the users grasp their meaning by interacting with them. Embodied interaction considers the user and the computer system in their context and in their physical environment.

Aims
The ability to create new human-computer interfaces by using algorithms from computer graphics, video analysis and language technology shall be developed. For these applications, knowledge from the fields of computer games, mobile assistance systems and other application fields of digital media is imparted.

List of references

· Paul Dourish (2001) Where The Action Is: The Foundations of Embodied
· Interaction, MIT Press October 2001.
· Popper, K. R. (1959). The logic of scientific discovery. New York: Basic Books.
· Rainer Malaka and Robert Porzel, Design Principles for Embodied Interaction.
· In: Mertsching, B.; Hund, M.; Aziz, Z. (eds.): KI 2009. Advances in artificial
· intelligence, Springer, Heidelberg, 2009, pp. 711-718.

Types of examination
regular processing of exercises and a technical discussion

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Frequency
irregular

Language
English

Workload
Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

Current Topics of Interactive Systems

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/3

Lecturer in charge of the module
Prof. Dr. J. Schöning

Lecturer
Prof. Dr. J. Schöning

Contents
After having achieved a general overview of the area of Human-Computer Interaction (HCI), learn more on the fundamentals of human-computer interaction and especially post-desktop interfaces. Work together in small teams on a semester-long project. Each week, in the labs, present and discuss work with peers.
In the lab will develop their own concept of a NUI and document it in a research paper. The course will start with a brief re-cap on design principles (Fitts' law, Norman: affordances, mappings, constraints, slips, seven stages of action) and processes (Design Process, Evaluation & Statistical Testing) in HCI. The main focus will be on the properties and characteristics of so called post-desktop or natural user interfaces (NUI), including but not limited to: Touch & Mobile Tangibles AR / VR / MR Deformable Interfaces Wearable Interfaces BCI, EEG, »Augmenting Humans«

Aims
»From GUI to NUI«:
- Knowledge of interaction design beyond WIMP
- Knowledge of different development methods
- Ability to carry out work analyses and to solve problems of task distribution
- between human and computer, ability to develop interfaces beyond WIMP
- Ability to include design patterns in the own development
- Ability to include special features (accessibility, localization, security) into development
- Professional and communicative competence

List of references

- Wigdor, D., & Wixon, D. (2011). Brave NUI world: designing natural user interfaces for touch and gesture. Elsevier.
- Van Dam, Andries. »Post-WIMP user interfaces.« Communications of the ACM 40.2 (1997): 63-67.
- Sharp, H., Rogers, Y., & Preece, J. (2007). Interaction design: beyond human-computer interaction.
- Recent research papers from ACM CHI, ACM UIST among other

Types of examination
homework, presentation, technical discussion, oral examination

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Requirements as regards content
Interactive Systems

Frequency
every summer term

Language
English

Workload
Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

Cognitive Modeling

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/4

Lecturers in charge of the module
Dr. T. Barkowsky

Lecturer
Dr. Holger Schultheis, Dr. T. Barkowsky

Contents
- cognitive modeling approaches and architectures
- cognitive modeling methodology
- case studies in cognitive modeling
- open questions in the field of cognitive science

Cognitive modeling deals with theoretical foundations of computational cognitive modeling and methods for developing such models based on empirical findings. Different paradigms for modeling are considered. The comparison of the different paradigms allows determining theoretical and methodological differences between different approaches of conceptualization.

Aims
By the end of the course participants should be able to
- understand and discuss the philosophical foundations of cognitive modeling
- explain the motivation for and goals of cognitive architectures
- summarize, interpret, and criticize interdisciplinary research literature
- understand, design, analyze, and assess symbolic cognitive models
- understand, design, analyze, and assess connectionist cognitive models
- understand, design, analyze, and assess dynamic cognitive models
- explain and contrast strengths and weaknesses of different modeling approaches (architectures, symbolic, connectionist, and dynamic approaches)
- explain and apply procedures for estimating model parameters
- understand and apply methods for evaluating cognitive models

List of references
R. Sun (Ed), The Cambridge Handbook of Computational Psychology, Cambridge University Press, Cambridge, UK, (2008).

Types of examination
regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Requirements as regards content
Simple mathematic and algorithmic thinking.

Frequency
generally every 2nd term

Language
Deutsch / English

Workload
Attendance 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

/

Design of Information Systems

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/5

Lecturer in charge of the module
Prof. Dr. M. Gogolla

Lecturer
Prof. Dr. M. Gogolla

Contents
1. Development cycle of information systems
2. Object-oriented, graphical design languages
3. Approaches to the integrated description of structure and behavior
4. Unified Modeling Language UML and Meta Models (UML diagrams describing structure and behavior, Object Constraint Language OCL, UML specification Environment USE, meta-modeling of UML)
5. Metamodeling of data models and their transformation (syntax and semantics of the ER model, syntax and semantics of the relation model, syntax and semantics of the transformation, instantiation and validation)

In particular, the following theoretical/methodological basics are treated in the context of this content:
· Relationship between UML/OCL and first-order predicate logic
· Validation of formal OCL specifications
· Fundamentals of metamodelling
· Metamodeling of database models and their transformation

Aims

· Be able to express yourself within the terms of the area of information systems. Call and classify system components and their metamodelling basics.
· Have detailed knowledge of information systems, in particular through meta-modeling of the systems. Demarcate modeling languages from programming languages. Differentiate conceptual models from implementation techniques.
· Implementation of models and meta-models. Metamodeling of database models. Can represent domain-specific languages with meta-models. Have developed good language understanding through strict separation of syntax and semantics.

List of references
· Rumbaugh, J., et al.: UML Reference Manual, Addison Wesles, 2004.
· OMG: UML 2.0, 2004.

Types of examination
regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours
6

Workload [ECTS]
8 CP

Requirements as regards content
Database systems.

Frequency
generally every summer term

Language
Deutsch / English

Workload
Attendance 84 h | Individual Preparation and Recapitulation: 156 h | 240 h

Advanced Computer Graphics

1st / 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/6

Lecturer in charge of the module
Prof. Dr. G. Zachmann

Lecturer
Prof. Dr. G. Zachmann

Contents
This course will introduce students to advanced and more complex methods and techniques of computer graphics. Some of the topics that were touched upon in the Bachelor course »Computer Graphics« will be covered in more depth. In addition, more and other topics will be covered that were not taught in the Bachelor's course. This approach will both broaden and deepen students' knowledge about the field of computer graphics.

Regular topics are:
1. Theory of boundary representations and mesh processing;
2. Advanced methods for texturing;
3. Generalized barycentric coordinates and parameterization of meshes;
4. Advanced shader programming (special effects);
5. Real-time rendering techniques (e.g., culling);
6. Ray-tracing (photo-realistic images);
7. Non-polygonal object representations (modeling);
8. Tone mapping.

Aims
Students will acquire:
- understanding of some of the more advanced and complex methods of computer graphics,
- more in-depth knowledge about some of the topics touched upon in the Bachelor's computer graphics course,
- the ability to understand current scientific literature on these topics, and the ability to implement complex methods in these areas,
- a broadened horizon across the exciting and vast field of computer graphics.

List of references

- Andrew Glassner (ed.): An Introduction to Ray Tracing; Morgan Kaufman;
- Peter Shirley: Realistic Ray Tracing; AK Peters;
- Foley, van Dam, Feiner, Hughes: Computer Graphics – Principles and Practice; Addison Wesley;
- Tomas Akenine-Möller, Eric Haines: Real-Time Rendering; AK Peters.
- Matt Pharr, Wenzel Jakob, Greg Humphreys: Physically-Based Rendering; Morgan Kaufmann. (Commonly referred to as PBRT)
- Alan Watt, Mark Watt: Advanced Animation and Rendering Techniques. Addison-Wesley

Types of examination

Graded exercises during the course and a short oral examination

Number of weekly semester hours

4

Workload [ECTS]

6 CP

Requirements as regards content

Computergraphics, basic programming abilities in C++

Frequency

generally every 2nd term

Language

Deutsch / English

Workload

Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180

Virtual Reality and Physically-Based Simulation

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/7

Lecturer in charge of the module
Prof. Dr. G. Zachmann

Lecturer
Prof. Dr. G. Zachmann

Contents
Virtual Reality (VR) is at the intersection of computer graphics, physics-based simulation, and human-computer interaction (HCI). VR deals with novel input devices, intuitive and direct interaction, immersion, real-time rendering, and physical-based real-time simulation. The latter is about the most realistic possible simulation of natural phenomena, e.g. Fire, fabric (e.g. as clothing), or the behavior of rigid objects in impact.

VR has now established as an important tool in various application areas (e.g. automotive and aircraft construction and medicine). Many techniques and solutions can also be applied in the field of computer games.

In this lecture, basic methods and algorithms will be introduced.
Subsequently, topics relevant to a complex VR system (e.g., object behavior, collision detection, acoustic rendering, etc.) are discussed.

Topics:
- introduction, terms, immersion, applications
- VR devices: displays, tracking, software design
- stereo rendering
- error-correction: tracking-correction, filtering,
- techniques for real-time rendering
- basic immersive interaction techniques: gesture recognition, navigation, selection, gripping, menus in 3D
- more complex immersive interaction techniques: World-in-Miniature, Action-at-a-Distance, etc.
- collision detection
- force feedback: rendering of forces
- acoustic rendering
- particle systems
- spring-mass systems

The exercises are all practical.

It is expected to be installed on the cross-platform-capable VR system InstantReality. The programming language can be selected by the participants; you can choose from Java, Javascript, and C ++.
You are also welcome to work on the tasks in small teams.

Aims

- know VR technologies and concepts; ability to classify different virtual environments
- know important 3D and immersive interaction metaphors
- know basic algorithms and methods for the simulation of virtual environments

List of references

- William R. Sherman, Alan B. Craig: Understanding Virtual Reality. Morgan Kaufmann, 200
- Don Brutzman, Leonard Daly: X3D: Extensible 3D Graphics for Web Authors. Morgan Kaufmann, 2007.
- Daniel Fleisch: A Student's Guide to Vectors and Tensors. Cambridg

Types of examination

regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours

4

Workload [ECTS]

6 CP

Requirements as regards content

Course: »Computergraphic« is recommended, programming abilities in Java or C++ are required. In the 2nd part you'll need to use ordinary differential equations.

Frequency

winter term

Language

Deutsch / English

Workload

Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

Massively Parallel Algorithms

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/8

Lecturer in charge of the module
Prof. Dr. G. Zachmann

Lecturer
Prof. Dr. G. Zachmann

Contents
This lecture introduces students to the basic and some advanced methods and techniques of massively parallel algorithms.

Some of the topics are:
- the programming environment CUDA C;
- the memory hierarchy and various memory characteristics;
- the GPU architecture;
- parallel reduction;
- coalesced memory access;
- massively parallel matrix algorithms;
- prefix-sum and its applications in image processing;
- texture-filtering;
- parallel sorting (odd-even, bitonic, adaptive bitonic);
- image processing;
- thrust;

Aims
The era of single-core processors is over. Meanwhile, there are new, massively-parallel processors (GPUs) that can handle hundreds to thousands of threads in parallel.

GPUs may become established as a new architecture for the main processors – especially on mobile devices – as they provide more compute power per unit of power. However, the large number of parallel cores poses new challenges for the design of algorithms and software so that they can benefit from the great parallelism. The main goal of this lecture is to enable students to design algorithms for this massively parallel hardware.

Simulation is now commonly regarded as the third pillar of science (alongside the Experiments and theory). In the simulation, a constantly growing demand for computing power is needed; but this is almost a commodity on the desktop due to the availability of GPUs.

At the end of this lecture the students will
- have had active experience in the development of software and algorithms for massively parallel architectures;
- know a number of massively parallel algorithm patterns;
- be able to develop own massively parallel algorithms;
- know CUDA.

In the first half of the lecture, students will familiarize themselves with the CUDA parallel programming environment through small and medium-sized exercises and frameworks. In the second half students will work on their own project.

List of references
- Jason Sanders, Edward Kandort: CUDA by Example. Addison-Wesley, Pearson Education.
- Wen-Mei W. Hwu: GPU Computing Gems Jade Edition. Morgan Kaufmann.
- David B. Kirk, Wen-Mei W. Hwu: Programming Massively Parallel Processors. Morgan Kaufmann.
- NVidia

Types of examination
regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Requirements as regards content
Algorithmic thinking, some knowledge about programming C/C++

Frequency
generally every 2nd term

Language
Deutsch / English

Workload
Attendance (Lectures and Tutorials): 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

Computational Geometry

1st and 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MI/9

Lecturer in charge of the module
Prof. Dr. G. Zachmann

Lecturer
Prof. Dr. G. Zachmann

Contents
- quadtrees / octrees, texture compression, isosurfaces, terrain visualization.
- KD-trees, BSP trees, boolean operations on objects, texture synthesis,
- bounding volume hierarchies.
- kinetic data structures, collision detection.
- convex hull.
- voronoi and delaunay diagrams, placement problems, TSP approximation
- range tTree and priority search tree, range queries on the grid.

Note: the exact composition of the topics is always slightly varied or expanded.
The lecture moves at the edge between computational geometry and computer graphics. Therefore, no practical, but only (simple) theoretical exercises will be asked.

Aims
The students will have
- knowledge and mastery of some very important geometric data structures for computer graphics (and other areas),
- deeper understanding of the reasons why certain algorithms are very efficient,
- knowledge of some exemplary applications of these data structures in computer graphics,
- certain skills in proving correctness and in complexity analysis of geometric algorithms.

List of references
- Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars: Computational Geometry: Algorithms and Applications; Springer
- Franco P. Preparata, Michael Ian Shamos: Computational Geometry: An Introduction; Springer (classical but not outdated yet)

Types of examination
regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Requirements as regards content
Simple mathmatic and algorithmic thinking.

Frequency
generally every 2nd term

Language
Deutsch / English

Workload
Attendance 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

IT Management 2

1st / 2nd semester

Module description
This module description serves as an example of a possible course in the module M-MI/M-MA-2

Module type
elective

Module number
M-MA-2/1

Lecturer in charge of the module
Prof. Dr. A. Breiter

Lecturer
Prof. Dr. A. Breiter

Contents
1. IT service management – Comparing ITIL version 3 to version 2
· Service Strategy
· Service Design
· Service Transition
· Service Operation
· Continual Service Improvement.

2. Managing data centers
· System management
· Information Security management

3. IT controlling
· Key performance indicators
· IT Balanced Scorecard

4. IT Governance – Green IT – Fair IT?
In particular, the following theoretical / methodological basics are treated in the context of this content:
· Methods of modeling IT service processes (according to ITIL)
· Methods of IT-Controlling (Balanced Scorecards, TCO)
· Methods of IT governance (after COBIT)

Aims
· Describe and analyze tasks, goals and functions of IT service management in theory and practice.
· Explain relevant questions of IT controlling.
· Explain and apply basic elements of data center management.
· Independently develop research questions and answer them with the help of scientific methods.
· Be able to reflect and present own research results.

List of references

· Krcmar, H. (2009). Informationsmanagement (5., vollst. überarb. und erw. Aufl.). Berlin [u.a.]: Springer.
· OGC. (2007). Service Design. Norwich: Office of Government Commerce. The Stationery Office.
· OGC. (2007). Service Strategy. Norwich: Office of Government Commerce. The Stationery Office.
· OGC. (2007). Service Operation. Norwich: Office of Government Commerce. The Stationery Office.
· OGC. (2007). Service Transition. Norwich: Office of Government Commerce. The Stationery Office.
· OGC. (2007). Continual Service Improvement. Norwich: Office of Government Commerce. The Stationery Office.
· Weitere Literatur als Reader (elektronisch)

Types of examination

regular processing of exercises and a technical discussion or oral examination

Number of weekly semester hours

4

Workload [ECTS]

6 CP

Requirements as regards content

IT-Management 1

Frequency

generally every 2nd term

Language

English

Workload

Attendance (Lectures and Tutorials): 45 h | Individual Preparation and Recapitulation: 135 h | 180

05.4.4 Integrierte und ergänzende Inhalte [integrated and extended fields]

Free Electives

1st and 2nd semester

degree program
Media Informatics and Media Design

Module type
free electives

Module number
M-UN

Lecturer in charge of the module
Prof. Dr. U. Bormann

Lecturers
Various

Comment
The field of »Free Electives« nominally comprises 12 CP. The real number of points depends on the alternatives chosen in other fields of electives. Lacking/surplus CP will be charged against these.

Contents
In the field of »Free Electives«, modules from all offers of the University of Bremen and the University of the Arts Bremen can be selected, if their content does not overlap with that of other modules.

Aims
The field of »Free electives« enables students to improve their individual skills within the studies offered by the University of Bremen and the University of the Arts Bremen. Students may select electives from the digital media lectures as well as lectures from other degree programs or on key qualifications. The aims / competences they achieve depend on the lectures they selected.

(Foreign-) Language courses may only be brought in with a maximum of 6 CP.

List of references
Depending on the chosen lecture(s).

Types of examination
Depending on the chosen lecture(s).

Number of weekly semester hours
depending on the chosen alternatives

Workload [ECTS]
12 CP see comments

Frequency
any term

Language
English / Deutsch

Workload
Depending on the chosen lecture(s).

Introduction to Digital Media

1st semester

degree program
Media Informatics and Media Design

Module type
required

Module number
M-MA-1

Lecturers in charge of the module
Prof. Peter von Maydell
Prof. Dr. Rainer Malaka

Lecturers
Various

Contents
- Introduction to the program's aims, resources and possibilities.
- Introduction to advanced research on the design and development of digital media
- Introduction to critical positions (impact, limitations, possibilities, responsibilities) within science, art and technology in respect to digital media
- Advanced topics of scientific and artistic work (debate, judgment and writing and presentation in any of the above fields.

Aims
Students will develop a common understanding about research and design of digital media.

Students will acquire skills in understanding current debates in digital media
and develop critical judgment of the cultural, social, economic and ecologic impact of digital media.

List of references

- Popper, K. R. (1959). The logic of scientific discovery. New York: Basic Books.
- Chalmers, A. F. (2005). What is this thing called science? (3. ed.). Maidenhead: Open Univ. Press.
- Wardrip-Fruin, N. and Montfort, N. (editors) (2003). The New Media Reader, MIT Press
- others per requirement

Types of examination
Essays, group presentations, documentation

Number of weekly semester hours
4

Workload [ECTS]
6

Formal requirements
none

Requirements as regards content
none

Frequency
winter term

Language
English

Workload
Attendance 60 h | Individual Preparation and Recapitulation: 120 h | 180 h

Special Topics in Digital Media

1st / 2nd semester

Degree program
Media Informatics and Media Design

Module type
compulsory optional

Module number
M-MA-2

Lecturers in charge of the module
Prof. Dr. Rainer Malaka (Media Informatics)
Prof. Dr. Andrea Sick (Media Theory)
Prof. Dennis Paul (Media Design)

Lecturers
Various

Comment
Free choice from courses offered in Media Design (M-MD), Media Informatics (M-MI), and Media Theory (M-MT).

Contents
Media Informatics:
M-MI/1 Entertainment Computing
M-MI/2 Embodied Interaction
M-MI/3 Current Topics of Interactive Systems
M-MI/4 Cognitive Modeling
M-MI/5 Design of Information Systems
M-MI/6 Advanced Computer Graphics
M-MI/7 Virtual Reality and Physically-Based Simulation
M-MI/8 Massively-Parallel Algorithms
M-MI/9 Computational Geometry
M-MI/10 IT-Management 2

Media Theory:
Drawing on exemplary topics, the course conveys methods to analyze media, as well as theories that describe general qualities of media, mediality and media technologies. Current developments will be of special interest in this regard. Relationships to artistic, creative and technological processes will be researched and identified.

Media Design:
The content of the course focuses on more specific topics. The range may extend from topics with a clearly technological focus investigating very specific new, digital or emergent technology from a designers point of view, to topics investigating niche aspects of media design or media art.

Aims
In this module, advanced courses on Digital Media have to be selected. The advanced courses will teach in depth knowledge on selected topics of Digital Media.

List of references
Depending on the project topic; to be determined in consultation with advisor

Types of examination
Project work, project report, presentation, and colloquia

Number of weekly semester hours
Depending on the chosen module.
Workload [ECTS]
6 CP

Frequency
Any term

Language
English

Workload
Depending on the chosen module.

Introduction to Computer Music

1st / 2nd semester

Module description
This modul description serves as an example of a possible course in the modul M-MA-2

Module type
Elective

Module number
B-MA-2/1

Lecturer in charge of the module
Prof. Kilian Schwoon

Lecturer
Prof. Kilian Schwoon

Content of courses within module
In this module, students will acquire the theoretical basics and practical-technical competences for using computers for music.

Basic methods of digital sound analysis, sound synthesis and sound processing will be designed; their musical potential will be investigated with the help of historical examples. Practical exercises and own concepts are in the focus of the module:

Students develop and realize musical or sound-artistic concepts with different emphases (design of instruments, composition, improvisation, installation).

Requirements for achieving credit points
Regular attendance and active participation, artistic design concept

Module type
compulsory

Type of course
Seminar

Subject/duration of examination
Cf. requirements for the award of credit points, MP

Number of weekly semester hours
4

WORKLOAD (ECTS)
6

Workload [ECTS]
none

Applicability of the module for other degree programs
Fine Arts, Integrated Design

Frequency
annually

Language
English

Smart Materials

1st / 2nd semester

Module description
This modul description serves as an example of a possible course in the modul M-MA-2

Module type
Elective

Module number
M-MA-2/2

Lecturer in charge of the module
Prof. Dennis Paul

Lecturers
Prof. Dennis Paul
External Lecturers

Content of courses within module
In this module, students will deal with a group of materials that can be used for medial productions due to their special properties such as changeability. After the stocktaking of existing materials (e. g. thermochromatic colours, nitional wires or electroluminiscent surfaces) and their application, they will develop ideas and scenarios for their own artistic-creative productions.

Requirements for achieving credit points
regular attendance and active participation
Presentation and documentation of results of the given assignments

Module type
compulsory

Type of course
seminar

Type of learning
attendance courses

Subject/duration of examination
cf. requirements for the award of credit points, MP

Number of weekly semester hours
4

Workload [ECTS]
6

Formal requirements
none

Applicability of the module for other degree programs
integrated Design and Fine Arts

Frequency
annually

Language
English

Media Art/Media Aesthetics

1st/2nd semester

Module description
This modul description serves as an example of a possible course in the modul M-MA-2

Module type
Elective

Module number
B-MA-2/3

Lecturer in charge of the module
Prof. Dr. Andrea Sick

Lecturers
Prof. Dr. Andrea Sick
lecturer at FB9 University
teaching appointments

Content of courses within module
This module gives an overview over the most important approaches of media art in the fields of aesthetics and art development.

The analysis of arts from the point of view of media science is taught. The correlation between arts and media and the medial procedures of artistic practice is to be made understood.

Requirements for achieving credit points
Regular attendance paper/presentation term paper

Type of course
Seminar

Type of learning
Attendance courses and self-study

Subject/duration of examination
Cf. requirements for the award of credit points, MP

Number of weekly semester hours
4

Workload [ECTS]
6

Formal requirements
none

Applicability of the module for other degree programs
General Sciences on Integrated Design and Fine Arts

Frequency
annually

Language
English

Forms of Intermedial Design

1st / 2nd semester

Module description
This modul description serves as an example of a possible course in the modul M-MA-2

Module type
Elective

Module number
B-MA-2/4

Lecturer in charge of the module
Nuri Ovüc

Lecturers
Nuri Ovüc
teaching appointments

Content of courses within module
In this module, the students learn how to conceive and develop cross-media events resp. projects. The focus is on the interplay of the different media – new visual contributions/languages/installations will be produced. The contributions will then be integrated in different medial environments.

Requirements for achieving credit points
artistic/design concept, term paper

Type of course
Seminar and tutorial

Type of learning
Frontal

Subject/duration of examination
Cf. requirements for the award of credit points, MP

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Frequency
annually

Language
English

Project Preparation

2nd semester

Degree program
Media Informatics and Media Design

Module type
required

Module number
M-MA-31

Lecturers in charge of the module
Prof. Dr. G. Zachmann
Prof. Ralf Baecker

Lecturers
Various

Contents
Students will acquire knowledge and skills regarding methods, technologies and processes that are required for module MA-32 (Master Project) in the following semester. The specific knowledge and skills will depend, to some degree, on the specific topics students will choose for their module MA-32.

To ensure a targeted selection of the concrete contents for this module (MA-31), the M.Sc. students in Media Informatics will communicate closely with the teacher and advisor of their chosen MA-32 module. In any case, the knowledge and skills will center around Digital Media, Media Design, Media Theory and Media Informatics. In the case of the Media Informatics students, typical knowledge and skills to be acquired will be in the fields of Visual Computing, Virtual Reality, Interaction Design, Human-computer Interaction, statistical methods, to name but a few.

M.A. students in Media Design will choose as Project Preparation one of the offered seminars from the theory pool at the HfK (Media Theory, Philosophy, Art History, Design Theory) or a seminar in cognitive science at the University which fits to their project subject. The students have to coordinate their choice closely with their teachers to ensure an adequate content for their MA-32 module primarily at the HfK.

In addition, the Master students in Media Informatics and in Media Design will research the state-of-the-art and identify the research challenges they expect to face in MA-32.

M.Sc. students are required to focus on Media Informatics in their work.

Aims
The students are able to define and outline a project dealing with complex problems of digital media. They acquire knowledge in the relevant fields of media design, media informatics, and media theory, which is leading to a successful Master's project.

List of references
Depending on project topic, to be determined in consultation with advisor

Types of examination
Presentations and papers, sometimes exams, depending on the advisor of MA-32.

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Frequency
summer term

Language
English

Workload
Attendance 54 h | Individual Preparation and Recapitulation: 126 h | 180 h

Master Project

3rd semester

degree program
Media Informatics and Media Design

Module type
required

Module number
M-MA-32

Lecturers in charge of the module
Prof. Dr. G. Zachmann
Prof. Ralf Baecker

Lecturers
Various

Comment
At the HfK each Master Project is supervised by two or more advisors with different areas of expertise (e.g. media theory, design practice, interface design or media art).

Also for M.A. students additional seminars in media- and design theory and technical skill workshops will be organized connected to the chosen topics and an obligatory plenum will take place every week.

Contents
Working on a complex problem with relevance to society, science, technology art or design, the students concern themselves with:

- Organization of both their individual work and / or teamwork
- Analysis of the problem
- Definition of objectives
- Research and presentation of the state of the art
- Identification of suitable technology (e.g. hardware, software libraries, tools)
- For M.Sc. students design of a solution (e.g. software architecture, algorithms, user interface)
- For M.A. students design of a solution, possibly in a wide sense of the term (e.g. comment, intervention etc.)
- Implementation
- Evaluation of the results (e.g. user studies, statistical analysis, presentation, exhibition)
- Preparation of final results for publication or other forms of public display, exhibitions, demonstrations, or other forms of public display.

M.Sc. students are required to focus on media informatics in their work;

Aims
The students are able to work theoretically, empirically, and practically on complex problems of development in a medium-sized, self-organized team or individually. They do not only apply existing knowledge in science, the arts and design, but also develop new concepts and methods.

List of references
Depending on the project topic; to be determined in consultation with advisor

Types of examination
Project work, project report, presentation, and regular colloquia

Number of weekly semester hours
20 (Media Informatics)
20 (+ 2 Tutorial) (Media Design)

Workload [ECTS]
30 CP

Frequency
Winter term

Language
English

Workload
Media Informatics:
Attendance (plenum): 280 h | work on the project: 620 h | 900 h

Media Design:
Attendance (plenum & tutorial): 308 h | work on the project: 592 h | 900 h

Plenary

4th semester

Degree program
Media Design

Module type
Required

Module number
M-MA-42

Lecturer in charge of the module
Petra Klusmeyer

Lecturers
Various

Contents
Presentation and discussion of the research and design questions and working steps of the master thesis.

Aims
Regular presentation and discussion of contents and methodology with the tutoring lecturers and the fellow students.

Types of examination
Successful development of the design/artistic research question, topic and approach underlying the master thesis.

Number of weekly semester hours
4

Workload [ECTS]
6 CP

Formal requirements
Applying for the master thesis and/or plenary requires providing proof of at least 60 CPs.

Frequency
Every summer term

Language
English

Workload
Attendance 56 h | Individual Preparation and Recapitulation: 124 h | 180 h

05.4.5 Masterarbeit

Master Thesis

4th semester

degree program
Media Informatics and Media Design

Module type
required

Module number
M-MA-4

Lecturers in charge of the module
Prof. Dr. U. Frese
Petra Klusmeyer

Lecturers
Various

Comments
Additionally the plenary M-MA-42 for M.A. students on media design.

Contents
Development and preparation of an original and comprehensive creative-artistic final thesis including a research proportion. Students link creative-artistic and scientific competences applying methods from science, arts and design.

Aims
The students are able to work theoretically, empirically, and practically on complex problems and innovative solutions in the field of digital media production and use. To this end, they employ methods of science as well as of the arts and artistic design. They work on their own initiative, set up schedules, and meet deadlines.

List of references
- Depending on project topic
- to be determined in consultation with advisor

Types of examination
Master thesis:
- Subject matter related to the selected topic, typically corresponding to the respective master's project
- Scientific research or development of artistic methods in the context of a complex problem in the field of digital media
- Application of scientific results and methods as well methods of the arts and artistic design
- Presenting work in science or the arts or artistic design in speech, writing, and digital media
- Participating in research or artistic discourse

M.Sc. students are required to focus on media informatics in their work; M.A. students on media design.

Seminar for graduates:
· Students present a topic of their Master Thesis.
· Students discuss with advisors and other students concerning
· topics and development process of their thesis.

Number of weekly semester hours
none

Workload [ECTS]
30 CP (Media Informatics)
24 CP (Media Design)

Frequency
could be appointed anytime with the advisor

Formal requirements
Successful development and working on research and design questions aiming at the master thesis. Applying for the master thesis and/or master colloquium requires providing proof of at least 60 CPs.

Language
English

Workload
Media Informatics: Editing the Task: 840 h | Preparation and conduct of the colloquium: 60 h | 900 h
Media Design: Editing the Task: 660 h | Preparation and conduct of the colloquium: 60 h | 720 h