Englisch courses summer Semester 2023

Bachelor's Degree Programme

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Automotive Computing (Bachelor, Hagenberg Campus)							
AC.ba	DAB4 U	Database Design	Practice-oriented session	4	Bachelor	3	5
AC.ba	DAB4 V	Database Design	Lecture	4	Bachelor	2	6
General Courses							
FHHGB	DEU1VO	German for Beginners	Lecture	2	Bachelor	2	7
Hardware-Software-Design (Bachelor, Hagenberg Campus)							
HSD.ba	ENG2-17ILV	English 2	Integrated course	2	Bachelor	2	8
Communication and Knowledge Media (Bachelor, Hagenberg Campus)							
KWM.ba	AUP6VO	Adaptivity and Personalization	Lecture	6	Bachelor	2	9
KWM.ba	STE2UE	Scientific and Technical English	Practice-oriented session	2	Bachelor	1	11
KWM.ba	WAC2IL	Web Accessibility	Integrated course	2	Bachelor	1	12
KWM.ba	WHM2UE	Web and Hypermedia Programming	Practice-oriented session	2	Bachelor	2,5	14
KWM.ba	WHM2VO	Web and Hypermedia Programming	Lecture	2	Bachelor	1	16
Medical and Bioinformatics (Bachelor, Hagenberg Campus)							
MBI.ba	21_TEN4UE	Technical English 2	Practice-oriented session	4	Bachelor	1	18
Mobile Computing (Bachelor, Hagenberg Campus)							
~~MC.ba~~	~~5_ALP~~	~~Alternative Programming Languages~~	~~Integrated course~~	~~4~~	~~Bachelor~~	~~5~~	~~19~~
MC.ba	5_DAB4 U	Database Design	Practice-oriented session	4	Bachelor	3	20
MC.ba	5_DAB4 V	Database Design	Lecture	4	Bachelor	2	21
Media Technology and Design (Bachelor, Hagenberg Campus)							
MTD.ba	05_DVC4IL	Digital Imaging / Visual Computing	Integrated course	4	Bachelor	5	22
MTD.ba	05_IGP4IL	Interaction and Game Programming	Integrated course	4	Bachelor	5	23

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Media Technology and Design (Bachelor, Hagenberg Campus)							
MTD.ba	05_ONM4IL	Online Multimedia	Integrated course	4	Bachelor	5	24
MTD.ba	05_PRO0PT	Semester Project	Project	4	Bachelor	1	25
~~MTD.ba~~	~~05_S3D4IL~~	~~Special Topic 3D~~	~~Integrated course~~	~~4~~	~~Bachelor~~	~~5~~	~~26~~
Software Engineering (Bachelor, Hagenberg Campus)							
SE.ba	20_SPR4PT	Software Study Project 1	Project	4	Bachelor	4	27
Secure Information Systems (Bachelor, Hagenberg Campus)							
~~SIB.ba~~	~~DIS6SE~~	~~Disruptive Information Security~~	~~Seminar~~	~~6~~	~~Bachelor~~	~~2~~	~~28~~
SIB.ba	HIS4IL	Human Aspects of Information Security	Integrated course	4	Bachelor	2	29
SIB.ba	SEN2IL	Social Engineering	Integrated course	2	Bachelor	2	30
Software Engineering (Bachelor - Part Time, Hagenberg Campus)							
SE.ba	09_VPS5VO	Distributed and Parallel Software Systems	Lecture	5	Bachelor	1	31

Master's Degree Programme

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Data Science and Engineering (Master, Hagenberg Campus)							
DSE.ma	0_2CO2U	Computational Intelligence II	Practice-oriented session	2	Master	2	32
DSE.ma	0_2CO2V	Computational Intelligence II	Lecture	2	Master	3	33
DSE.ma	0_MOS2U	Modelling and Simulation	Practice-oriented session	2	Master	2	35
DSE.ma	0_MOS2V	Modelling and Simulation	Lecture	2	Master	3	36
Interactive Media (Master, Hagenberg Campus)							
IM.ma	HMF2	Hypermedia Frameworks	Integrated course	2	Master	5	37
IM.ma	IVI2	Information Visualization	Integrated course	2	Master	5	38
IM.ma	RTE2	Real Time Engineering	Integrated course	2	Master	5	39
IM.ma	SDM2	Software Design Methods	Integrated course	2	Master	5	40
IM.ma	VCO2	Visual Computing	Integrated course	2	Master	5	41
Communication and Knowledge Media (Master, Hagenberg Campus)							
KWM.ma	KWM510	Intercultural Online Collaboration	Integrated course	2	Master	5	42
KWM.ma	KWM531	Leadership	Integrated course	2	Master	2,5	43
KWM.ma	KWM540	Digitalization: Technologies and Deployment Scenarios	Integrated course	2/4	Master	2	45
Mobile Computing (Master, Hagenberg Campus)							
MC.ma	3_MC509	Home and Building Automation	Integrated course	2/4	Master	5	46
Software Engineering (Master, Hagenberg Campus)							
SE.ma	15_DML2ILV	Data Mining and Machine Learning	Integrated course	2	Master	5	47
SE.ma	22_KIN2ILV	Artificial Intelligence	Integrated course	2	Master	5	48

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Human-Centered Computing (Master - Part Time, Hagenberg Campus)							
HCC.ma	17_DVA2I	Data Preprocessing and Analytics	Integrated course	2	Master	3	49
Information Engineering and -Management (Master - Part Time, Hagenberg Campus)							
IEM.ma	20_KIN2 U	Artificial Intelligence and Machine Learning	Practice-oriented session	2	Master	2	50
IEM.ma	20_KIN2 V	Artificial Intelligence and Machine Learning	Lecture	2	Master	1,5	51
Information Security Management (Master - Part Time, Hagenberg Campus)							
ISM.ma	CCC2ILV	Cross Cultural Business Communication	Integrated course	2	Master	3	52

Lecture/Seminar profile:

Database Design (DAB4 U)

Degree course	AC.ba
Course title	Database Design
Course code	DAB4 U
Level	Bachelor
Term	SS23
Lecturer	Andreas Müller
Contact hours per week	2,4
ECTS credits	3
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
In this course we will discuss fundamental concepts of databases (relationl and non-relational). Topics include Entity Relationship Diagrams, Relational Models & SQL, Stored Procedures, Triggers, Indexes, Concurrency, NoSQL, APIs & ORM and Security.

Prerequisites:
n.a.

Lecture/Seminar profile:

Database Design (DAB4 V)

Degree course	AC.ba
Course title	Database Design
Course code	DAB4 V
Level	Bachelor
Term	SS23
Lecturer	Andreas Müller
Contact hours per week	1,6
ECTS credits	2
Course type	Lecture
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
In this course we will discuss fundamental concepts of databases (relationl and non-relational). Topics include Entity Relationship Diagrams, Relational Models & SQL, Stored Procedures, Triggers, Indexes, Concurrency, NoSQL, APIs & ORM and Security.

Prerequisites:
n.a.

Lecture/Seminar profile:

German for Beginners (DEU1VO)

Degree course	FHHGB
Course title	German for Beginners
Course code	DEU1VO
Level	Bachelor
Term	SS23
Lecturer	Bettina Buchberger
Contact hours per week	1,6
ECTS credits	2
Course type	Lecture
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

English 2 (ENG2-17ILV)

Degree course	HSD.ba
Course title	English 2
Course code	ENG2-17ILV
Level	Bachelor
Term	SS23
Lecturer	Julia Maria Lengauer
Contact hours per week	2
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

Adaptivity and Personalization (AUP6VO)

Degree course	KWM.ba
Course title	Adaptivity and Personalization
Course code	AUP6VO
Level	Bachelor
Term	SS23
Lecturer	Mirjam Augstein, Markus Schedl
Contact hours per week	2
ECTS credits	2
Course type	Lecture
Examinations	written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Course Description:
Adaptivity is a way of making systems personalized to users - in many ways. For example, adaptivity can affect the graphical user interface of a system, which then automatically adapts to the user, but also the type and amount of content presented. The latter means a way out of the so-called "information dilemma" which has become a growing problem since the early days of the Internet. The rapidly increasing amount of available information as well as the increasing diversity of users pose new challenges to the designers and developers of the systems. A single representation is often no longer sufficient. This course deals with the basics of personalization and adaptive systems. Different aspects of adaptive systems are covered, starting with the goals of adaptivity, user modeling techniques, security aspects, and evaluation of adaptive systems. The goal of the course is to provide a holistic overview of the topic. Technical aspects as well as the user perspective will be considered. After completing the course, students should be able to design adaptive systems and know and apply methods for the acquisition, analysis and interpretation of data that serve as a basis for adaptivity. Furthermore, students should be able to evaluate adaptive systems in terms of usability and added value compared to non-adaptive variants.

Prerequisites for the Course:
Students participating in the course need to have basic (web) programming skills and should be familiar with the basics of human-centered design.

Assessment:

The course will be assessed by a written exam at the end of the semester. Students need to achieve at least 50% of the obtainable points in order to complete the course positively.

Prerequisites:
n.a.

Lecture/Seminar profile:

Scientific and Technical English (STE2UE)

Degree course	KWM.ba
Course title	Scientific and Technical English
Course code	STE2UE
Level	Bachelor
Term	SS23
Lecturer	Annamaria Mähr
Contact hours per week	1
ECTS credits	1
Course type	Practice-oriented session
Examinations	written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
In this course you will learn how to effectively deliver elevator pitches and how to talk shop proficiently. In addition, a number of grammar-related topics are covered (gerund, conditionals, adjectives).

Prepare, review and read materials for class. Carry out verbal and written assignments. Complete oral and written classroom assignments. Engage in group-, pair- and roleplay activities. Participate in discussions & give feedback when called upon. Grammar reviews. Leading a discussion. Final grammar examination.

Prerequisites: A sound knowledge of English, a minimum of B2-level. The prerequisite for passing the course is the fulfilment of all assignments.

Prerequisites:
n.a.

Lecture/Seminar profile:

Web Accessibility (WAC2IL)

Degree course	KWM.ba
Course title	Web Accessibility
Course code	WAC2IL
Level	Bachelor
Term	SS23
Lecturer	Reinhard Koutny, Peter Heumader
Contact hours per week	1
ECTS credits	1
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	4

Learning objectives:
Accessibility of web and software systems is of crucial importance for the inclusion and participation of people with disabilities and older people (approx. 20% of the total population) in the information and knowledge society. The way web and software interfaces are designed, determines whether independent and self-directed interaction and access for people with disabilities is possible. In the information society, disability is no longer just an attribute of the individual but a quality criterion for the design of the information and communication technology (ICT)-based living environment.
This requirement for the design, implementation and use of technical systems is reflected in political directives, laws and increasingly also in social and economic requirements. In addition, accessibility of web and software systems is an essential contribution to increasing usability and user experience for all people, regardless of age and/or any disabilities.

Graduates of this lecture:
- gain broad awareness of the problems and needs of people with disabilities and older people when interacting with standard hardware and websites or software systems,
- have basic knowledge about assistive technology that standard hardware and software already provide today and about specialized assistive technology (AT) that these people (can) use at the human-computer interface (HCI),
- recognize the potential of accessible user interfaces to mitigate the effects of disabilities and to improve inclusion, care, and support of people with disabilities,
- develop awareness and understanding of the need for accessibility as a basic condition for realizing this potential in inclusion and participation in all areas of life,
- gain in-depth knowledge of technical standards for accessible web and software development
- learn to use different methods, techniques and tools in the implementation of the standards,
- acquire knowledge of how these standards are implemented with different development

environments on different platforms,
- learn methods and use tools for evaluating accessibility,
- are able to independently carry out exemplary practical examples in design and programming,
- develop competencies to realize accessibility at the current state of the art, but also in the future,
- understand accessibility as an integral part of web/software engineering

Content:

1. Introduction:
○ Objectives and overview of the lecture
○ What is accessibility and why is accessibility important.
○ Overview of guidelines
○ Assistive technologies and their types of interaction with user interfaces of web/software systems
○ Self-experience: browsing and using ICT without screen, mouse, and keyboard; target audience.
2. Accessibility guidelines, their xemplary implementation and application examples (Part 1)
○ Principle 1: Perceivability: equivalent alternatives, adaptation of content, …
3. accessibility guidelines, their exemplary implementation and application examples(Part 2)
○ Principle 2: Operability: keyboard interface, navigation, time, ...
4. accessibility guidelines, their exemplary implementation and application examples (Part 3)
○ Principle 3: Understandability: readability, user guidance, error prevention, ...
○ Principle 4: Robustness: Compatibility with AT and other user agents, ...
○ WCAG 2.1
5. Accessible dynamic web and software systems: Accessible Rich Internet Applications (WAI-ARIA)
○ HTML 5 Accessibility
○ What is WAI-ARIA?
○ ARIA elements and methods
○ ARIA Examples

Teaching/Learning Methods, Media:
The course consists of
● Lecture/presentation part (10 LE all participants)
● Lab (9 LE 2 groups)
● Exercises to be done independently
Accompanying the lecture, 2 practical exercise projects are handed out, which the students work out during the course of the semester. This fosters the development of competencies in the independent implementation of accessibility. Exercise details, teaching materials, further communication and exercise submission will be realized via Moodle.
LAB:
● Assistive Technologies (2 LE)
● Accessible web development basics 1(3 LE)
● Website accessibility check + checker tools(2 LE)
● ARIA/HTML 5(2 LE)
Exercise:
● Project: WCAG 2.1 Evaluation
● Project: Web site accessibility
Form of performance assessment and evaluation criteria
The grade is made up of the projects to be submitted, whereby both projects must be positively graded. Each project is graded from 0-100%, with 100% corresponding to a perfectly elaborated project. Projects that have achieved at least 50% are considered positively submitted. The grade is the average of the two projects.

Prerequisites:

n.a.

Lecture/Seminar profile:

Web and Hypermedia Programming (WHM2UE)

Degree course	KWM.ba
Course title	Web and Hypermedia Programming
Course code	WHM2UE
Level	Bachelor
Term	SS23
Lecturer	Johannes Schönböck
Contact hours per week	2
ECTS credits	2,5
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	4

Learning objectives:
Graduates have basic knowledge in the conception, design and implementation of hypermedia applications, taking into account usability, standards compliance and progressive enhancement. The implementation is based on modern languages and tools. The focus of the course is on client-side web development with JavaScript. Students will gain a detailed insight into the basic concepts and technologies of the web, with current design trends and frameworks (jQuery) being scrutinized and explored using practical examples. The course consists of a lecture and a practical exercise - lecture and exercise can only be attended together.

Content:
Content:
Introduction into Client Side Scripting
• JavaScript basics
• Document Object Model (DOM)
• Object-oriented programming in JavaScript

Teaching methods:
The course will be held as lecutre with accompanying exercises. The following teaching methods are used:
• Teaching of the contents (concepts, methods, ...)
• Practical implementation of individual tasks
• Independent work in depth

Assessment:
Lecture: The lecture is evaluated by means of a written exam at the end of the semester, in which questions for understanding the subject matter have to be answered as well as practical examples

have to be worked out. The total number of points will result in the grade. For a positive completion of the lecture, at least 50% must be achieved.
Exercise: According to the FHG, attendance is compulsory for the exercises. Attendance lists are kept to check attendance. Students must achieve at least 80% attendance for a positive assessment.
At the end of the semester, the exercise grade is determined by the quality of the solutions submitted for the exercise sheets. 8 exercises are handed out, of which at least 7 must be submitted. The exercises have to be handed in electronically via the e-learning system. 25 points are awarded for each exercise assignment, therefore a maximum of 200 points can be achieved. Only assignments that have been evaluated with more than 6 points are considered to have been handed in. If the exercise performance achieved during the semester is not sufficient, a grace period may be granted within which additional performance must be achieved for positive completion of the exercise.
Exercises handed in too late will be scored with a point deduction and only if the correction has not yet been completed. Points will be deducted for late submission: 1-12 h -1 points, 12-24 h - 3 points, for each additional 12 h another-3 points will be deducted. In the case of exercises that are recognized as a copy of a colleague, the instructor must be consulted; whether and to what extent the exercise will be graded in such cases depends on the individual case. In principle, the copied parts of the exercise will be scored with 0 points for all persons involved.

What is allowed:
• Joint discussion of the tasks and discussion of possible solutions;
• Joint development of general solution structures;
• helping each other to solve detailed problems.

What is not allowed:
• Copying solutions (even with subsequent changes)

The final solution must be written by yourself in any case.

Prerequisites:
n.a.

Lecture/Seminar profile:

Web and Hypermedia Programming (WHM2VO)

Degree course	KWM.ba
Course title	Web and Hypermedia Programming
Course code	WHM2VO
Level	Bachelor
Term	SS23
Lecturer	Johannes Schönböck
Contact hours per week	1
ECTS credits	1
Course type	Lecture
Examinations	written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
Graduates have basic knowledge in the conception, design and implementation of hypermedia applications, taking into account usability, standards compliance and progressive enhancement. The implementation is based on modern languages and tools. The focus of the course is on client-side web development with JavaScript. Students will gain a detailed insight into the basic concepts and technologies of the web, with current design trends and frameworks (jQuery) being scrutinized and explored using practical examples. The course consists of a lecture and a practical exercise - lecture and exercise can only be attended together.

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• helping each other to solve detailed problems.

What is not allowed:
• Copying solutions (even with subsequent changes)

The final solution must be written by yourself in any case.

Prerequisites:
n.a.

Lecture/Seminar profile:

Technical English 2 (21_TEN4UE)

Degree course	MBI.ba
Course title	Technical English 2
Course code	21_TEN4UE
Level	Bachelor
Term	SS23
Lecturer	Alastair Long
Contact hours per week	1
ECTS credits	1
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	4

Learning objectives:
n.a.

Content:
The skills acquired in the module English for Communication will be combined with those from the module Technical English to improve each student's written and oral communication skills.
Each student will choose a topic from the realm of bioinformatics, create a PowerPoint presentation for it, and deliver it; this will be followed by a group discussion of the content as well as feedback for the speaker. In addition, each student will critique one presentation in writing, and the instructor will do all of them via audio or video analysis. The areas of topicality include a short review of presentation techniques, rhetorical expression, pitfalls during a presentation, and critique writing.

Prerequisites:
n.a.

Lecture/Seminar profile:

Alternative Programming Languages (5_ALP)

Degree course	MC.ba
Course title	Alternative Programming Languages
Course code	5_ALP
Level	Bachelor
Term	SS23
Lecturer	Michael Bögl
Contact hours per week	4
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
- Get an understanding of design concepts of different programming languages.
- Basic understanding of compilation and compiled languages.
- Basic understanding of interpretation and interpreted languages.
- Learn and apply concepts of different languages.
- Become open to learn new concepts and languages.
- Judgement when to use which type of language.

Content:
Paradigms of modern native and interpreted programming languages; compiler theory; syntactical and structural design, applicability, implementation techniques, mapping scenarios, integration and embedding options of a selection of several modern programming languages according to specific purposes. For example:
1. Statistical data processing or big data analysis (R)
2. System Programming (Go, Rust)
3. Interpreted scripting languages (Python, Ruby, Perl)
4. Virtualized languages (Kotlin, Scala, C#)
5. Client-side web languages (JavaScript, Dart)

Prerequisites:
n.a.

Lecture/Seminar profile:

Database Design (5_DAB4 U)

Degree course	MC.ba
Course title	Database Design
Course code	5_DAB4 U
Level	Bachelor
Term	SS23
Lecturer	Erik Sonnleitner
Contact hours per week	2,4
ECTS credits	3
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
The goal of this course is to achieve a holistic understanding of modern database systems, especially towards relational and so-called NoSQL databases. We will start with database essentials, designing entity relationship diagrams, relational modeling and SQL (including DDL, DML, Trigger, Stored Procedures, etc). Moreover, database internals including transactions, concurrency protocols, security and physical data organization are presented. We'll also cover the heterogeneous landscape of modern NoSQL-style database systems, common APIs and security hardening.

Prerequisites:
n.a.

Lecture/Seminar profile:

Database Design (5_DAB4 V)

Degree course	MC.ba
Course title	Database Design
Course code	5_DAB4 V
Level	Bachelor
Term	SS23
Lecturer	Erik Sonnleitner
Contact hours per week	1,6
ECTS credits	2
Course type	Lecture
Examinations	written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
The goal of this course is to achieve a holistic understanding of modern database systems, especially towards relational and so-called NoSQL databases. We will start with database essentials, designing entity relationship diagrams, relational modeling and SQL (including DDL, DML, Trigger, Stored Procedures, etc). Moreover, database internals including transactions, concurrency protocols, security and physical data organization are presented. We'll also cover the heterogeneous landscape of modern NoSQL-style database systems, common APIs and security hardening.

Prerequisites:
n.a.

Lecture/Seminar profile:

Digital Imaging / Visual Computing (05_DVC4IL)

Degree course	MTD.ba
Course title	Digital Imaging / Visual Computing
Course code	05_DVC4IL
Level	Bachelor
Term	SS23
Lecturer	David Christian Schedl
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Students learn basic processes and techniques from digital image processing and computer vision. In addition to the theoretical understanding, students also acquire practical skills in implementing and applying algorithms and software that are used, for example, in deep learning, robotics, medicine, biology, astronomy, and media production.

Requirements
General interest in image processing and a basic math understanding.

Prerequisites:
Grundlagen in Design, Web, Medientechnik, Interaction und Games.

Lecture/Seminar profile:

Interaction and Game Programming (05_IGP4IL)

Degree course	MTD.ba
Course title	Interaction and Game Programming
Course code	05_IGP4IL
Level	Bachelor
Term	SS23
Lecturer	Philipp Wintersberger
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
In this course, we will discuss and apply the following three principles:

Exertion: Inclusion of body movement (i.e., gestures, activities, sequences) into games, play, and simulation. How can we create experiences that make our users exhausting themselves with joy?
Integration: Waiving the boundaries between users and technology. How can we create experiences that make people believe being an entity with technological artifacts?
AI and machine learning in games: How can we make our game actors self-learn and optimize behavior? For this part, there is no fundamental knowledge of AI and math needed.
Grading: In group projects, we will develop experiences that foster on at least one of the above mentioned areas.
Requirements
General interest into gameful experiences or simulation beyond classical games. Basic knowledge of Unity and/or Unreal assumed.

Prerequisites:
Fundamentals in Design, Web, media technology, Interaction and Games.

Lecture/Seminar profile:

Online Multimedia (05_ONM4IL)

Degree course	MTD.ba
Course title	Online Multimedia
Course code	05_ONM4IL
Level	Bachelor
Term	SS23
Lecturer	Rimbert Rudisch-Sommer
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	4

Learning objectives:
n.a.

Content:
In-depth contents in Hypermedia Programming, such as:

TypeScript
React
State Management (eg Redux)
Functional and Reactive Programming Concepts (eg RxJS)
Media-APIs (eg WebRTC, Streaming)
Laravel

Prerequisites:
Fundamentals in Design, Web, media technology, Interaction and Games.

Lecture/Seminar profile:

Semester Project (05_PRO0PT)

Degree course	MTD.ba
Course title	Semester Project
Course code	05_PRO0PT
Level	Bachelor
Term	SS23
Lecturer	Martin Harrer
Contact hours per week	1
ECTS credits	1
Course type	Project
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

Special Topic 3D (05_S3D4IL)

Degree course	MTD.ba
Course title	Special Topic 3D
Course code	05_S3D4IL
Level	Bachelor
Term	SS23
Lecturer	Marius David Oelsch
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	4

Learning objectives:
n.a.

Content:
Rigging is the foundation of all kind of manually animated sequences, from pretty simple rigs to quite complex full creature rigs. This course discusses different types of rigging for animation in Blender. Other than a bit of theory up front the course will mostly be in practical examples and exercises.

Prerequisites:
n.a.

Lecture/Seminar profile:

Software Study Project 1 (20_SPR4PT)

Degree course	SE.ba
Course title	Software Study Project 1
Course code	20_SPR4PT
Level	Bachelor
Term	SS23
Lecturer	Christian Oliver Bauernfeind
Contact hours per week	4
ECTS credits	4
Course type	Project
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Realisation of the first part of an extensive project with a real client (from industry/business or research) in a team, going through defined project phases, practising the process methods and models as well as the creation of all relevant project (process) documents and product documents.

Prerequisites:
Fundamentals of Project Engineering, Programming and Algorithms, Social Competence and Business Studies

Lecture/Seminar profile:

Disruptive Information Security (DIS6SE)

Degree course	SIB.ba
Course title	Disruptive Information Security
Course code	DIS6SE
Level	Bachelor
Term	SS23
Lecturer	
Contact hours per week	2
ECTS credits	2
Course type	Seminar
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
After successful completion of this course students will be able to:
Based on a business perspective
* Exhibit a basic understanding of technological, legal, ethical, organizational, and personnel issues involved with the introduction of disruptive technologies and their impact on information security.
* Identify and understand security processes throughout an organization adopting disruptive technologies and integrate information security holistically within an organization
* Identify shortages of information security processes and find ways to improve them.
* Communicate issues of risk and security with stakeholders.

Prerequisites:
n.a.

Lecture/Seminar profile:

Human Aspects of Information Security (HIS4IL)

Degree course	SIB.ba
Course title	Human Aspects of Information Security
Course code	HIS4IL
Level	Bachelor
Term	SS23
Lecturer	Marcus Nohlberg
Contact hours per week	2
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
Basics of human behaviour in the context of information security, subjective assessment of risks and threats, effectiveness of policies and regulations, overt and covert avoidance behaviour, basic concepts and examples of security awareness training.

Prerequisites:
n.a.

Lecture/Seminar profile:

Social Engineering (SEN2IL)

Degree course	SIB.ba
Course title	Social Engineering
Course code	SEN2IL
Level	Bachelor
Term	SS23
Lecturer	Marcus Nohlberg
Contact hours per week	2
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
Psychological basics of manipulation and influence, mechanisms and basic patterns of social engineering attacks and scams, possibilities of recognising and avoiding such attacks.

Prerequisites:
n.a.

Lecture/Seminar profile:

Distributed and Parallel Software Systems (09_VPS5VO)

Degree course	SE.ba
Course title	Distributed and Parallel Software Systems
Course code	09_VPS5VO
Level	Bachelor
Term	SS23
Lecturer	Bogdan Burlacu
Contact hours per week	1
ECTS credits	1
Course type	Lecture
Examinations	written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Introduction to the development of parallel and distributed programmes (motivation, application areas, Moore's Law, TOP500 list), theoretical basics (speed up, efficiency, Amdahl's Law, Gustafson's Law, consequences), overview of parallel hardware architectures (Flynn's Taxonomy, pipelining, shared memory systems, distributed memory systems), challenges when creating concurrent programmes (deadlocks, livelocks, race conditions, overhead, synchronisation), development of concurrent or parallel applications for .NET, OpenMP

Prerequisites:
n.a.

Lecture/Seminar profile:

Computational Intelligence II (0_2CO2U)

Degree course	DSE.ma
Course title	Computational Intelligence II
Course code	0_2CO2U
Level	Master
Term	SS23
Lecturer	Stephan Winkler, Sebastian Dorl
Contact hours per week	0,67
ECTS credits	2
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
descripion on page 33 and 34

Prerequisites:
n.a.

Lecture/Seminar profile:

Computational Intelligence II (0_2CO2V)

Degree course	DSE.ma
Course title	Computational Intelligence II
Course code	0_2CO2V
Level	Master
Term	SS23
Lecturer	Stephan Winkler, Ulrich Bodenhofer, Sebastian Dorl
Contact hours per week	2
ECTS credits	3
Course type	Lecture
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Theoretical part:
• Differentiation between numerical and heuristic optimization
• Taxonomy of heuristic optimization methods
• Examples of combinatorial optimization problems and complexity theory
• Solution space behavior and P and NP problems
• Heuristic methods (overview): Problem-specific methods vs. metaheuristics
• Construction vs. improvement heuristics
• Proximity and distance of solutions
• Local search
• Genetic Algorithms (GA)
• Evolution strategies
• Genetic Programming (GP)
• Symbolic regression and symbolic classification
• Basics of support vector machines: linear SVM, soft-margin SVM, non-linear SVMs and the kernel trick
• SVMs for classification of biological sequences
• Multi-class SVM and support vector regression
• History and basics of neural networks
• The backpropagation algorithm
• Tips and tricks for the practical use of neural networks
• Deep learning fundamentals: vanishing gradients, pre-training, alternative activation functions,

drop-out
• Convolutional neural networks: basics, transfer learning with the help of pre-trained networks, object recognition
• Recurrent neural networks and Long Short-Term Memory (LSTM) and their application in sequence and language processing
• Basic idea of Generative Adversarial Networks (GANs), Neural Style Transfer
• Deep fakes

Practical part:
• Development and use of evolutionary algorithms to solve different problems
• Implementation of evolutionary algorithms to solve different problems
• Use of data processing pipelines: data cleaning, feature definition & extraction, model selection, tuning, results analysis
• Use of regression and classification algorithms to solve different data mining tasks
• Use of different methods to find a solution and combination of methods (data preprocessing, clustering, classification / regression)
• Use of existing frameworks (HeuristicLab, MATLAB, Python packages) and implementation of own preprocessing methods
• Involvement of students in research projects of the research groups Heuristic and Evolutionary Algorithms (HEAL) and Bioinformatics (BIN)
• Use of linear and non-linear support vector machines for classification and regression
• Hyperparameter selection for SVMs using grid Search
• Use of classic neural networks for the classification of vectorial data
• Hyperparameter selection for neural networks using random search
• Use of convolutional neural networks for image classification
• Use of pre-trained convolutional neural networks for image classification
• Use of a simple GAN architecture to generate image data

Prerequisites:
n.a.

Lecture/Seminar profile:

Modelling and Simulation (0_MOS2U)

Degree course	DSE.ma
Course title	Modelling and Simulation
Course code	0_MOS2U
Level	Master
Term	SS23
Lecturer	Stephan Winkler
Contact hours per week	1
ECTS credits	2
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
In the practical part of this course the contents presented in the lectures are implemented using software frameworks MATLAB/Simulink and AnyLogic.

Prerequisites:
n.a.

Lecture/Seminar profile:

Modelling and Simulation (0_MOS2V)

Degree course	DSE.ma
Course title	Modelling and Simulation
Course code	0_MOS2V
Level	Master
Term	SS23
Lecturer	Stephan Winkler
Contact hours per week	2
ECTS credits	3
Course type	Lecture
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
• - continuous modelling
  - continuous simulation (numerical integration)
  - discrete modelling
  - discrete simulation discrete modelling
  - Discrete simulation techniques (incl. discrete event specified systems)
  - systems spread of diseases (epidemiology)
  - Predator-prey models
  - Control (incl. P, PID, cascade controllers)
  - Parameter optimisation and identification through simulation-based optimisation
  - Agent-based modelling and simulation

Software frameworks used:
• MATLAB / Simulink
• AnyLogic

Prerequisites:
n.a.

Lecture/Seminar profile:

Hypermedia Frameworks (HMF2IL)

Degree course	IM.ma
Course title	Hypermedia Frameworks
Course code	HMF2
Level	Master
Term	SS23
Lecturer	Rimbert Rudisch-Sommer
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
Students have gained an understanding of the principles of modern hypermedia application architectures with a focus on server-side application layers with different platforms. The students are able to select the most suitable tools for the respective application purpose from the multitude of existing and emerging tools and to use them correctly.

Content:
Architectures of Hypermedia Applications, Server-Side Frameworks (e.g. Spring Framework, Ruby on Rails, Play Framework), Rapid Application Development, Reactive Programming, Web Services, REST, Persistence Libraries.

Prerequisites:
n.a.

Lecture/Seminar profile:

Information Visualization (IVI2IL)

Degree course	IM.ma
Course title	Information Visualization
Course code	IVI2
Level	Master
Term	SS23
Lecturer	Mandy Keck, Holger Stitz
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
The course consists of a theoretical and a practical part. While the theoretical part serves as a basic introduction to information visualization, a practical project offers the opportunity to apply and deepen this knowledge.
Theory: Definition of information visualization, role of visualization in data analysis, reference model of visualization, data types and structures, visual perception and visual variables, visualization and interaction techniques, narrative visualizations (storytelling), presentation of common visualization libraries.

Prerequisites:
n.a.

Lecture/Seminar profile:

Real Time Engineering (RTE2IL)

Degree course	IM.ma
Course title	Real Time Engineering
Course code	RTE2
Level	Master
Term	SS23
Lecturer	Philipp Wintersberger
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
Graduates have knowledge of software and architecture patterns in the context of interactive real-time applications. They have an overview of the internal processes and mechanisms of current game and physics engines, as well as a theoretical and practical understanding of real-time physics simulation and its requirements and limitations. You have practical knowledge regarding the implementation of domain-specific problems using classical and visual programming methods.

Content:
Fundamentals of interactive real-time applications. Requirements and solutions for delay-free processing of user input, adaptation of the data model and visual and auditory output (data structures, software design patterns, architecture patterns). Fundamentals of real-time physical simulations. Implementation and integration with visual programming techniques (visual scripting).

Prerequisites:
n.a.

Lecture/Seminar profile:

Software Design Methods (SDM2IL)

Degree course	IM.ma
Course title	Software Design Methods
Course code	SDM2
Level	Master
Term	SS23
Lecturer	Hans Prüller
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
Modern Software Architectures and Methods of System Design, Modeling- and Design-Patterns, Development Environments, Test-cases, Use-cases, Performance vs. Elegance.

Prerequisites:
none

Lecture/Seminar profile:

Visual Computing (VCO2IL)

Degree course	IM.ma
Course title	Visual Computing
Course code	VCO2
Level	Master
Term	SS23
Lecturer	David Christian Schedl
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
Graduates are familiar with advanced methods and techniques from the field of machine vision. In addition to mathematical and theoretical understanding, students also acquire practical skills in the implementation and application of algorithms and software that are used, for example, in robotics, medicine, biology, astronomy and media technology.

Content:
Fundamentals of digital image processing and machine vision; visual perception; colours; cameras; linear and non-linear filters; spectral meth-ods; geometric operations; interpolation methods; multi-perspective methods; artificial intelligence; algorithms and software.

Prerequisites:
n.a.

Lecture/Seminar profile:

Intercultural Online Collaboration (KWM510)

Degree course	KWM.ma
Course title	Intercultural Online Collaboration
Course code	KWM510
Level	Master
Term	SS23
Lecturer	Martina Gaisch
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	3

Learning objectives:
n.a.

Content:
This module elaborates on intercultural theories that are predominant on a macro-level and discusses possible implications and cross-border interactions between individuals of different societal backgrounds. It is further discussed how globalization and internationalization endeavors encourage intercultural cooperation and what prerequisites are required for virtual teamwork across nations. Several hands-on examples are provided and critical intercultural incidents can be experienced, discussed and reflected upon throughout cross-border cooperation.

Prerequisites:
n.a.

Lecture/Seminar profile:

Leadership (KWM531)

Degree course	KWM.ma
Course title	Leadership
Course code	KWM531
Level	Master
Term	SS23
Lecturer	Carrie Kovacs
Contact hours per week	1,5
ECTS credits	2,5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Course Aims:
The course aims to provide an overview of major leadership theories, including basic assumptions, empirical evidence and practical applications of these theories. Students will practice applying theories to real-life examples (e.g., personal experiences, case studies…) in order to gain a deeper understanding of the leadership process and to reflect on the interaction between theory, empirical research, and practice.

Content:
The course will present the following topics broadly, with students covering individual topics in more depth:
• Defining & Describing Leadership
• Trait Approach / Skills Approach
• Behavioral Approach
• Situational Approach / Path-Goal Theory
• Leader-Member Exchange (LMX)
• Gender & Leadership
• Leadership Ethics
• Servant Leadership / Followership

Teaching Methods:
Online meetings consisting of teacher and student presentations, discussions and interactive

exercises. Students take an active part in structuring individual classes.

Assignments/Grading:
• Class participation, including preparing discussion questions and taking part in discussions (40%)
• Helping plan & lead a class on one topic (30%)
• Summarizing & presenting an empirical leadership study (30%)

Literature:
Northouse, P. G. (2018). Leadership: Theory and practice (8th ed.). Sage.
as well as selected empirical articles

Prerequisites:
n.a.

Lecture/Seminar profile:

Digitalization: Technologies and Deployment Scenarios (KWM540)

Degree course	KWM.ma
Course title	Digitalization: Technologies and Deployment Scenarios
Course code	KWM540
Level	Master
Term	SS23
Lecturer	Stefan Unterhuber
Contact hours per week	1
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
After successful completion of the course ...
... the students received a general overview of the nature of Digital Transformation (DT) and its current and predicted effects on their own lives and work,
... students have an overview of technological developments relevant to DT and their effects on everyday life and the world of work,
... the students have developed a differentiated view of the implementation of digitization ideas, which includes the different success factors in the concrete environment (e.g. Disruption vs. Evolution),
... the students know the different drivers behind the DT as well as the respective hurdles,
... the students know best practices for digitization projects in different industries and markets,
... the students know a number of methods for dealing practically with the requirements of complex and dynamic digitization projects.

Prerequisites:
n.a.

Lecture/Seminar profile:

Home and Building Automation (3_MC509)

Degree course	MC.ma
Course title	Home and Building Automation
Course code	3_MC509
Level	Master
Term	SS23
Lecturer	Christoph Schaffer
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
EIB/KNX, LON, digitalstrom, UPnP, CEBus, DALI, EHS, HAVi, HomePlug, HomeRF, Jini, X10, Cobranet, AMX, Crestron

Prerequisites:
n.a.

Lecture/Seminar profile:

Data Mining and Machine Learning (15_DML2ILV)

Degree course	SE.ma
Course title	Data Mining and Machine Learning
Course code	15_DML2ILV
Level	Master
Term	SS23
Lecturer	Michael Affenzeller, Kaifeng Yang
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Overview of characteristic data mining problems, categorization of problems, complexity of hypothesis spaces, overfitting, underfitting, use of training validation and test data, cross-validation Find-S and Candidate Elimination algorithms, Decision Trees, Case-based Learning, Rule-Based learning, ensemble techniques.
Genetic Programming, symbolic regression, symbolic classification.
Exercise part: Use of the different machine learining algorithms on the basis of data sets from practice as well as benchmark data sets; training in the use of the Data Mining functionalities of HeuristicLab.

Prerequisites:
n.a.

Lecture/Seminar profile:

Artificial Intelligence (22_KIN2ILV)

Degree course	SE.ma
Course title	Artificial Intelligence
Course code	22_KIN2ILV
Level	Master
Term	SS23
Lecturer	Stephan Dreiseitl, Erik Pitzer
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:
n.a.

Content:
Structure of intelligent systems, search algorithms, heuristics, constraint satisfaction problems, propositional logic and predicate logic as languages of knowledge representation and inference, planning algorithms, knowledge representation and inference in stochastic systems using Bayesian networks and Markov chains, optimal action selection in deterministic and stochastic environments through reinforcement learning.

Prerequisites:
n.a.

Lecture/Seminar profile:

Data Preprocessing and Analytics (17_DVA2I)

Degree course	HCC.ma
Course title	Data Preprocessing and Analytics
Course code	17_DVA2I
Level	Master
Term	SS23
Lecturer	Bogdan Burlacu
Contact hours per week	2
ECTS credits	3
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

Artificial Intelligence and Machine Learning (20_KIN2 U)

Degree course	IEM.ma
Course title	Artificial Intelligence and Machine Learning
Course code	20_KIN2 U
Level	Master
Term	SS23
Lecturer	Bogdan Burlacu
Contact hours per week	1
ECTS credits	2
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

Artificial Intelligence and Machine Learning (20_KIN2 V)

Degree course	IEM.ma
Course title	Artificial Intelligence and Machine Learning
Course code	20_KIN2 V
Level	Master
Term	SS23
Lecturer	Bogdan Burlacu
Contact hours per week	1
ECTS credits	1,5
Course type	Lecture
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
n.a.

Prerequisites:
n.a.

Lecture/Seminar profile:

Cross Cultural Business Communication (CCC2ILV)

Degree course	ISM.ma
Course title	Cross Cultural Business Communication
Course code	CCC2ILV
Level	Master
Term	SS23
Lecturer	Martina Gaisch
Contact hours per week	1,5
ECTS credits	3
Course type	Integrated course
Examinations	written examination
Language of instruction	English
Places for international students	2

Learning objectives:
n.a.

Content:
Theories and core concepts of intercultural communication processes, intercultural negotiation with accompanying reflection,
Examples and experiences from practical application areas, exercises for the further development of generic key competences. Intercultural negotiation and dialogue skills are practised and analysed on the basis of several case studies.

Prerequisites:
n.a.