

ENGLISH COURSES WINTER SEMESTER 2022/23

UNIVERSITY OF APPLIED SCIENCES UPPER
AUSTRIA

HAGENBERG CAMPUS



Winter Semester 2022/23

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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	ALD3 U	Algorithms and Data Structures	Practice-oriented session	3	Bachelor	3	7
AC.ba	ALD3 V	Algorithms and Data Structures	Lecture	3	Bachelor	2	8
AC.ba	VIS3 U	Distributed Information Systems	Practice-oriented session	3	Bachelor	3	9
AC.ba	VIS3 V	Distributed Information Systems	Lecture	3	Bachelor	2	10
Hardware-Software-Design (Bachelor, Hagenberg Campus)							
HSD.ba	EKI5-17ILV	Introduction to Artificial Intelligence	Integrated course	5	Bachelor	2,5	11
HSD.ba	ENG1-17ILV	English 1	Integrated course	1	Bachelor	2	12
HSD.ba	ENG3-17ILV	English 3	Integrated course	3	Bachelor	1,5	13
HSD.ba	ENGD3-20ILV	English 3	Integrated course	3	Bachelor	1,5	14
Communication and Knowledge Media (Bachelor, Hagenberg Campus)							
KWM.ba	ENG1UE	English I	Practice-oriented session	1	Bachelor	1	15
KWM.ba	ENG3UE	English III	Practice-oriented session	3	Bachelor	1	16
KWM.ba	IXD3VO	Interaction Design	Lecture	3	Bachelor	1	17
Medical and Bioinformatics (Bachelor, Hagenberg Campus)							
MBI.ba	21_KEN1UE	English 1	Practice-oriented session	1	Bachelor	2	18
MBI.ba	21_TEN3UE	Technical English 1	Practice-oriented session	3	Bachelor	1	19
MBI.ba	21_TEN5UE	Technical English 3	Practice-oriented session	5	Bachelor	1	20
Mobile Computing (Bachelor, Hagenberg Campus)							
MC.ba	4_MOG	Mobile Games	Integrated course	5	Bachelor	5	21
MC.ba	4_MOS	Mobile Sports	Integrated course	5	Bachelor	5	22

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Mobile Computing (Bachelor, Hagenberg Campus)							
MC.ba	4_SEA	Software Development Using Android	Integrated course	3	Bachelor	5	23
MC.ba	4_SEI	Software Development Using iOS/Swift	Integrated course	3	Bachelor	5	24
MC.ba	5_ALP	Alternative Programming Languages	Integrated course	5	Bachelor	5	25
MC.ba	5_VIS3 U	Distributed Information Systems	Practice-oriented session	3	Bachelor	3	26
MC.ba	5_VIS3 V	Distributed Information Systems	Lecture	3	Bachelor	2	27
Media Technology and Design (Bachelor, Hagenberg Campus)							
MTD.ba	45_MTD290A	Project 1	Project	3	Bachelor	6	28
MTD.ba	45_MTD350	Visual Effects	Integrated course	5	Bachelor	5	29
MTD.ba	45_MTD352	Stop Motion Animation	Integrated course	5	Bachelor	1	30
MTD.ba	45_MTD370	Audio Processing	Integrated course	5	Bachelor	5	31
MTD.ba	45_MTD380	Web Applications	Integrated course	5	Bachelor	5	32
MTD.ba	45_MTD384	Introduction to Virtual Reality	Integrated course	5	Bachelor	5	33
MTD.ba	45_MTD386	Machine Learning with Python	Integrated course	5	Bachelor	5	34
Software Engineering (Bachelor, Hagenberg Campus)							
SE.ba	09_VPS5VO	Distributed and Parallel Software Systems	Lecture	5	Bachelor	1	35
SE.ba	14_VPS5UE	Distributed and Parallel Software Systems	Practice-oriented session	5	Bachelor	1,5	36

Master's Degree Programme

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Digital Arts (Master, Hagenberg Campus)							
DA.ma	DA630	Generative and Interactive Arts	Integrated course	3	Master	4,5	37
DA.ma	DA641	Special Topic: Game Design Prototyping	Integrated course	3	Master	4,5	38
Data Science and Engineering (Master, Hagenberg Campus)							
DSE.ma	0_1CO1U	Computational Intelligence I	Practice-oriented session	1	Master	2	39
DSE.ma	0_1CO1V	Computational Intelligence I	Lecture	1	Master	3	40
DSE.ma	0_NUM1U	Numerical Methods	Practice-oriented session	1	Master	2	41
DSE.ma	0_NUM1V	Numerical Methods	Lecture	1	Master	3	42
Energy Informatics (Master, Hagenberg Campus)							
ENI.ma	ENI401	Physics	Integrated course	1	Master	5	43
ENI.ma	ENI402	International Energy Markets and Energy Law	Integrated course	1	Master	5	44
ENI.ma	ENI403	Processes and Process Modelling	Integrated course	1	Master	5	45
ENI.ma	ENI404	Systems Engineering I: Fundamentals	Integrated course	1	Master	5	46
ENI.ma	ENI406	Energy Consumers	Integrated course	3	Master	5	47
ENI.ma	ENI501	Communication Technology	Integrated course	1	Master	5	48
ENI.ma	ENI506	Home and Building Automation	Integrated course	3	Master	5	49
ENI.ma	ENI507	Cloud Computing/Big Data	Integrated course	3	Master	5	50
ENI.ma	ENI508	Software Systems II: SCADA	Integrated course	3	Master	5	51
ENI.ma	ENI517	Introduction to Python	Integrated course	1	Master	5	52
ENI.ma	ENI601	Scientific Working	Seminar	3	Master	1	53

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Embedded Systems Design (Master, Hagenberg Campus)							
ESD.ma	DRS3-18UE	Distributed Realtime Systems	Practice-oriented session	3	Master	2	54
ESD.ma	DRS3-18VO	Distributed Realtime Systems	Lecture	3	Master	3	55
Interactive Media (Master, Hagenberg Campus)							
IM.ma	AIN1	Artificial Intelligence	Integrated course	1	Master	5	56
IM.ma	GDE1	Game Development	Integrated course	1	Master	5	57
IM.ma	HCI1	Human Computer Interaction	Integrated course	1	Master	5	58
IM.ma	HUX1	Hypermedia UX Engineering	Integrated course	1	Master	5	59
IM.ma	IM601	Design for Physical Prototyping	Integrated course	3	Master	4,5	60
IM.ma	IM620	Semantic Online Services and Applications	Integrated course	3	Master	4,5	61
IM.ma	IM621	Semantic Text Analysis	Integrated course	3	Master	4,5	62
IM.ma	IM645	Special Topic: In-Game Technologies	Integrated course	3	Master	4,5	63
IM.ma	IM692	Academic Writing	Seminar	3	Master	3	64
IM.ma	RTG1	Real Time Graphics	Integrated course	1	Master	5	65
IM.ma	STO1	Special Topic 1	Integrated course	1	Master	5	66
Software Engineering (Master, Hagenberg Campus)							
SE.ma	15_APP3ILV	Alternative Programming Paradigms	Integrated course	3	Master	5	67
SE.ma	15_BDV3ILV	Big Data Analytics and Interactive Visualization	Integrated course	3	Master	5	68
SE.ma	15_DWO1ILV	Data Warehousing, OLAP and Business Intelligence	Integrated course	1	Master	5	69
SE.ma	15_HEA1ILV	Heuristic and Evolutionary Algorithms	Integrated course	1	Master	5	70
SE.ma	15_MSM1ILV	Modelling and Simulation	Integrated course	1	Master	5	71

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Secure Information Systems (Master, Hagenberg Campus)							
SIM.ma	SAS3SE	Current Security Topics	Seminar	3	Master	2	72
Human-Centered Computing (Master - Part Time, Hagenberg Campus)							
HCC.ma	17_INT3I	Intercultural Negotiation	Integrated course	3	Master	1,5	73
Information Engineering and -Management (Master - Part Time, Hagenberg Campus)							
IEM.ma	20_BEC3 T	Business English Communication Skills	Individual Training	3	Master	1	74
IEM.ma	20_ICC3 I	Intercultural Communication	Integrated course	3	Master	2	75
Information Security Management (Master - Part Time, Hagenberg Campus)							
ISM.ma	LAN1ILV	Language 1	Integrated course	1	Master	2	76
ISM.ma	SAW3ILV	Security Awareness	Integrated course	3	Master	3	77

General Courses

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
	GER1	German Course	Lecture			2	

Lecture/Seminar profile:**Algorithms and Data Structures (ALD3 U)**

Degree course	AC.ba
Course title	Algorithms and Data Structures
Course code	ALD3 U
Level	Bachelor
Term	WS22/23
Lecturer	Marc Kurz
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:

Focus on algorithms and data structures. Specification of algorithms; Complex dynamic data structures (trees, graphs), standard algorithms (search, sorting, dynamic search trees, hashing methods), iterative methods (conversion of sum expressions), recursive algorithms, elementary graph algorithms, calculation models and complexity measures. In the area of concrete applications, data formats for geodata (OGC SFS, GDF,...) are treated as well as path data-graphs and routine algorithms.

Prerequisites:

n.a.

Lecture/Seminar profile:**Algorithms and Data Structures (ALD3 V)**

Degree course	AC.ba
Course title	Algorithms and Data Structures
Course code	ALD3 V
Level	Bachelor
Term	WS22/23
Lecturer	Marc Kurz
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:

Focus on algorithms and data structures. Specification of algorithms; Complex dynamic data structures (trees, graphs), standard algorithms (search, sorting, dynamic search trees, hashing methods), iterative methods (conversion of sum expressions), recursive algorithms, elementary graph algorithms, calculation models and complexity measures. In the area of concrete applications, data formats for geodata (OGC SFS, GDF,...) are treated as well as path data-graphs and routing algorithms.

Prerequisites:

n.a.

Lecture/Seminar profile:**Distributed Information Systems (VIS3 U)**

Degree course	AC.ba
Course title	Distributed Information Systems
Course code	VIS3 U
Level	Bachelor
Term	WS22/23
Lecturer	Michael Plattner
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:

Theoretical foundations of “distributed systems” - basic practical knowledge about client / server communication via TCP / UDP sockets (C ++ / Java) and the use of threads, taking the corresponding synchronization mechanisms into account - Java RMI - Java-based SOAP / REST APIs - fundamentals in the area of frameworks and component-oriented software development.

Prerequisites:

n.a.

Lecture/Seminar profile:**Distributed Information Systems (VIS3 V)**

Degree course	AC.ba
Course title	Distributed Information Systems
Course code	VIS3 V
Level	Bachelor
Term	WS22/23
Lecturer	Jens Krösche
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:

Theoretical foundations of “distributed systems” - basic practical knowledge about client / server communication via TCP / UDP sockets (C ++ / Java) and the use of threads, taking the corresponding synchronization mechanisms into account - Java RMI - Java-based SOAP / REST APIs - fundamentals in the area of frameworks and component-oriented software development.

Prerequisites:

n.a.

Lecture/Seminar profile:**Introduction to Artificial Intelligence (EKI5-17ILV)**

Degree course	HSD.ba
Course title	Introduction to Artificial Intelligence
Course code	EKI5-17ILV
Level	Bachelor
Term	WS22/23
Lecturer	Dietmar Millinger
Contact hours per week	2
ECTS credits	2,5
Course type	Integrated course
Examinations	written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Definition and Context of AI

Machine Learning

Life cycle of Machine Learning Projects

The goal of the class is to provide actionable knowledge about the basic principles and structures as well as

functions of applied AI systems. This class has a focus on machine learning. With this knowledge the

student shall be able to select and integrate AI modules into larger software systems. Therefore the students

learn about a number of common AI modules, their functions and their interfaces. A special focus lies in the

life cycle of machine learning projects from proof of concept to production situations and the use of frameworks in production projects. In the practical part, 6 exercises are implemented in python on jupyter

notebooks and strategies for improvement of the results are developed.

Prerequisites:

n.a.

Lecture/Seminar profile:**English 1 (ENG1-17ILV)**

Degree course	HSD.ba
Course title	English 1
Course code	ENG1-17ILV
Level	Bachelor
Term	WS22/23
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	3

Learning objectives:

n.a.

Content:

Grammar is refreshed and deepened, subject-specific or everyday vocabulary is expanded, and important phrases and idioms are conveyed to improve written and oral expression. Topics include, among others, application documents, job interviews, as well as current technical topics.

Prerequisites:

n.a.

Lecture/Seminar profile:**English 3 (ENG3-17ILV)**

Degree course	HSD.ba
Course title	English 3
Course code	ENG3-17ILV
Level	Bachelor
Term	WS22/23
Lecturer	Julia Maria Lengauer
Contact hours per week	2
ECTS credits	1,5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Further and more elaborate sharpening of subject-specific or everyday vocabulary; important phrases and idioms are taught to achieve an improvement in both written and oral expression.

Prerequisites:

n.a.

Lecture/Seminar profile:**English 3 (ENGD3-20ILV)**

Degree course	HSD.ba
Course title	English 3
Course code	ENGD3-20ILV
Level	Bachelor
Term	WS22/23
Lecturer	Julia Maria Lengauer
Contact hours per week	1,6
ECTS credits	1,5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Further and more elaborate sharpening of subject-specific or everyday vocabulary; important phrases and idioms are taught to achieve an improvement in both written and oral expression.

Prerequisites:

n.a.

Lecture/Seminar profile:**English I (ENG1UE)**

Degree course	KWM.ba
Course title	English I
Course code	ENG1UE
Level	Bachelor
Term	WS22/23
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:

The content of the course is focused on deepening, broadening and refreshing of competences in the areas of grammar, subject-specific and general vocabulary, context-appropriate written and oral expression through role-playing, group work, work in pairs, research, debates, as well as video and audio work, etc. The subject areas should be related to specialized topics of the course or to topics of the social competence lectures held in the respective semester (e.g., context-adequate conversation in various every day and professional situations).

Prerequisites:

n.a.

Lecture/Seminar profile:**English III (ENG3UE)**

Degree course	KWM.ba
Course title	English III
Course code	ENG3UE
Level	Bachelor
Term	WS22/23
Lecturer	Annamaria Mähr
Contact hours per week	1
ECTS credits	1
Course type	Practice-oriented session
Examinations	oral examination
Language of instruction	German/English
Places for international students	2

Learning objectives:

n.a.

Content:

The focus of the course is primarily on the enhancement of oral expression skills, including the training of presentation skills, description of statistics and other data and result presentations, job applications, job interviews, negotiations (especially with regard to the professional internship) through oral presentation, discussion, role plays on various real-life situations.

Prerequisites:

n.a.

Lecture/Seminar profile:**Interaction Design (IXD3VO)**

Degree course	KWM.ba
Course title	Interaction Design
Course code	IXD3VO
Level	Bachelor
Term	WS22/23
Lecturer	Thomas Neumayr
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:

After the course, students know the basics of the human-centered design process, have learned helpful methods and techniques for interaction design, and are skilled in the basics of sketching and prototyping in the context of Human-Computer Interaction.

Content:

The usability and user experience of many interactive products (e.g., websites, apps, entertainment devices, smart homes, ...) could be substantially improved if the creators of such technologies would think more about their users' actual needs, goals, and skills. Therefore, the Interaction Design lecture is concerned with presenting tools and techniques that allow students to understand how human-centered design of user interfaces for interactive products works. Topics include usability, user experience, human-computer interaction, and human-centered design methods. Different methods for the design, prototyping, and testing of new user interfaces together with test users are discussed. The course teaches important methods from usability engineering and interaction design such as user observation, requirements analysis, sketching, wireframes, prototyping, etc. To pass the course, students have to pass a final written exam at the end of the term (semester).

Prerequisites:

n.a.

Lecture/Seminar profile:**English 1 (21_KEN1UE)**

Degree course	MBI.ba
Course title	English 1
Course code	21_KEN1UE
Level	Bachelor
Term	WS22/23
Lecturer	Sandra Zwirchmayr, Alastair Long
Contact hours per week	2
ECTS credits	2
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	4

Learning objectives:

n.a.

Content:

Primarily—but not exclusively—by means of simulations, role plays, group work, pair work, presentations, research, debates, as well as video and audio work important elements of grammar will be reviewed, technical and general vocabulary skills will be expanded, and idiomatic expressions will be introduced. All this should lead to an improvement in each student's oral and written communication skills. Some of the areas of topicality include job application documents, job interviews, and current bioinformatics issues as well as those from other areas.

Prerequisites:

n.a.

Lecture/Seminar profile:**Technical English 1 (21_TEN3UE)**

Degree course	MBI.ba
Course title	Technical English 1
Course code	21_TEN3UE
Level	Bachelor
Term	WS22/23
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:

Primarily—but not exclusively—by means of group work, pair work, presentations, research, debates, as well as video and audio work the skills acquired in the module English for Communication will be honed and the process will be continued to expand each student's technical and general vocabulary skills as well as idiomatic usage in order to improve their written and oral communication skills. Areas of topicality, among others, are expressing cause and effect, predictions, and insights (past, present, future) into important companies from areas such as pharmaceuticals, agriculture, environment, and biotechnology.

Prerequisites:

n.a.

Lecture/Seminar profile:**Technical English 3 (21_TEN5UE)**

Degree course	MBI.ba
Course title	Technical English 3
Course code	21_TEN5UE
Level	Bachelor
Term	WS22/23
Lecturer	Sandra Zwirchmayr
Contact hours per week	1
ECTS credits	1
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Primarily—but not exclusively—by means of group work, pair work, presentations, research, case studies, debates, as well as video and audio work the skills acquired in the module English for Communication as well as those from the third and fourth semesters will be honed and the process will be continued to expand each student's technical and general vocabulary skills as well as idiomatic usage in order to improve their written and oral communication skills.

In addition, areas dealing with stress situations within a company (employee conflicts, generational differences, tough decisions, heterogeneous company cultures, diverse employee interests, etc.) will be dealt with in order to study behavioral patterns and further interpersonal skills.

Prerequisites:

n.a.

Lecture/Seminar profile:**Mobile Games (4_MOG)**

Degree course	MC.ba
Course title	Mobile Games
Course code	4_MOG
Level	Bachelor
Term	WS22/23
Lecturer	Christian Bartsch
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:

n.a.

Content:

Technical topics about development of mobile games with a game engine.
Students develop their own games as a semester project in groups of 2, the project submission and presentation determine the final grade.

Prerequisites:

n.a.

Lecture/Seminar profile:**Mobile Sports (4_MOS)**

Degree course	MC.ba
Course title	Mobile Sports
Course code	4_MOS
Level	Bachelor
Term	WS22/23
Lecturer	Stephan Selinger
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:

n.a.

Content:

The lectures show the basics, methods, algorithms and techniques needed to successfully participate in the development of such systems.

Accompanying the theory parts (see the list below), we are going to develop an app, so that at the end of the course we will have a fully functional system.

Course content:

- Introduction (definitions, example systems, ...)
- Mobile sports for health
- Mathematical and physical foundations (classification, clustering, regression, kinematics, force and motion, work and energy, power)
- Principles of exercise training
- Exercise and work physiology
- Applications of heart-rate monitoring, energy expenditure, respiration rate
- Speed and distance devices
- Power meters
- Technology for mobile sports applications (ANT, 802.15.4, BT LE, Garmin Connect IQ)
- Applications of machine learning

Prerequisites:

n.a.

Lecture/Seminar profile:

Software Development Using Android (4_SEA)

Degree course	MC.ba
Course title	Software Development Using Android
Course code	4_SEA
Level	Bachelor
Term	WS22/23
Lecturer	Jens Krösche
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:

n.a.

Content:

An Android development course for beginners covering the basics of Android development using Kotlin.

Prerequisites:

n.a.

Lecture/Seminar profile:**Software Development Using iOS/Swift (4_SEI)**

Degree course	MC.ba
Course title	Software Development Using iOS/Swift
Course code	4_SEI
Level	Bachelor
Term	WS22/23
Lecturer	
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:

- Development with the programming language Swift
- Usage of common iOS frameworks (UIKit, Core Data etc.)
- Development of iOS apps with Xcode

Content:

- Introduction
- Swift Fundamentals
- UIKit
- Intro to Xcode
- Data & Testing
- Git & Networking
- Core Data
- SwiftUI
- App Store Submissions & Tools

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	WS22/23
Lecturer	
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:**Distributed Information Systems (5_VIS3 U)**

Degree course	MC.ba
Course title	Distributed Information Systems
Course code	5_VIS3 U
Level	Bachelor
Term	WS22/23
Lecturer	Jens Krösche
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	4

Learning objectives:

n.a.

Content:

Theoretical foundations of “distributed systems” - basic practical knowledge about client / server communication via TCP / UDP sockets (C ++ / Java) and the use of threads, taking the corresponding synchronization mechanisms into account - Java RMI - Java-based SOAP / REST APIs - fundamentals in the area of frameworks and component-oriented software development

Prerequisites:

n.a.

Lecture/Seminar profile:**Distributed Information Systems (5_VIS3 V)**

Degree course	MC.ba
Course title	Distributed Information Systems
Course code	5_VIS3 V
Level	Bachelor
Term	WS22/23
Lecturer	Jens Krösche
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:

Theoretical foundations of “distributed systems” - basic practical knowledge about client / server communication via TCP / UDP sockets (C ++ / Java) and the use of threads, taking the corresponding synchronization mechanisms into account - Java RMI - Java-based SOAP / REST APIs - fundamentals in the area of frameworks and component-oriented software development

Prerequisites:

n.a.

Lecture/Seminar profile:**Project 1 (45_MTD290A)**

Degree course	MTD.ba
Course title	Project 1
Course code	45_MTD290A
Level	Bachelor
Term	WS22/23
Lecturer	
Contact hours per week	4,5
ECTS credits	6
Course type	Project
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	2

Learning objectives:

n.a.

Content:

Interactive media project. Projects are based on the knowledge and skills acquired during the first two semesters. Each project has a separate and specific goal. The project course is supplemented by the "project management" course.

Prerequisites:

n.a.

Lecture/Seminar profile:**Visual Effects (45_MTD350)**

Degree course	MTD.ba
Course title	Visual Effects
Course code	45_MTD350
Level	Bachelor
Term	WS22/23
Lecturer	Patrick Proier
Contact hours per week	4
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	4

Learning objectives:

n.a.

Content:

Introduction to advanced After Effects compositing workflows to combine real footage and synthetic 3D imagery for visual effects in motion (e.g., 2D/3D compositing, match-moving, HDRI, 3D object scanning, aerial mapping, particle simulations, simple motion capturing, color grading, etc.).

Prerequisites:

n.a.

Lecture/Seminar profile:**Stop Motion Animation (45_MTD352)**

Degree course	MTD.ba
Course title	Stop Motion Animation
Course code	45_MTD352
Level	Bachelor
Term	WS22/23
Lecturer	
Contact hours per week	0,85
ECTS credits	1
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:

n.a.

Content:

Workflow, principles and language of related analogue animation techniques: Stop Motion, Clay Animation, Cut Out, Cartoon Animation, Rotoscoping.

Prerequisites:

n.a.

Lecture/Seminar profile:**Audio Processing (45_MTD370)**

Degree course	MTD.ba
Course title	Audio Processing
Course code	45_MTD370
Level	Bachelor
Term	WS22/23
Lecturer	
Contact hours per week	2,8
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:

Fundamentals of processing digital audio signals in both theory and practice. Specification and implementation of filters. Development environment with support for audio development. Simulation of the effect of basic algorithms from the field of synthesis and development of customized audio plug-ins (eg Max / MSP / Jitter).

Prerequisites:

n.a.

Lecture/Seminar profile:**Web Applications (45_MTD380)**

Degree course	MTD.ba
Course title	Web Applications
Course code	45_MTD380
Level	Bachelor
Term	WS22/23
Lecturer	Rimbert Rudisch-Sommer
Contact hours per week	2,8
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:

Using PHP-based ContentManagement-/WebApplication-Frameworks for the development of advanced Web Applications.

Prerequisites:

n.a.

Lecture/Seminar profile:**Introduction to Virtual Reality (45_MTD384)**

Degree course	MTD.ba
Course title	Introduction to Virtual Reality
Course code	45_MTD384
Level	Bachelor
Term	WS22/23
Lecturer	
Contact hours per week	2,8
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:

Concepts and definition, application areas and application development, stereoscopic rendering and display technologies, tracking and input devices, interaction and navigation, visualisation basics, networked virtual environments, state of the art hardware and best practices.

Prerequisites:

n.a.

Lecture/Seminar profile:**Machine Learning with Python (45_MTD386)**

Degree course	MTD.ba
Course title	Machine Learning with Python
Course code	45_MTD386
Level	Bachelor
Term	WS22/23
Lecturer	
Contact hours per week	2,8
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	4

Learning objectives:

n.a.

Content:

With the programming language "Python", which is widely used in the field of artificial intelligence and machine learning, we show the typical course of a machine learning project. Classification and regression methods are familiarized with real tasks, such as the forecasting of real estate prices or the recognition of handwriting. An introduction to the implementation of models based on neural networks is provided with the program library "Tensorflow".

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	WS22/23
Lecturer	Stefan Wagner
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 programs (motivation, application domains, Moore's law, TOP500 list), theoretical foundations (speedup, efficiency, Amdahl's law, Gustafson's law, consequences), overview of parallel hardware architectures (Flynn's taxonomy, pipelining, shared memory systems, distributed memory systems), challenges of implementing concurrent programs (deadlocks, livelocks, race conditions, overhead, synchronization), development of concurrent or parallel applications for .NET, OpenMP

Prerequisites:

WEB2

Lecture/Seminar profile:**Distributed and Parallel Software Systems (14_VPS5UE)**

Degree course	SE.ba
Course title	Distributed and Parallel Software Systems
Course code	14_VPS5UE
Level	Bachelor
Term	WS22/23
Lecturer	Stefan Wagner, Jan Zenisek
Contact hours per week	1
ECTS credits	1,5
Course type	Practice-oriented session
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	4

Learning objectives:

n.a.

Content:

Exercises deepen the content of the lecture by practical examples.

Prerequisites:

WEB2

Lecture/Seminar profile:**Generative and Interactive Arts (DA630)**

Degree course	DA.ma
Course title	Generative and Interactive Arts
Course code	DA630
Level	Master
Term	WS22/23
Lecturer	Roland Haring
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:

n.a.

Content:

Concepts of procedural, real-time audio, video, interactivity, randomness, installations. Algorithmic creation of artistic contents, such as images, videos, sounds and texts. Randomness, numerical techniques (fractal, chaos, etc.), mapping images, optimal placement, formal esthetics, gestalt perception. Interactive techniques. Algorithmic music generation. Algorithmic generation of texts and stories.

Prerequisites:

n.a.

Lecture/Seminar profile:**Special Topic: Game Design Prototyping (DA641)**

Degree course	DA.ma
Course title	Special Topic: Game Design Prototyping
Course code	DA641
Level	Master
Term	WS22/23
Lecturer	Michael Lankes
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	German/English
Places for international students	2

Learning objectives:

n.a.

Content:

The course deals with the approaches and types of game prototyping in the context of games research. Innovative design topics are covered that are outside the classical game design concept: natural user interfaces in games (e.g., Eye-Tracking games), hybrid games (i.e., VR/AR games), or Low-Fidelity game prototypes (e.g., Wizard-of-Oz Prototyping). Scientific topics such as methods and empirical research are also covered.

Prerequisites:

n.a.

Lecture/Seminar profile:

Computational Intelligence I (0_1CO1U)

Degree course	DSE.ma
Course title	Computational Intelligence I
Course code	0_1CO1U
Level	Master
Term	WS22/23
Lecturer	Michael Affenzeller, Michael Kommenda
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:

supervised/unsupervised learning, Hypothesis space feature selection Conceptual learning, candidate elimination cross-validation, case-based reasoning, rule-based reasoning nearest neighbours, decision trees classifier systems, Artificial Neuronal Networks (classical & Bayesian approach), Deep Learning, Support Vector Machines & Kernel Methods, Random forest regression/classification, Bayesian Networks und Clustering, Markov Chain Monte Carlo Sampling, exercises with WEKA, HeuristicLab and SPSS/Clementine

Prerequisites:

n.a.

Lecture/Seminar profile:

Computational Intelligence I (0_1CO1V)

Degree course	DSE.ma
Course title	Computational Intelligence I
Course code	0_1CO1V
Level	Master
Term	WS22/23
Lecturer	Michael Affenzeller, Michael Kommenda
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:

supervised/unsupervised learning, Hypothesis space feature selection Conceptual learning, candidate elimination cross-validation, case-based reasoning, rule-based reasoning nearest neighbours, decision trees classifier systems, Artificial Neuronal Networks (classical & Bayesian approach), Deep Learning, Support Vector Machines & Kernel Methods, Random Forest regression/classification, Bayesian Networks und Clustering, Markov Chain Monte Carlo Sampling, exercises with WEKA, HeuristicLab and SPSS/Clementine

Prerequisites:

n.a.

Lecture/Seminar profile:**Numerical Methods (0_NUM1U)**

Degree course	DSE.ma
Course title	Numerical Methods
Course code	0_NUM1U
Level	Master
Term	WS22/23
Lecturer	Stephan Dreiseitl
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:

Introduction: problems of calculating with floating point numbers, examples from numerical differentiation/integration.

Numerical linear algebra: least squares for systems of equations, eigenvalues, eigensystems, diagonalization, Monte Carlo methods: basics

Optimization: continuous functions with or without constraints (gradient methods, quasi-Newton methods, etc.), integer optimization, branch & bound, branch & cut, simplex/complex method, systems of equations:

Algebraic equations (Newton methods etc.)

Differential equation systems (Runge Kutta etc.)

Dynamic optimization: graph search, Q-learning

Approximation methods, splines, Fourier transformation

Prerequisites:

n.a.

Lecture/Seminar profile:**Numerical Methods (0_NUM1V)**

Degree course	DSE.ma
Course title	Numerical Methods
Course code	0_NUM1V
Level	Master
Term	WS22/23
Lecturer	Stephan Dreiseitl
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:

Introduction: problems of calculating with floating point numbers, examples from numerical differentiation/integration.

Numerical linear algebra: least squares for systems of equations, eigenvalues, eigensystems, diagonalization, Monte Carlo methods: basics

Optimization: continuous functions with or without constraints (gradient methods, quasi-Newton methods, etc.), integer optimization, branch & bound, branch & cut, simplex/complex method, systems of equations:

Algebraic equations (Newton methods etc.)

Differential equation systems (Runge Kutta etc.)

Dynamic optimization: graph search, Q-learning

Approximation methods, splines, Fourier transformation

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Physics (ENI401)**

Degree course	ENI.ma
Course title	Physics
Course code	ENI401
Level	Master
Term	WS22/23
Lecturer	
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:

- Fundamental definitions and units
DC and AC, current, voltage, resistor, impedance, energy and power.
- Measurement technology
Fundamentals of measurements (electrical Power, electrical energy, temperature, light);
measurement chain (sensor to data acquisition).
- EMC
Physically principles of electromagnetically impacts; screening and coupling decreasing measures;
source and sink considerations; filtering.
- Measurement errors and accuracy
Error types (systematic, digitalization, random, ...); accuracy; resolution.
- Data acquisition concepts
- Filtering of data
- Measurement amplifiers

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:

International Energy Markets and Energy Law (ENI402)

Degree course	ENI.ma
Course title	International Energy Markets and Energy Law
Course code	ENI402
Level	Master
Term	WS22/23
Lecturer	
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:

- Energy and Climate Policy within the EU
The 2020 climate and energy package; the 2030 framework for climate and energy policies; liberalisation of the electricity and gas markets; promotion of the use of energy from renewable sources; energy efficiency directive; the EU emissions trading system; regulation on wholesale energy market integrity and transparency (REMIT); agency for the cooperation of energy regulators; network codes.
- Smart Meter
Smart meter rollout recommendation (EU); smart grid task forces (EU); homologation/verification of meters (Non EU/EU/National).
- Energy pricing with respect to examples like:
Whole sale trading market, stock exchange; classical energy utilization; domestic systems; island systems.
- Microgrid systems Energy trading
Market places, products, hedging, ...
- Financial assessment
- Overview on marketing and market development

Prerequisites: According to the prerequisites for degree programme access

Lecture/Seminar profile:

Processes and Process Modelling (ENI403)

Degree course	ENI.ma
Course title	Processes and Process Modelling
Course code	ENI403
Level	Master
Term	WS22/23
Lecturer	
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:

- Market roles and processes in a liberalized energy market

Supply contract management and related processes, such as start of supply, move-in and move-out and end of supply; grid usage contracting and billing; meter-reading services; master data distribution; energy settlement; process and communication monitoring; grid operator, supplier.

- Business processes

- Rollout process

- Processes modelling

Methodologies, tools.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Systems Engineering I: Fundamentals (ENI404)**

Degree course	ENI.ma
Course title	Systems Engineering I: Fundamentals
Course code	ENI404
Level	Master
Term	WS22/23
Lecturer	Stephan Selinger
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:

Fundamentals of systems and software engineering; system development life cycle, life cycle management, agile and traditional processes and methods, unified process, scrum, XP, eclipse process framework project; requirements engineering, use cases; software architectures; modeling structure and behavior in UML and SysML, UML style guidelines, language architecture of UML (Metamodel, meta object facility (MOF)), XML metadata interchange format (XMI), UML profiles, object constraint language (OCL), eclipse modeling framework (EMF), graphical modeling framework, model-to-model transformation, model-to-text transformation, code generation, Xtext and Xtend; model driven architecture, domain specific languages and domain specific modeling; software configuration management (SCM), defect tracking.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Energy Consumers (ENI406)**

Degree course	ENI.ma
Course title	Energy Consumers
Course code	ENI406
Level	Master
Term	WS22/23
Lecturer	
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:

- Technology of energy consumers with special respect to energy efficiency and load shift flexibility: Lights (Tungsten, florescent, LED); power supply aspects (power electronic converters, daylight concepts, drives, single phase, three phase); heating, cooling, and venting systems (heat pumps, venting systems, air conditions, fridges).

- Applications with respect to efficiency and load shift potential: Pumping; compressed air; heating, venting and air conditioning (low energy and passive house aspects); lighting (life cycle, physiology, and architecture aspects); street lighting (life span aspects with special aspects to: LED technology (lightning protection, life span under environmental conditions)).

- Automation aspects:
Automation concepts; additional auxiliary energy aspects; energy saving potentials due to automation.

- Economic aspects of energy efficient technologies and load shift.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Communication Technology (ENI501)**

Degree course	ENI.ma
Course title	Communication Technology
Course code	ENI501
Level	Master
Term	WS22/23
Lecturer	Armin Veichtlbauer
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:

- State of the art communication technology
- Communication architectures and models for smart grid
- Physical data communications, access, detection and estimation techniques for smart grid
- Smart grid and wide-area networks
- Spectrum requirement planning

- Communication channel characteristics:
CENELEC A-D Band; FCC; ARIB; EPRI; ISM; COSTxxx; IMT etc.

- Radio communication systems:
Cellular systems; wireless local area networks; terrestrial broadcasting; shorrange communication.

- Standards / Upcoming standards:
IEEE P1901; ITU-T G.hn; IEEE 802.15.4; 6LoWPAN; IEEE 802.11; ETSI GS OSG 001; G3-PLC; homeplug.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Home and Building Automation (ENI506)**

Degree course	ENI.ma
Course title	Home and Building Automation
Course code	ENI506
Level	Master
Term	WS22/23
Lecturer	Christoph Schaffer
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:

KNX, LON, BACNet, digitalstrom, DALI, Z-Wave, ZigBee, EnOcean, HomePlug (AV, GreenPhy), Nest, ULE (DECT), G3-PLC, IEEE 1901.2, BACnet, EEBus, openHAB, OSGI (Open Services Gateway initiative), Apple HomeKit.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Cloud Computing/Big Data (ENI507)**

Degree course	ENI.ma
Course title	Cloud Computing/Big Data
Course code	ENI507
Level	Master
Term	WS22/23
Lecturer	
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:

Basic principles of cloud computing (idea and motivation, opportunities and risks, application areas); architecture of cloud computing platforms (layer model for the classification of platforms, IaaS, PaaS, SaaS); architecture of cloud applications (tier architecture, AOP, stateful / stateless services, loose coupling, separation of concerns, asynchronous message processing); google app engine (architecture, memory models, task queues, integration of external services, security, programming model); microsoft windows azure (architecture, fault tolerance, programming model, memory services: blobs, tables, queues, SQL azure, windows azure service bus); amazon web services (architecture, EC2, SQS, SNS, S3, load balancing, VPC).

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Software Systems II: SCADA (ENI508)**

Degree course	ENI.ma
Course title	Software Systems II: SCADA
Course code	ENI508
Level	Master
Term	WS22/23
Lecturer	
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:**- Power System Operation:**

Supervisory control and data acquisition (SCADA); basics of power grid automation (typical functionality, real-time requirements, information flow); information architecture (CIM-reference model); protocols (IEC 61850, IEC 60870-5 standards, DNP3); deepened understanding of IEC 61850; existing software solutions and their features; power grid protection; IT security aspects in power grids.

- Power System Analysis:

Data analysis (weather forecast, load profiles and simultaneity of loads); basic simulation/computation/analysis approaches used in power grid operation (load flow, short circuit); optimization and control of the grid (optimal power flow, load frequency control).

- Practical Part:

Application of selected SCADA and simulation tools.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:**Java Advanced (ENI517)**

Degree course	ENI.ma
Course title	Introduction to Python
Course code	ENI517
Level	Master
Term	WS22/23
Lecturer	Stephan Selinger
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:

An introductory course in Python for basic knowledge.

Prerequisites:

n.a.

Lecture/Seminar profile:**Scientific Working (ENI601)**

Degree course	ENI.ma
Course title	Scientific Working
Course code	ENI601
Level	Master
Term	WS22/23
Lecturer	Marc Kurz
Contact hours per week	0,5
ECTS credits	1
Course type	Seminar
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Understanding the scientific method, the peer reviewing process, and the organization of program committees and scientific conferences. Improving scientific paper reading and paper writing skills. Improving scientific presentation skills.

Prerequisites:

According to the prerequisites for degree programme access

Lecture/Seminar profile:

Distributed Realtime Systems (DRS3-18UE)

Degree course	ESD.ma
Course title	Distributed Realtime Systems
Course code	DRS3-18UE
Level	Master
Term	WS22/23
Lecturer	Dietmar Millinger
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:

The lecture notes are composed of the following chapters:

- 1) Distributed Systems and Time
- 2) Real/Time Communication and Execution
- 3) Architectures
- 4) Faults and Fault/Tolerance

Prerequisites:

n.a.

Lecture/Seminar profile:**Distributed Realtime Systems (DRS3-18VO)**

Degree course	ESD.ma
Course title	Distributed Realtime Systems
Course code	DRS3-18VO
Level	Master
Term	WS22/23
Lecturer	Dietmar Millinger
Contact hours per week	2
ECTS credits	3
Course type	Lecture
Examinations	written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

The lecture notes are composed of the following chapters:

- 1) Distributed Systems and Time
- 2) Real/Time Communication and Execution
- 3) Architectures
- 4) Faults and Fault/Tolerance

Prerequisites:

n.a.

Lecture/Seminar profile:**Artificial Intelligence (AIN1)**

Degree course	IM.ma
Course title	Artificial Intelligence
Course code	AIN1
Level	Master
Term	WS22/23
Lecturer	
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:

Logical foundations; Classical (non-data) AI; Data-based AI; Reinforce-ment learning; Bayes nets; Backpropagation; Multi-layer perceptrons; Neural networks; Deep learning; Algorithms and software.

Prerequisites:

n.a.

Lecture/Seminar profile:**Game Development (GDE1)**

Degree course	IM.ma
Course title	Game Development
Course code	GDE1
Level	Master
Term	WS22/23
Lecturer	
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:

Introduction to game development with a 3D game engine; asset production, pipeline & integration; fundamentals of sound, networking and physics in modern games; integration of middleware APIs; scripting; data-driven game development; project management in the software domain, agile development methods, software prototyping & testing. In the course, game projects and tech-demos are defined together, each with an innovative feature. These are iteratively developed and tested in teams using agile methods. Special consideration is given to 3D multiplayer and network games.

Prerequisites:

n.a.

Lecture/Seminar profile:**Human Computer Interaction (HCI1)**

Degree course	IM.ma
Course title	Human Computer Interaction
Course code	HCI1
Level	Master
Term	WS22/23
Lecturer	Kathrin Probst
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:

Overview HCI Design; Human Perception and Performance Models (e.g., Fitts's Law, Power Law of Practice, Hick's Law), Embodied Interaction, Special Topics in HCI (e.g., Gestural Interaction, Proxemic / Spatially-Aware Interaction, Tangible Interaction, Voice Interaction, Gaze Interaction); Introduction to empirical research methods (quantitative, qualitative), design and implementation of empirical studies, evaluation and reporting of results.

Prerequisites:

n.a.

Lecture/Seminar profile:**Hypermedia UX Engineering (HUX1)**

Degree course	IM.ma
Course title	Hypermedia UX Engineering
Course code	HUX1
Level	Master
Term	WS22/23
Lecturer	
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 JavaScript and other client-side languages (e.g. Type-script), workflow tools (e.g. Babel, Webpack), frameworks (e.g. React, Angular, Vue), components, state management (e.g. Redux, Vuex), web APIs (e.g. REST, GraphQL), UI frameworks.

Prerequisites:

n.a.

Lecture/Seminar profile:**Design for Physical Prototyping (IM601)**

Degree course	IM.ma
Course title	Design for Physical Prototyping
Course code	IM601
Level	Master
Term	WS22/23
Lecturer	
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Physical Prototyping is the process of making a physical representation of an idea. Early in the process physical prototypes can be made of all kinds of materials. Physical prototypes allow designers and users to interact with the idea. By building an idea, designers are challenged to "build to think" and thus gain deeper insights. This course will go beyond early physical prototyping: it is a hands-on introduction to interactive electronics prototyping for students with a variety of backgrounds, including those with no prior experience in electronics. Familiarity with programming is helpful, but not required. Participants learn basic electronics, microcontroller programming, and physical prototyping using the Arduino platform, then use digital and analog sensors, LED lights and motors to build, program and customize a smart prototype. Moreover, students will get enough theoretical background for developing their own physical prototypes.

Prerequisites:

n.a.

Lecture/Seminar profile:**Semantic Online Services and Applications (IM620)**

Degree course	IM.ma
Course title	Semantic Online Services and Applications
Course code	IM620
Level	Master
Term	WS22/23
Lecturer	
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Information architectures, Smart search technologies, Web APIs (Google, YouTube, eBay, Amazon, etc.) and their use for mashups, data analysis and classification (data mining), applications (e.g., individualized recommendation systems, document classification and filtering), Web communities (application integration and interfaces), dynamic navigation concepts (tagging).

Prerequisites:

n.a.

Lecture/Seminar profile:**Semantic Text Analysis (IM621)**

Degree course	IM.ma
Course title	Semantic Text Analysis
Course code	IM621
Level	Master
Term	WS22/23
Lecturer	
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Basic and advanced techniques for text-based information systems: efficient text indexing; Boolean and vector space retrieval models; evaluation and interface issues; Web search including crawling, link-based algorithms, and Web metadata; text/Web clustering, classification; text mining.

Prerequisites:

n.a.

Lecture/Seminar profile:**Special Topic: In-Game Technologies (IM645)**

Degree course	IM.ma
Course title	Special Topic: In-Game Technologies
Course code	IM645
Level	Master
Term	WS22/23
Lecturer	
Contact hours per week	3
ECTS credits	4,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Introduction to free-to-play (F2P) business model; concepts for game monetization, in-app purchases and the necessary adaptations to game design and mechanics as well as supporting technologies. Analytics, player metrics, AB testing, key performance indicators, rapid iterations. Supporting technologies: scripting, component-based development, data-driven development, user generated content, cellular automata, voxel engine, game data persistence, security considerations.

Prerequisites:

n.a.

Lecture/Seminar profile:**Academic Writing (IM692)**

Degree course	IM.ma
Course title	Academic Writing
Course code	IM692
Level	Master
Term	WS22/23
Lecturer	Jeremiah Diephuis
Contact hours per week	2
ECTS credits	3
Course type	Seminar
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Writing efficiently and eloquently requires a great deal more than just using suitable vocabulary and the appropriate tenses. Style, register and flow can vary a great deal depending on the purpose and context of the text being written. This course addresses the challenges involved in crafting sentences that are comprehensible, precise and defensible. The main topics include the development of logical argumentative structures, describing and interpreting data, moderating claims and handling complex grammatical issues. This course is highly recommended for students who will be writing their theses in English or for researchers who would like to hone their proposal and paper writing skills. Regular writing assignments are required.

Prerequisites:

n.a.

Lecture/Seminar profile:**Real Time Graphics (RTG1)**

Degree course	IM.ma
Course title	Real Time Graphics
Course code	RTG1
Level	Master
Term	WS22/23
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:

n.a.

Content:

Computer graphics fundamentals; algorithms and software; rasterization; transformation pipeline; animation; lighting and illumination; materials; postprocessing and image-based techniques; non-photorealistic rendering; texturing and texture-based techniques; shadows; ray tracing.

Prerequisites:

n.a.

Lecture/Seminar profile:**Special Topic 1 (STO1)**

Degree course	IM.ma
Course title	Special Topic 1
Course code	STO1
Level	Master
Term	WS22/23
Lecturer	
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:

Alternating selection of current in-depth topics in Interactive Media, such as:

- Physical Prototyping
 - Green Media Systems
 - Digital Terrain Modeling
- etc.

Prerequisites:

n.a.

Lecture/Seminar profile:**Alternative Programming Paradigms (15_APP3ILV)**

Degree course	SE.ma
Course title	Alternative Programming Paradigms
Course code	15_APP3ILV
Level	Master
Term	WS22/23
Lecturer	Erik Pitzer, Stephan Dreiseitl
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:

The focus of the course is on paradigms, and not on learning new programming languages; we concentrate on comparing the alternative problem-solving possibilities afforded by the different paradigms (and languages). Imperative and object-oriented programming are assumed to be known; the course discusses different manifestations of the object-oriented paradigm based on peculiarities of languages such as Ruby and Io. In the functional paradigm, the differences between purely functional programming languages and imperative programming languages are highlighted using the example languages Clojure, Scala, Elixir and Haskell. Concepts such as actuators, futures, end recursion, pattern matching, message passing, mixins, traits, lazy evaluation and many more are presented and discussed using code examples. In the logical paradigm, Prolog is used to show how to get a different view of programming by separating the logical and the control aspects of a programming language.

Prerequisites:

n.a.

Lecture/Seminar profile:

Big Data Analytics and Interactive Visualization (15_BDV3ILV)

Degree course	SE.ma
Course title	Big Data Analytics and Interactive Visualization
Course code	15_BDV3ILV
Level	Master
Term	WS22/23
Lecturer	Barbara Traxler, Mandy Keck, Holger Stitz
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:

- Characteristics and challenges of big data
- Big data analytics stacks and architectures
- Frameworks and algorithms for batch and stream processing
- Hands-on examples using e.g. Hadoop, Map Reduce, Hive, Spark, Kafka
- Concepts of interactive visualization and visual analytics
- Visualization of multi-dimensional data
- Hands-on visual analytics projects using D3

Prerequisites:

n.a

Lecture/Seminar profile:**Data Warehousing, OLAP and Business Intelligence (15_DWO1ILV)**

Degree course	SE.ma
Course title	Data Warehousing, OLAP and Business Intelligence
Course code	15_DWO1ILV
Level	Master
Term	WS22/23
Lecturer	Henryk Maciejewski
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:

Basics: Analytical vs. direct data processing – different architectures for different requirements; Data Warehouse as a holistic repository of analytical data; Real application examples of OLAP (Online Analytical Processing) Data warehouse systems.

Building a data warehouse: methodology of the data warehouse implementation process, preservation of data integrity, accuracy and completeness, ETL processes (extract-transform-load), task and meaning of metadata. Database design for Data Warehouse: database requirements for multidimensional queries; Database technologies for OLAP.

Purpose and typical areas of application of data mining in science and industry; data preprocessing and modelling; Feature identification; Critical factors for successful data mining; Data mining process; Methodologies for data mining.

Problem formulation for data mining: prediction problems; clustering; association rules; Text mining and web mining; Structure and pattern identification in time series data. Algorithms: Algorithms for feature selection; Linear methods for regression and classification;

Exercise part: Training in the use of a commercial OLAP development environment.

Prerequisites:

n.a.

Lecture/Seminar profile:**Heuristic and Evolutionary Algorithms (15_HEA1ILV)**

Degree course	SE.ma
Course title	Heuristic and Evolutionary Algorithms
Course code	15_HEA1ILV
Level	Master
Term	WS22/23
Lecturer	Michael Affenzeller, Stefan Wagner
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:

Taxonomy of optimization algorithms, distinction between numerical and heuristic optimization, examples of combinatorial optimization problems and complexity theory, solution space behavior and P and NP problems. Heuristic methods: Problem-specific methods vs. metaheuristics, construction vs. improvement heuristics, neighborhood and distance of solutions, local search, non-population-based methods, Simulated Annealing, Tabu Search. Population-based methods: Ant-Colony Optimization, Swarm Intelligence, Genetic Algorithms, Evolutionary Strategies, Genetic Programming.

In exercises the parameterization of algorithms will be trained, analytical as well as empirical analysis of different optimization techniques using HeuristicLab, a generic open source framework for heuristic optimization methods.

Prerequisites:

n.a.

Lecture/Seminar profile:**Modelling and Simulation (15_MSM1ILV)**

Degree course	SE.ma
Course title	Modelling and Simulation
Course code	15_MSM1ILV
Level	Master
Term	WS22/23
Lecturer	Stephan Winkler
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:

Principles of the modeling of dynamical system, taxonomy of dynamic models; continuous modeling & simulation vs. discrete modeling & simulation; stochastic vs. deterministic simulation; linear vs. nonlinear modeling. Basics of optimization techniques, especially for optimizing model parameters as well as identifying system parameters based on measurement data. Growth models, oscillators, and population models. Discrete event specified systems.

In the practical part of the lectures we discuss application examples, especially technical / physical systems, basics of economics, epidemiology and the spreading of contagious diseases, and predator prey systems. MATLAB / Simulink and AnyLogic are used as frameworks for modeling and simulating systems.

Prerequisites:

n.a.

Lecture/Seminar profile:**Current Security Topics (SAS3SE)**

Degree course	SIM.ma
Course title	Current Security Topics
Course code	SAS3SE
Level	Master
Term	WS22/23
Lecturer	Marcus Nohlberg
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:

This course focuses on security awareness in general, and on the creation of security training materials specifically. The course begins with lectures on security awareness, followed by group work in specific elements in security awareness. We also talk about research in the field, and the course finishes with a presentation of the security awareness training materials the group has created. There is also a brief report that the group will write and submit for examination. The course is taught over Teams and is examined in two oral presentations and a brief report.

Prerequisites:

n.a.

Lecture/Seminar profile:**Intercultural Negotiation (17_INT3I)**

Degree course	HCC.ma
Course title	Intercultural Negotiation
Course code	17_INT3I
Level	Master
Term	WS22/23
Lecturer	Martina Gaisch
Contact hours per week	1
ECTS credits	1,5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Theories and core concepts of intercultural communication are conveyed. In doing so, intercultural negotiation techniques are tried out and reflected upon. Examples from practical application areas and exercises to further develop generic key competences are experienced. Further, intercultural negotiation and dialogue skills are practiced and analyzed based on hands-on case studies.

Prerequisites:

n.a.

Lecture/Seminar profile:**Business English Communication Skills (20_BEC3 T)**

Degree course	IEM.ma
Course title	Business English Communication Skills
Course code	20_BEC3 T
Level	Master
Term	WS22/23
Lecturer	Martina Gaisch
Contact hours per week	1
ECTS credits	1
Course type	Individual Training
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Students are familiarized with appropriate terminology from the field of Business English. They learn to use the English language professionally in a professional context and to discuss current and study-relevant topics.

In the process, both the subject-specific vocabulary and grammatical skills are deepened and further developed with the aim of successfully using the foreign language in everyday life, study and work

Prerequisites:

n.a.

Lecture/Seminar profile:**Intercultural Communication (20_ICC3 I)**

Degree course	IEM.ma
Course title	Intercultural Communication
Course code	20_ICC3 I
Level	Master
Term	WS22/23
Lecturer	Martina Gaisch
Contact hours per week	1
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

Theories and core concepts of intercultural communication Processes of intercultural adaptation according to Milton Bennett's stage model and cultural dimensions based on Hall, Hampden-Turner, Hofstede and Lewis Examples and experiences from practical application areas Exercises to develop key competences
Role plays, case studies and critical incidents in intercultural work settings

Prerequisites:

n.a.

Lecture/Seminar profile:**Language 1 (LAN1ILV)**

Degree course	ISM.ma
Course title	Language 1
Course code	LAN1ILV
Level	Master
Term	WS22/23
Lecturer	
Contact hours per week	2
ECTS credits	2
Course type	Integrated course
Examinations	written examination
Language of instruction	English
Places for international students	2

Learning objectives:

n.a.

Content:

This course aims at preparing participants for the Cambridge BEC higher certificate. Students get competencies in receptive and productive language skills. The course is structured in ways that draw on all linguistic skills required for the BEC higher examination. Reading, writing, listening and speaking competencies are conveyed by providing sufficient course material to the students. Two face-to-face modules provide the learners with the opportunity to clarify open questions but also to engage with their cohorts and practise speaking exercises. The rest will be conveyed via BigBlueButton to ensure an interactive and assisted teaching and learning.

Prerequisites:

n.a.

Lecture/Seminar profile:

Security Awareness (SAW3ILV)

Degree course	ISM.ma
Course title	Security Awareness
Course code	SAW3ILV
Level	Master
Term	WS22/23
Lecturer	Marcus Nohlberg
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:

Learning theory, advertising psychology, internal corporate communication, the concept of culture in various dimensions and its influence on human behaviour, project and change management

Prerequisites:

n.a.