Courses for exchange students

Winter semester 2023/2024

UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA

School of Informatics, Communications and Media

International courses

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
International Courses							
	AIC1IL_INT	AI in Creativity	Integrated course		Bachelor	5	4
	ADS1IL_INT	Algorithms and Data Structures (with Java)	Written examination		Bachelor	5	6
	BOB1IL_INT	Basics of Biology and Chemistry	Integrated course		Bachelor	3	7
	BIA1IL_INT	Bioinformatics Algorithms	Integrated course		Bachelor	3	8
	CDF1IL_INT	Computer Design and Firmware Programming	Integrated course		Bachelor	5	9
	GDP1IL_INT	General Data Protection Regulation	Integrated course		Bachelor	4	10
	IDP1IL_INT	Interaction Design and Prototyping	Lecture		Bachelor	2	11
	MUR1IL_INT	Methods of Empirical User Research: Data Collection and Analysis	Integrated course		Bachelor	3	12
	MAD1IL_INT	Mobile App Development	Integrated course		Bachelor	5	13
	SEM1PR_INT	Semester Project	Project result		Bachelor	10	14
	SOE1IL_INT	Social Engineering	Integrated course		Bachelor	2	15

Bachelor's Degree Programme

Programme (department)	Course unit code	Course unit title	Course type	Semester (level)	Level	ECTS	Page
Hardware-Software-Design (Bachelor, Hagenberg Campus)							
HSD.ba	EKI5-17ILV	Introduction to Artificial Intelligence	Integrated course	5	Bachelor	2,5	16
HSD.ba	ENG1-17ILV	English 1	Integrated course	1	Bachelor	2	17
HSD.ba	ENG3-17ILV	English 3	Integrated course	3	Bachelor	1,5	18
Communication and Knowledge Media (Bachelor, Hagenberg Campus)							
KWM.ba	COM1UE	Communication in the New Media Age	Practice-oriented session	1	Bachelor	1	19
KWM.ba	IDP3VO	Interaction Design and Prototyping	Lecture	3	Bachelor	1	20
KWM.ba	PRE3UE	Presentation Skills for Knowledge Transfer	Practice-oriented session	3	Bachelor	1	21
Medical and Bioinformatics (Bachelor, Hagenberg Campus)							
MBI.ba	21_KEN1UE	English 1	Practice-oriented session	1	Bachelor	2	22
MBI.ba	21_TEN3UE	Technical English 1	Practice-oriented session	3	Bachelor	1	23
MBI.ba	21_TEN5UE	Technical English 3	Practice-oriented session	5	Bachelor	1	24
Media Technology and Design (Bachelor, Hagenberg Campus)							
MTD.ba	05_GWP5IL	Games with a Purpose	Integrated course	5	Bachelor	5	25
MTD.ba	05_ISY5IL	Intelligent Systems	Integrated course	5	Bachelor	5	26
MTD.ba	05_PRO0PT	Semester Project	Project	3	Bachelor	10	27
Software Engineering (Bachelor, Hagenberg Campus)							
SE.ba	09_VPS5VO	Distributed and Parallel Software Systems	Lecture	5	Bachelor	1	28
SE.ba	14_VPS5UE	Distributed and Parallel Software Systems	Practice-oriented session	5	Bachelor	1,5	29

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	AST3IL	Animation Special Topics	Integrated course	3	Master	5	30
Data Science and Engineering (Master, Hagenberg Campus)							
DSE.ma	0_1CO1U	Computational Intelligence I	Practice-oriented session	1	Master	2	31
DSE.ma	0_1CO1V	Computational Intelligence I	Lecture	1	Master	3	32
DSE.ma	0_NUM1U	Numerical Methods	Practice-oriented session	1	Master	2	33
DSE.ma	0_NUM1V	Numerical Methods	Lecture	1	Master	3	34
Interactive Media (Master, Hagenberg Campus)							
IM.ma	GDE1IL	Game Development	Integrated course	1	Master	5	35
IM.ma	RTG1IL	Real Time Graphics	Integrated course	1	Master	5	36
IM.ma	STO1IL	Special Topic: Design for Physical Prototyping	Integrated course	1	Master	5	37
Software Engineering (Master, Hagenberg Campus)							
SE.ma	15_DWO1ILV	Data Warehousing, OLAP and Business Intelligence	Integrated course	1	Master	5	38
SE.ma	15_HEA1ILV	Heuristic and Evolutionary Algorithms	Integrated course	1	Master	5	39
SE.ma	15_MSM1ILV	Modelling and Simulation	Integrated course	1	Master	5	40
SE.ma	22_BDV3ILV	Big Data Analytics and Interactive Visualization	Integrated course	3	Master	5	41
Secure Information Systems (Master, Hagenberg Campus)							
SIM.ma	SAS3SE	Current Security Topics	Seminar	3	Master	2	42
Human-Centered Computing (Master - Part Time, Hagenberg Campus)							
HCC.ma	INT3I	Intercultural Negotiation	Integrated course	3	Master	1,5	43

Lecture/Seminar profile:

AI in Creativity

Degree course	MTD.ba
Course title	AI in Creativity
Course code	AIC1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Markus Unterweger
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	Projects and exercises
Language of instruction	English
Places for international students	Infinite

Learning objectives:

- Understand the fundamentals of creativity and its different dimensions, including artistic, scientific, and technological.
- Learn the basics of AI and its different applications in the field of creativity, including generative art, music composition, and storytelling.
- Explore the ethical and social implications of using AI to create art and other forms of creative output and develop a critical perspective on the role of technology in creativity.
- Analyse case studies and real-world examples of AI-generated art and creative works, and evaluate their aesthetic, technical, and emotional qualities.
- Develop practical skills in using AI tools and techniques to generate creative output, including using neural networks, machine learning algorithms, and other computational tools.

Content:

Introduction to Creativity and AI

- The concept of creativity and its various dimensions
- What is AI? Types of AI and its applications in different domains
- The intersection of creativity and AI: past, present, and future

AI in Creative Fields

- Generative art: algorithms and techniques for creating art with AI
- Music composition: using AI for generating music and exploring new genres
- Storytelling: AI tools for generating narratives, plotlines, and characters

Ethical and Social Implications

- Bias in AI and its impact on creative work
- Ownership and copyright of AI-generated content

- The role of AI in changing the creative process and the meaning of "art"

Collaboration and Co-creation

- Human-AI interaction in the creative process
- Integrating AI-generated output with human creativity
- Case studies of successful collaborations and co-creation projects

Hands-on Practice

- Experimentation with AI tools and techniques for creative output
- Project-based learning: creating an AI-generated art, music, or storytelling project
- Feedback and critique sessions

Future of Creativity and AI

- The impact of AI on the creative industries and professions
- Potential new forms of creative expression with AI
- Ethical and social considerations for the future of AI in creativity

Prerequisites:
None

Lecture/Seminar profile:

Algorithms and Data Structures (with Java)

Degree course	SE.ba
Course title	Algorithms and Data Structures (with Java)
Course code	ADS1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	a. Univ.-Prof. Dr. Johannes Sametinger
Contact hours per week	2,5
ECTS credits	5
Course type	Integrated course (combination of lecture and exercises)
Examinations	Written examination
Language of instruction	English
Places for international students	Infinite

Learning objectives:

- Knowledge of standard algorithms and the most important data structures, with their complexity in time (algorithms) and space (data structures)
- Use and adaptation of such algorithms and data structures for solving appropriate problems

Content:

Algorithms for

- searching (sequential search, binary search, hashing),
- sorting (simple sorting algorithms like insertion and selection sort as well as efficient sorting algorithms like merge, heap and quick sort) and
- pattern matching

Additionally: recursive algorithms and recursion versus iteration

Data structures like

- arrays,
- linked lists,
- binary (search) trees, heaps,

stacks, queues and priority queues

Complexity of algorithms

Prerequisites:

Basics of programming with any programming language

Basic understanding of object-oriented programming

Lecture/Seminar profile:

Basics of Biology and Chemistry

Degree course	MBI.ba
Course title	Basics of Biology and Chemistry
Course code	BOB1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Louise Buur, Julia Vetter
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	Infinite

Learning objectives:
Get an understanding of biology and chemistry
Learn how to apply basic techniques in a biolab
PCR, electrophoresis

Content:
Basic measurements
Conductivity measurements
Titration of acids and bases
Effect of buffer
Hydrogen production
Spectrophotometry
Measurement of osmosis

Prerequisites:
Basic knowledge in biology and chemistry

Lecture/Seminar profile:

Bioinformatics Algorithms

Degree course	MBI.ba
Course title	Bioinformatics Algorithms
Course code	BIA1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Stephan Winkler, Julia Vetter
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	Infinite

Learning objectives:
Get an understanding of statistics frameworks for bioinformatics
Learn about exact as well as heuristic methods for aligning biological sequences

Content:
Bayesian statistics; methods for sequence alignment: global and local pairwise alignment, multiple alignments, scoring matrices, phylogenetic trees, heuristic methods for determining alignment (BLAST, FASTA), profile-based methods of sequence comparison, characterization of protein families.

Prerequisites:
Basic knowledge in statistics, programming, biology, and chemistry

Lecture/Seminar profile:

Computer Design and Firmware Programming

Degree course	HSD.ba
Course title	Computer Design and Firmware Programming
Course code	CDF1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	N.N.
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	written examination
Language of instruction	English
Places for international students	Infinite

Learning objectives:
Knowing the structure and basic functioning of a simple CPU (Central Processing Unit)
Understanding the relationship between hardware structure, time sequences and programmability in machine and assembly language
Hardware-near programming and handling of a modern ARM microcontroller platform
Ability to program peripherals of microcontrollers

Content:
Introduction to computer architecture: RISC/CISC, control unit (FSM, micro-programmed) and datapath
CPU-Microarchitecture: structure and timing models, working through the design of a simple CPU
Introduction to the ARM assembly programming language: instruction classes, command architecture, addressing modes, hands-on lab on ARM assembly basics
Programming of ARM-Microcontrollers in C and assembly language, macro programming, inline assembly, use of libraries, compiler directives.

Prerequisites:
Foundations of Digital Design (combinational and sequential circuits, Finite State Machines), Basic skills in programming

Lecture/Seminar profile:

General Data Protection Regulation

Degree course	SIB.ba - Secure Information Systems Bachelor
Course title	General Data Protection Regulation
Course code	GDP1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Thomas Schweiger, FH-Prof. Mag. Dr. Peter Burgstaller
Contact hours per week	4
ECTS credits	4
Course type	Integrated course
Examinations	Written or oral examination
Language of instruction	English
Places for international students	Infinite

Learning objectives:

Students know the basic principles of the General Data Protection Regulation. They are able to deal with data protection problems on the basis of the law and find comprehensibly and justifiable solutions.

Content:

Principles of the General Data Protection Regulation of the European Union and the Data Protection Law in Austria.

Prerequisites:

None

Lecture/Seminar profile:

Interaction Design and Prototyping

Degree course	KWM.ba
Course title	Interaction Design and Prototyping
Course code	IDP1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Ing. Thomas Neumayr, MA
Contact hours per week	1
ECTS credits	2
Course type	Lecture
Examinations	Written Exam and oral Presentation
Language of instruction	English
Places for international students	Infinite

Learning objectives:

Students completing the course have basic knowledge of the Human-Centered Design Process and can transfer this knowledge to concrete implementations in future projects. They get to know different tried and tested principles and guidelines on the one hand, and techniques and methods for sketching and prototyping on the other hand. Regarding grading: At the end of the term, there is 1) a written exam on the topics covered (both theoretical content and practical application) as well as 2) a reading assignment of topically relevant publications which the students will summarize and present in an oral exam.

Content:

The course covers the essential basics of interaction design for interactive products in the context of the Human-Centered Design Process. Established key principles of related literature and guidelines are dealt with in addition to guide the conceptualization of interaction forms and interaction patterns, protoyping procedures and context-related requirements analyses, work process and interaction analyses. Planning and conception of interactive systems often includes taking into account different input and output devices, ergonomics, quality criteria of interactive systems, participatory and evolutionary design approaches. Lastly, methods and techniques for prototyping, sketching and storyboards are taught.

Prerequisites:

Interest in the Human-Centered Design Process and overall Human-Computer Interaction is of advantage.

Lecture/Seminar profile:

Methods of Empirical User Research: Data Collection and Analysis

Degree course	KWM.ba
Course title	Methods of Empirical User Research: Data Collection and Analysis
Course code	MUR1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Carrie Kovacs
Contact hours per week	2
ECTS credits	3
Course type	Integrated Course
Examinations	Written Report and oral Presentation
Language of instruction	English
Places for international students	Infinite

Learning objectives:
The course offers a project-based introduction to methods of empirical user research, with a focus on data collection and analysis. Students are introduced to strategies for understanding and measuring user experience, including basics of user research design, methods of data collection, and rudimentary data analysis techniques. Students practice applying these strategies in the form of an independent user research project.

Content:
Introduction to and practical application of user research methods to a real-world UX problem:
Basics of user research design (e.g., qualitative/quantitative methods, experimental design, sample selection)
Methods of data collection (e.g., interviews, standardized UX questionnaires, systematic observation, think-aloud methods)
Rudimentary data analysis techniques (e.g., content analysis, descriptive statistics)

Prerequisites:
Interest in user experience and user research methods. Parallel enrolment in the course “Interaction Design and Prototyping” is recommended.

Lecture/Seminar profile:

Mobile App Development

Degree course	MC.ba
Course title	Mobile App Development (Android)
Course code	MAD1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	TBD
Contact hours per semester	60
ECTS credits	5
Course type	Integrated course
Examinations	Project result
Language of instruction	English
Places for international students	Infinite

Learning objectives:

Students acquire basic knowledge in the development of mobile applications using Android. The focus is not on the operating system itself but on the development of applications with its distinct APIs and programming language (Kotlin).

During this course, some of the most important APIs are presented step by step. The theoretical knowledge is backed up by one or more exercises for every API. In the end, every student should be able to development a more or less complex smartphone based mobile app based on Android using Kotlin.

Content:

Activity, Resources, View/Layout/Interaction, Context, Sensors, Manifest, Intent, Notification, Inter-Component Communication, Lists, Fragments, AppBar, UI-Navigation and Preferences

Prerequisites:

Decent knowledge in OO programming in Java or alike is necessary.

Lecture/Seminar profile:

Semester Project

Degree course	
Course title	Semester Project
Course code	SEM1PR_INT
Level	Bachelor
Term	WS23/24
Lecturer	Martin Harrer
Contact hours per week	1
ECTS credits	10
Course type	Project
Examinations	Project result
Language of instruction	English
Places for international students	Infinite

Learning objectives:
Working in a team on a specific topic, where you fulfill most of the prerequisites of the project.

Content:

Define Milestones and a final goal of the project. Write a project report at the end including your definded milestones. Report problems and argue why you have chosen which technology and how you solved upcoming problems.

Prerequisites:

The Prerequisites depend on the project you have chosen. For a web project for example HTML, CSS, javascript, PHP and MySQL.

Lecture/Seminar profile:

Social Engineering

Degree course	SIB.ba - Secure Information Systems Bachelor
Course title	Social Engineering
Course code	SOE1IL_INT
Level	Bachelor
Term	WS23/24
Lecturer	Marcus Nohlberg
Contact hours per semester	Blocked in one week
ECTS credits	2
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	Infinite

Learning objectives:

Students know typical attack scenarios of Social Engineering. They understand and are able to describe social engineering, recognize the relevance of employee training in connection with the information security goals of a company, and accompany the implementation of security awareness measures in companies.

Content:

Psychological basics of manipulation and influencing, mechanisms and basic patterns of social engineering attacks and scams, ways of detecting and avoiding such attacks.

Prerequisites:

None

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	WS23/24
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	WS23/24
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:
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	WS23/24
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:

Communication in the New Media Age (COM1UE)

Degree course	KWM.ba
Course title	Communication in the New Media Age
Course code	COM1UE
Level	Bachelor
Term	WS23/24
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:
Broadening and revision of English communication skills.

Content:
The content of the course is a targeted deepening, broadening and refreshing of English language skills in the areas of grammar, subject-specific and general vocabulary, context-appropriate written and oral expression through role plays, 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 lecture held in the respective semester (e.g. context-adequate conversation in various everyday and professional situations).

Prerequisites:
A sound knowledge of English, a minimum of B2-level.

Lecture/Seminar profile:

Interaction Design and Prototyping (IDP3VO)

Degree course	KWM.ba
Course title	Interaction Design and Prototyping
Course code	IDP3VO
Level	Bachelor
Term	WS23/24
Lecturer	Thomas Neumayr
Contact hours per week	1
ECTS credits	1
Course type	Lecture
Examinations	written examination
Language of instruction	English
Places for international students	10

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 1) have to pass a final written exam at the end of the term (semester), and additionally 2) get assigned scientific literature to familiarize with recent topics, summarize the main contents, and orally present the essentials to the lecturer.

Prerequisites:
No previous knowledge required.

Lecture/Seminar profile:

Presentation Skills for Knowledge Transfer (PRE3UE)

Degree course	KWM.ba
Course title	Presentation Skills for Knowledge Transfer
Course code	PRE3UE
Level	Bachelor
Term	WS23/24
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:
Enhancement of communication skills – with a focus on the mandatory professional internship.

Content:
The focus of the course is primarily to enhance oral communication skills, in the areas of presentation, describing statistics and other data, job applications, interview situations, negotiations (especially with regard to the mandatory professional internship) using discussions, role plays, team work based on a multitude of real-life scenarios.

Prerequisites:
A sound knowledge of English, a minimum of B2-level.

Lecture/Seminar profile:

English 1 (21_KEN1UE)

Degree course	MBI.ba
Course title	English 1
Course code	21_KEN1UE
Level	Bachelor
Term	WS23/24
Lecturer	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	WS23/24
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, 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	WS23/24
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, 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:

Games with a Purpose (05_GWP5IL)

Degree course	MTD.ba
Course title	Games with a Purpose
Course code	05_GWP5IL
Level	Bachelor
Term	WS23/24
Lecturer	Georgi Yordanov Kostov, Jeremiah Diephuis
Contact hours per week	3
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	German/English
Places for international students	5

Learning objectives:
Participants should acquire a detailed knowledge of “impact games”, also known as serious games, and gamification. They will be introduced to the history, areas of application and the theories on which impact games are based in addition to becoming familiar with the general mechanisms of gamification. Participants will apply these concepts in the production of a game-based prototype for the completion of the course.

Content:
Introduction to the topic of impact games (serious games) and definition of their areas of application, in addition to gamification models and use cases. The course will focus both on theoretical and practical aspects in the field of game design for educational, motivational and persuasive purposes. Regular game design challenges and the development and evaluation of a prototype in small groups will serve as the primary method of assessment.

Prerequisites:

Interest in game design, preferably with at least some basic familiarity with game development, asset creation and/or UI/UX design. Students with different backgrounds (psychology, education, etc.) are welcome!

Lecture/Seminar profile:

Intelligent Systems (05_ISY5IL)

Degree course	MTD.ba
Course title	Intelligent Systems
Course code	05_ISY5IL
Level	Bachelor
Term	WS23/24
Lecturer	Ulrich Bodenhofer
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:
Even though the title “Intelligent Systems” sounds much broader, this course focuses on machine learning – which is considered the most important subfield in the current artificial intelligence (AI) hype. The course consists (1) of a theoretical, lecture-like part in which the most important concepts and methods of machine learning are introduced and (2) practical exercises that are implemented in Python notebooks using well-known software packages, such as, pandas, scikit-learn, and Tensorflow/Keras. The course is structured as follows:

Unit 1: Overview of Artificial Intelligence
Unit 2: Basics of Machine Learning
Unit 3: Data Preprocessing and Visualization
Unit 4: Supervised Machine Learning
Unit 5: Basics of Neural Networks and Deep Learning
Unit 6: Convolutional Neural Networks
Unit 7: Further Topics in Deep Learning

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	WS23/24
Lecturer	Martin Harrer
Contact hours per week	1
ECTS credits	10
Course type	Project
Examinations	continuous assessment
Language of instruction	English
Places for international students	10

Learning objectives:
Working in a team on a specific topic, where you fulfill most of the prerequisites of the project

Content:
Work on the project, define Milestones and a final goal of the project. Write a project report at the end including your defined milestones. Report problems and argue why you have chosen which technology and how you solved upcoming problems.

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	WS23/24
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 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	WS23/24
Lecturer	Bogdan Burlacu
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	2

Learning objectives:
n.a.

Content:
Exercises deepen the content of the lecture by practical examples.

Prerequisites:
WEB2

Lecture/Seminar profile:

Animation Special Topics (AST3IL)

Degree course	DA.ma
Course title	Animation Special Topics
Course code	AST3IL
Level	Master
Term	WS23/24
Lecturer	Dmytro Shyshkov
Contact hours per week	2,4
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
The students are familiar with methods and strategies for comprehensive approaches to procedural design. They learn to adapt conventional methods in an experimental approach to develop independent visual languages.

Content:
This course focuses on procedural workflows in 3D computer graphics. Students learn what procedural design is, where and how these approaches are used, and why it is important to engage with them. The course covers the fundamentals of procedural modeling, animation, and simulations. It includes the basics of vector calculus, scripting methods in Houdini, and working with volumes.

Prerequisites:
special prerequisites required - to be discussed separately

Lecture/Seminar profile:

Computational Intelligence I (0_1CO1U)

Degree course	DSE.ma
Course title	Computational Intelligence I
Course code	0_1CO1U
Level	Master
Term	WS23/24
Lecturer	Gabriel Kronberger
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:
exercises with python, weka, heuristic lab

Prerequisites:
Entsprechend der Zugangsvoraussetzungen des Studienganges

Lecture/Seminar profile:

Computational Intelligence I (0_1CO1V)

Degree course	DSE.ma
Course title	Computational Intelligence I
Course code	0_1CO1V
Level	Master
Term	WS23/24
Lecturer	Gabriel Kronberger
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:
Machine Learning & Data Science
Hypothesis space, concept learning, feature selection
Bias-variance tradeoff, cross-validation
Linear regression
K-Nearest Neighbor regression / classification
Logistic Regression, Linear & Quadratic Discriminant Analysis
Ensemble learning, bagging, boosting,
Decision Trees, Random Forest, Gradient Boosted Trees
Support Vector Machines
Artificial Neural Networks, Backpropagation

Prerequisites:
Entsprechend der Zugangsvoraussetzungen des Studienganges

Lecture/Seminar profile:

Numerical Methods (0_NUM1U)

Degree course	DSE.ma
Course title	Numerical Methods
Course code	0_NUM1U
Level	Master
Term	WS23/24
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:
Concurrent exercises, practical applications of the theoretical lecture contents.

Prerequisites:
according to the prerequisites for degree program access

Lecture/Seminar profile:

Numerical Methods (0_NUM1V)

Degree course	DSE.ma
Course title	Numerical Methods
Course code	0_NUM1V
Level	Master
Term	WS23/24
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: floating point arithmetic, examples from numerical differentiation and integration. Numerical linear algebra: least squares solutions to linear systems, eigenvalues, eigensystems, diagonalisation, fundamentals of monte carlo methods.
Optimisation: Constrained and unconstrained continuous optimisation (gradient descent, quasi-Newton methods). Integer optimisation, branch & bound, branch & cut simplex/complex method, systems of equations: algebraic equations (Newton's method). Differential systems (Runge Kutta etc.), dynamic optimisation: graph searching, Q-learning, approximation algorithms, splines, Fourier transformation.

Prerequisites:
according to the prerequisites for degree program access

Lecture/Seminar profile:

Game Development (GDE1IL)

Degree course	IM.ma
Course title	Game Development
Course code	GDE1IL
Level	Master
Term	WS23/24
Lecturer	Johannes Lugstein
Contact hours per week	2,4
ECTS credits	5
Course type	Integrated course
Examinations	oral or written examination
Language of instruction	English
Places for international students	2

Learning objectives:
Graduates know the complex workflow required for the concrete realization of computer games. Students have expertise with a professional 3D game engine and know agile development processes.

Content:
Introduction to game development with a 3D game engine; asset produc-tion, pipeline & integration; fundamentals of sound, networking and phys-ics 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 innova-tive feature. These are iteratively developed and tested in teams using agile methods. Special consideration is given to 3D multiplayer and net-work games.

Prerequisites:
n.a.

Lecture/Seminar profile:

Real Time Graphics (RTG1IL)

Degree course	IM.ma
Course title	Real Time Graphics
Course code	RTG1IL
Level	Master
Term	WS23/24
Lecturer	David Christian Schedl
Contact hours per week	2,4
ECTS credits	5
Course type	Integrated course
Examinations	continuous assessment
Language of instruction	English
Places for international students	2

Learning objectives:
Students will have a detailed knowledge of advanced techniques in real-time computer graphics and will be able to implement them in selected applications. Students understand theoretical and mathematical aspects of algorithms used in computer games, computer-animated movies and visual film effects.

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

Prerequisites:
n.a.

Lecture/Seminar profile:

Special Topic: Design for Physical Prototyping (STO1IL)

Degree course	IM.ma
Course title	Special Topic: Design for Physical Prototyping
Course code	STO1IL
Level	Master
Term	WS23/24
Lecturer	Sara Mlakar, Samuel Dieter Zühlke, Thomas Preindl, Andreas Pointner
Contact hours per week	2,4
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:
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:

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	WS23/24
Lecturer	Henryk Maciejewski
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:
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 Date 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:
according to the prerequisites for degree program access

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	WS23/24
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:
according to the prerequisites for degree program access

Lecture/Seminar profile:

Modelling and Simulation (15_MSM1ILV)

Degree course	SE.ma
Course title	Modelling and Simulation
Course code	15_MSM1ILV
Level	Master
Term	WS23/24
Lecturer	
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:
according to the prerequisites for degree program access

Lecture/Seminar profile:

Big Data Analytics and Interactive Visualization (22_BDV3ILV)

Degree course	SE.ma
Course title	Big Data Analytics and Interactive Visualization
Course code	22_BDV3ILV
Level	Master
Term	WS23/24
Lecturer	Barbara Traxler, Mandy Keck, Holger Stitz
Contact hours per week	2,5
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:
according to the prerequisites for degree program access

Lecture/Seminar profile:

Current Security Topics (SAS3SE)

Degree course	SIM.ma
Course title	Current Security Topics
Course code	SAS3SE
Level	Master
Term	WS23/24
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	4

Learning objectives:
Foundations of:

* Information Security Awareness
* How to create Security Awareness materials
* How to create Security Awareness campaigns
* How to present security materials
* Basics of research within the human element

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	INT3I
Level	Master
Term	WS23/24
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	8

Learning objectives:
Knowledge of concepts in intercultrual communication.

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:
No previous knowledge required for Master Students. Bachelor's degree students with good knowledge in English.