Study regulations of the
FH Master's course

Web Communication & Information Systems

To obtain the academic degree

Master of Science in Engineering
Abbreviated MSc

as an appendix to the statutes of the FH Kufstein Tirol

Organizational form: part-time
Duration: 4 semesters
Scope: 120 ECTS
Places for beginners per academic year: 20 part-time

Version 1
Decided by the FH Faculty Council on October 07, 2020

Content

With the amendment to the University Act 2020, the so-called "University of Applied Sciences Studies Act (FHStG)" has been renamed "University of Applied Sciences Act (FHG)". Accordingly, a necessary editorial adjustment was made in this document on January 13th, 2021 and the name FHStG was replaced by FHG.

1 OCCUPATIONAL PROFILES

1.1 Occupational fields

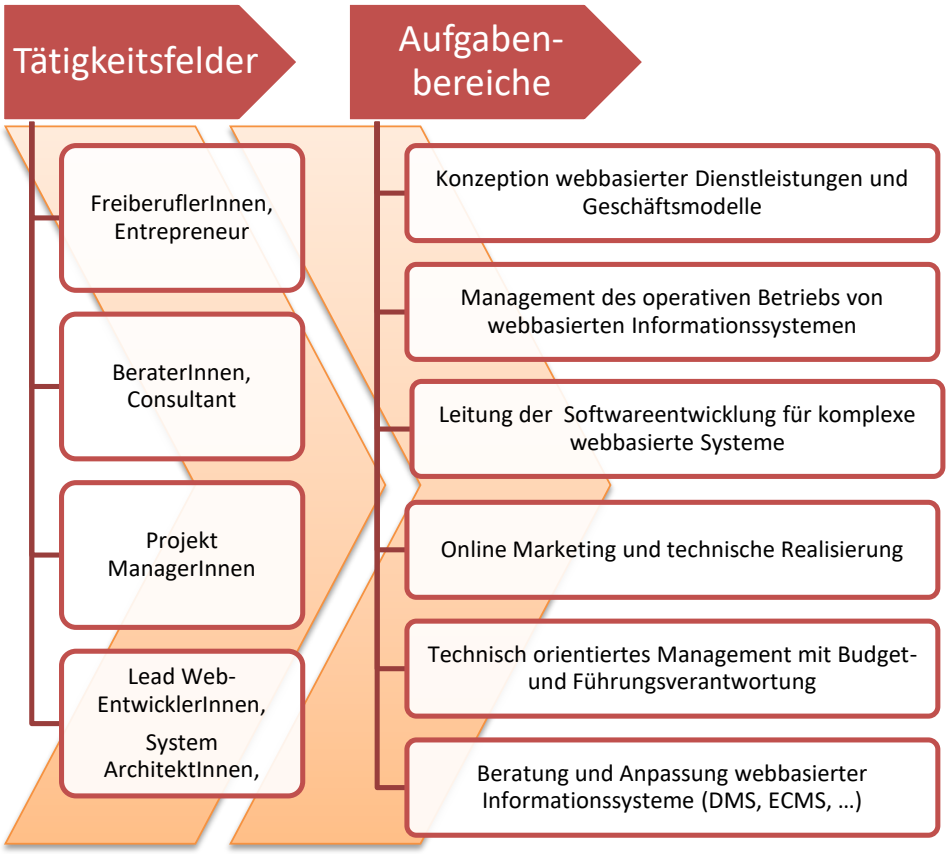
Essential characteristics of the professional fields of activity are the **orientation towards technically oriented activities** with a higher degree of complexity, as well as the **flexible fields of action** in which the graduates can develop their professional and management skills.
These can be used in the scope of a freelance activity as well as within a company structure at the middle or upper management level. Graduates of this course of study are therefore able to develop into **leading roles** of division or department heads or to lead corresponding staff units.
Some **fields of activity** are listed as examples in the figure below.

For the periodic revision of the Master's course, the previously-defined professional fields of activity in the development team were subjected to a critical appraisal and further developed accordingly. During the course of these observations, it was found that the professional sphere of activity of the graduates is very broad - it ranges from working in the self-employed sector (up to entrepreneurship), through participation in responsible roles in companies of various sizes, to fields of activity in research and development. However, these **contexts of professional activity** result more from the individual CVs and motivations of the graduates than by the curricular contents. They are therefore not further differentiated in the new version of the professional fields of activity and no longer form a direct subject of the Master's training.

Graduates of the Master's course in Web Communication & Information Systems can basically work in all industries that are involved in activities in the web environment - these are nowadays almost all companies and industries. Due to their broad business and technical education as generalists, graduates are, however, particularly sought-after employees and managers in the following **core industries**:

Software / IT	International corporations, especially
IT Consulting	Service and trade
(Web) agencies	Finances
Media management	Industry

Fields of activity and responsibilities for graduates of the degree program



Fields of activity
Fields of responsibility
Freelancer, entrepreneur
Counsellor, consultant
Project manager
Lead web developer
System architect
Conception of web-based services and business models
Management of the operation of web-based information systems
Head of software development for complex web-based systems
Online marketing and technical implementation
Technically-focused management with budget and leadership responsibility
Consulting and adaptation of web-based information systems (DMS, ECMS, etc.)

The classification into sectors is made more difficult by the profitable fact that technological change makes web-based systems increasingly relevant for all institutions and companies. As a result, graduates can enter a wide range of **institutions and types of companies**: According to the professionally-qualified members of the development team, large companies as well as regional SMEs, GO and NGOs, agencies and interest groups are looking for qualified graduates from the technical/engineering-scientific field.

Based on the training objective of an all-rounder, the potential **specific occupational fields of activity in the labor market are very broad**. However, the following two dimensions are essential characteristics of the occupational fields of activity:

1. The **focus on technically-oriented activities**, which either have a higher degree of complexity or include the management and leadership of teams in addition to the implementation, as well as
2. the **flexible fields of action** in which the graduates can apply their skills These can be used in the scope of a freelance activity as well as within a company structure at the middle or upper management level.

Following an induction phase, graduates of this course of studies are able to take on **leading positions, often in a technical environment** .
Characteristic of the professional environment of our graduates is the **dynamic development of the professional fields** partly within the same field of activity - this can have a variety of causes, such as (rapid) career development within the company or changes in the requirements from the current employment, which causes a change in the dominant professional field of activity. This revision therefore pursues the solution of condensing the many specific occupational fields of activity into a few **generic occupational fields of activity**, which are described in more detail below:

I. Technical Consulting & Project Management

Technical consultants advise mainly industrial and commercial enterprises on technical innovations, potential applications and advantages of certain equipment and technical solutions. They develop technical concepts for their clients and monitor the implementation. Technically-oriented consultants often work as sales representatives of a supplier in the technical field.
Technical project management is a functional description that can apply to leading functions in all technical areas. Project managers have extensive decision-making authority for their respective areas of responsibility.

Specific tasks are:

- Consulting and adaptation of web-based information systems (DMS, ECMS, etc.)
- Acquisition and implementation of consulting projects
- Technical analysis and implementation tasks
- Defining offers
- Developing information strategies and feasibility studies
- Conception, introduction of previously-conceived requirements and technical documentation
- Requirements analysis and technical specifications
- Establishing the interface between customers/specialist managers and developers
- Writing functional specifications and technical documentation
- Project Coordination and Communication
- Project-specific monitoring and reporting with regard to technical quality standards as well as the professional and timely implementation
- Coordination and management of the internal project team
- Representing projects towards clients

II. Software development primarily for web-based systems

Software developers implement software projects for use in the company in specific technical terms (e.g. creating new individual software for company-specific requirements or custom programming for the use of existing software packages). In doing so, they apply modern methods for the engineering design of reliable and secure software systems. Within the framework of the Master's course, the software developers focus primarily on web-based and mobile technologies and apply their knowledge of

appropriate technologies and frameworks adequately in order to implement appropriate marketable and modern solutions. Specific tasks are:

- Software development for complex web-based or mobile systems, also in a coordinating or leading role
- Active participation in the development of new features, prototypes and marketable applications
- Research and development (especially new technologies and systems)
- Management, coordination, training and coaching of development teams
- Implementation of technical reviews and quality assurance (e.g. through software tests)
- Technological consultation and support of project teams
- Application of agile development methods
- Development of technical concepts in interdisciplinary project teams
- Integration of software solutions into existing infrastructures
- Monitoring compliance with release schedules and qualitative software development standards including documentation
- Definition and monitoring of design guidelines
- 2nd or 3rd level technical support

III. System development and operation

Core areas for system development include the construction, design and conception of complex integrated solutions and software architectures; in this Master's course with reference to web-based and mobile technologies. System developers apply proven architecture models and patterns and pay attention to the integration of the systems to be developed into the existing IT landscape. They carry out their activities on the basis of close cooperation within the team as well as with external partners.
In the field of system operation, the interdisciplinary approach is pursued to develop complex technological systems in large projects to plan and operate at system level. This includes aspects of scalability and availability as well as ensuring system security.

Specific tasks are:

- Brainstorming and concept development of web-based services and business models
- Design and implementation of SOA-based architectures for enterprise systems
- Development of suitable digital communication solutions for Web/Mobile/Crossmedia based on the requirements of customers and the market
- Planning and conception of software architectures in the field of web-based and mobile systems
- Analysis and optimization of information platforms
- Consulting of internal departments on questions of application integration, process optimization, automation, etc.
- Monitoring and evaluation of trends
- Presentation of concepts and solutions
- Detailed knowledge of functions and application of current frameworks and technologies
- Conception of tool strategies and tool planning
- Design and implementation of systems in the area of collaboration and communication solutions
- Integration of new solutions into existing customer systems
- Evaluation, piloting and introduction of new tools
- Maintenance, provision and operation of the tools as well as training and consultation of users
- Development of operational concepts and integration into existing technologies, including monitoring of the systems

- Detection and correction of system failures
- Active participation in the permanent optimization processes of the systems
- Definition, documentation of the systems based on the existing process landscape

1.2 Qualification profile

The qualification aims and learning outcomes of the Master's courseWeb Communication & Information Systems correspond both to the academic and professional requirements and to *ISCED level 0616* (International Standard Classification of Education). The contents taught qualify the graduates for the specified professional fields of activity.

The qualification aims are mapped in various fields of competence. The relationship between occupational profiles and fields of competence is shown in the table below. A distinction is made between those competences which are central to the respective field of activity, those which tend to have a complementary effect and those which, as additional complementary skills, complement the exercise of the field of activity.

Presentation of the program's different fields of competence in relation to the defined professional fields:

Module & Kompetenzfelder	Berufsbilder: Technische Beratung & Projekt Management	Software-Entwicklung	System-Entwicklung & -Betrieb
Data & Information Engineering and Security (DTS)	○	●	●
Masterarbeit & Wissenschaftliches Arbeiten (MWA)	○	○	○
Project Support & Management Aspects for Web Projects (PMS)	●	○	○
Praxistransfer & Empirie (PXT)	○	○	○
Software Engineering (SE)	●	○	●
Softwareentwicklung (SWE)	○	●	○
Web-basierte Systeme (WEB)	●	●	●
Wahlpflichtfach (WPF	○	○	○

Legende:

Kernkompetenz: ●

ergänzende Kompetenz: ○

Komplementärkompetenz: ○

Module and fields of competence
Job profiles
Technical Consulting and Project Management
Software Development
System Development and Operation
Data and Information Engineering and Security (DTS)
Master Thesis and Scientific Work (MWA)
Project Support and Management Aspects for Web Projects (PMS)
Practice Transfer and Empiricism (PXT)
Software Engineering (SE)
Software Development (SWE)
Web-based Systems (WEB)
Elective subject (WPF)
Key:
Core competence:
Additional competence

Complementary competence

The contents taught qualify graduates for the above-mentioned positions, tasks and activities. **Aspired learning outcomes** are the ability to plan and develop projects for the introduction of complex web-based applications, as well as coordinating, advisory or leading roles in the field of technical management. Such systems can be positioned in the public web (cloud services, content management systems, e-commerce systems, etc.) or be used within the company (ECMS, CRM, portal systems).

This requires a **broad basic technical knowledge**, which is **specially adapted to web-based systems** and takes their specifics into account. These include not only system-immanent characteristics such as distributed IT infrastructures (distributed computing), special requirements for scalability and security (system security, data security) but also characteristics such as quality of service and availability, which also affect non-technical contractual aspects of service provider and customer (quality of service, software as a service).
Finally, **knowledge of managing development and implementation processes** of complex (web-based) software systems is a core of the qualification profile. Students master professional project management and can draw on a collection of methods that enable them to master the idiosyncrasies of web development (frequent releases, continuous development). This includes in particular detailed knowledge of modern software engineering methods, such as SCRUM, which especially support an agile approach.
This knowledge is complemented by **expertise on the social impact of web-based software systems (social software, collaboration software)**, as they are used on the internet but also increasingly in companies.

Finally, at the end of their studies, students will have **detailed knowledge of widely-used systems of the most important classes of web-based systems for companies** (e.g. ECMS), both in commercial and open source environments. As an approach, the focus here is on communicating **"best-in-class" system solutions**, which are complemented by particularly innovative alternative system approaches. Close **cooperation with manufacturers and consulting firms** is also an objective in this area.

The course of study not only aims at the theoretical transfer of knowledge, but also promotes and demands **transfer, analysis and application skills** in the following fields based on the methods and products commonly used in the economy:

Technical competences (technical-scientific competences)
Graduates have knowledge, understanding and application skills in the following technical fields, in which they can also independently develop solutions to complex problems:

- Consulting in the field of technical management
- Knowledge of distributed IT infrastructures (distributed computing), quality of service, software as a service
- Expertise on the social impact of web-based software systems (social software)
- Determine scalability and security requirements
- Managing development and implementation processes of complex web-based software systems
- System integration at a strategic level
- Development of functional and performance specifications
- Information Modelling
- Understanding of tasks, methods and procedures in the functional areas of companies

Methodological competencies (technical and scientific competencies)

In the following fields of practice, graduates have an understanding of different methods, knowledge of their respective advantages and disadvantages, areas of application and the skills to apply them in a managerial capacity:

- Project planning, implementation and documentation
- Agile software engineering methods
- Strategic analysis of software systems
- Solution competence
- Conflict management
- Requirements management
- Evaluation competence

Interdisciplinary qualifications (personal and social skills)
Graduates have meta-competences that lead to the following interdisciplinary qualifications:

- Social Skills
- Professional Presentation
- Media Competence
- Understanding of technical and economic relationships
- Fluent written and spoken English skills

The following table correlates the professional fields of activity with the typical tasks of the professional field and the description of skills.

Fields of activity, typical tasks and competence descriptions

Occupational field of activity	Task	Competence description	Competence allocation	Curriculum/modules
Technical advice and **Project management**	Consultation regarding the effective use of modern web technologies and support during the implementation process	Performing requirement analyses Technology selection to suit the requirements of the application Operational management of the project-oriented implementation process in terms of resources and scope	Professional-academic	PMS, SE, WEB
Software Development	Implementing concepts for web-based and mobile web applications	Development of technical realization concepts Implementation of concepts Quality assurance and validation of the artefacts created through application of engineering processes	Professional-academic	DTS, SWE, WEB
System development and operation	Design and operation of web-based and mobile IT systems	Conception of new web-based systems by applying architectural models and patterns Integrating solutions into an existing IT landscape	Professional-academic	DTS, SE, WEB

	Planning and operational management of a complex web-based application

2 CURRICULUM

2.1 Curriculum Data

	PT	Comment if applicable
First year of study (YYY/YY$_{+1}$)	2021/2022	
Standard duration of study (number of semesters)	4	
Obligatory WSH (Total number for all sem.)	52	
Course weeks per semester (number of weeks)	15	
Obligatory course hours (Total for all sem.)	780	Sum does not include the costs for supervision and assessment of the Master thesis
Obligatory ECTS (Total for all sem.)	120	
WS start (Date, comm.: poss. CW)	CW 40	
WS end (Date, comm.: poss. CW)	CW 5	
SS start (Date, comm.: poss. CW)	CW 11	
SS end (Date, comm.: poss. CW)	CW 28	
WS weeks	15	
SS weeks	15	
Obligatory semester abroad (semester specification)	No	
Language of instruction (specify)	German	The proportion of English-language courses amounts to [Company Address]% of the WSH
Internship (semester information, duration in weeks per semester)	No	

2.3 Curriculum matrix

Module assignment overview

Module	Module Title	Course title	WSH	ECTS	Sem.
DTS	Data & Information Engineering and Security	Data modelling and storage	3	6	1
		Information & Knowledge Retrieval (E)	3	6	3
		Web Security & IT Governance (E)	2	3	4
MWA	Master thesis & academic methods	Colloquium for the Master thesis	1	2	4
		Master thesis	0	22	4
		Academic Methods	1	2	3
PMS	Project Support & Management Aspects for Web Projects	Operational and Strategic Management of Web Applications (E)	2	4	3
		Tool-driven project management for web-based architectures	2	3	1
PXT	Practice Transfer and Empirical Work	Practical Project	2	4	3
		Proseminar I	1	2	1
		Proseminar II	1	2	2
		Study trip (E)	2	3	2
SE	Software Engineering	Concept and design of technical systems	2	3	1
		Modern software architecture	2	3	2
		Special topics of software engineering	3	6	1
SWE	Software Development	Software development for mobile and embedded systems	3	6	2
		Software development with web-based technologies	3	6	1
WEB	Web-based systems	Cloud Foundation and Infrastructures	3	6	2
		Content and Communication Oriented Systems (E)	2	4	1
		e-Business / e-Shopping Applications	2	4	2
		Intelligent and Adaptive Systems (E)	3	6	3
		Mixed Reality Technologies and Applications (E)	3	6	2
WPF	Elective courses	Agile Product Development (elective)	2	4	3
		Application-oriented Analysis Platforms (elective)	2	4	3
		Business Platforms and Cloud Computing (elective)	2	4	3
		Data Visualization and Visual Analytics (elective)	2	4	3
		Internet of Things (elective)	2	4	3
		Human-computer interaction (elective)	2	4	3
		Process Automation (elective)	2	4	3
		Quantitative Process and Quality Management (Six Sigma) (elective)	2	4	3
		Trends in Data Science (elective)	2	3	4
		Trends in ERP (elective)	2	3	4
		Trends in Smart Products (elective)	2	3	4
		Trends in Web Technologies (elective)	2	3	4
			52	**120**	

In the following curriculum matrix, some courses are offered as elective courses together with the Master's courses in Web Communication and Information Systems, Smart Products and Solutions and ERP Systems and Business Process Management. In the third semester, students select 1 course from a bundle of 4 non-technical courses and 1 course from a bundle of 4 technical courses. In the fourth semester, they select a course from a bundle of 4 courses. The following courses are included:

Non-technical elective courses in the third semester (1 out of 4):

- Agile Product Development
- Data Visualization and Visual Analytics
- Human-computer Interaction
- Quantitative Process and Quality Management (Six Sigma)

Technical elective courses in the third. semester (1 out of 4):

- Application-oriented Analysis Platforms
- Business Platforms and Cloud Computing
- Internet of Things
- Process Automation

Elective courses in the fourth semester (1 out of 4):

- Trends in Data Science
- Trends in ERP
- Trends in Smart Products
- Trends in Web Technologies

The following description of the courses does not include the work involved in supervising Master theses. 0.6 weekly semester hours are planned per supervised thesis, i.e. for 20 students an additional 12 thesis weekly semester hours, which are incurred in the 4th semester. In total, the specified AWSH sum of 67 AWSH is achieved over all 4 semesters.

1st semester

Course no.	Course title	Course type	T	E	eLV	WSH	No. of groups	AWSH	ALVS	MODULE	ECTS
DTS.1	Data modelling and storage	ILV	X		17%	3	1	3	45	DTS	6
PMS.1	Tool-driven project management for web-based architectures	ILV			15%	2	1	2	30	PMS	3
PX.1	Proseminar I	ILV	X		20%	1	1.5	1.5	22.5	PXT	2
SE.1	Concept and design of technical systems	ILV			15%	2	1	2	30	SE	3
SE.2	Special topics of software engineering	ILV			17%	3	1	3	45	SE	6
SWE.1	Software development with web-based technologies	ILV	X		17%	3	1	3	45	SWE	6
WEB.1	Content and Communication Oriented Systems (E)	ILV	X	X	15%	2	1	2	30	WEB	4
Total line:						16		16.5	247.5		30
Course hours = Total WSH x course weeks						240					

2nd semester

Course no.	Course title	Course type	T	E	eLV	WSH	No. of groups	AWSH	ALVS	MODULE	ECTS
PXT.2	Proseminar II	SE	X		20%	1	1.5	1.5	22.5	PXT	2
PXT.3	Study trip (E)	ILV		X	15%	2	1	2	30	PXT	3
SE.3	Modern software architecture	ILV			15%	2	1	2	30	SE	3
SWE.2	Software development for mobile and embedded systems	ILV	X		17%	3	1	3	45	SWE	6
WEB.2	Cloud Foundation and Infrastructures	ILV	X		17%	3	1	3	45	WEB	6
WEB.3	e-Business / e-Shopping Applications	ILV	X		15%	2	1	2	30	WEB	4
WEB.4	Mixed Reality Technologies and Applications (E)	ILV	X	X	17%	3	1	3	45	WEB	6
Total line:						16		16.5	247.5		30
Course hours = Total WSH x course weeks						240					

3rd semester

Course no.	Course title	Course type	T	E	eLV	WSH	No. of groups	AWSH	ALVS	MODULE	ECTS
DTS.2	Information and Knowledge Retrieval (E)	ILV	X	X	17%	3	1	3	45	DTS	6
MWA.1	Academic Methods	SE			20%	1	1	1	15	MWA	2
PMS.2	Operational and Strategic Management of Web Applications (E)	ILV		X	15%	2	1	2	30	PMS	4
PXT.4	Practical Project	PT	X		15%	2	2	4	60	PXT	4
WEB.3	Intelligent and Adaptive Systems (E)	ILV	X	X	17%	3	1	3	45	WEB	6
WPF.1	Process Automation (elective)	ILV	X		15%	2	1	2	30	WPF	4
WPF.10	Data Visualization and Visual Analytics (elective)	ILV			15%	2	1	2	30	WPF	4
WPF.11	Agile Product Development (elective)	ILV			15%	2	1	2	30	WPF	4
WPF.2	Application-oriented Analysis Platforms (elective)	ILV	X		15%	2	1	2	30	WPF	4
WPF.3	Internet of Things (elective)	ILV	X		15%	2	1	2	30	WPF	4
WPF.4	Business Platforms and Cloud Computing (elective)	ILV	X		15%	2	1	2	30	WPF	4
WPF.8	Human-computer interaction (elective)	ILV			15%	2	1	2	30	WPF	4
WPF.9	Quantitative Process and Quality Management (Six Sigma) (elective)	ILV			15%	2	1	2	30	WPF	4
Total line:						15		17	255		30
Course hours = Total WSH x course weeks						225					

4th semester											
Course no.	Course title	Course type	T	E	eLV	WSH	No. of groups	AWSH	ALVS	MODULE	ECTS
DTS.3	Web Security and IT Governance (E)	ILV	X	X	15%	2	1	2	30	DTS	3
MWA.2	Master thesis	SE	X		0%	0	1	0	0	MWA	22*
MWA.3	Colloquium for the Master thesis	SE	X		0%	1	1	1	15	MWA	2
WPF.10	Trends in Data Science (elective)	ILV	X		0%	2	1	2	30	WPF	3
WPF.11	Trends in Smart Products (elective)	ILV	X		0%	2	1	2	30	WPF	3
WPF.12	Trends in Web Technologies (elective)	ILV	X		0%	2	1	2	30	WPF	3
WPF.9	Trends in ERP (elective)	ILV	X		0%	2	1	2	30	WPF	3
Total line:						5		5	75		30
Course hours = Total WSH x course weeks						75					

* The 22 ECTS for the Master thesis in the fourth semester are divided into 20 ECTS for the Master thesis and 2 ECTS for the final examination.

Abbreviations	
eLV	E-learning proportion of course in percent
E	Lecture in English language
ECTS	ECTS – Credit points
LV	Course
LVS	Course hour(s)
WSH	Weekly semester hour(s)
T	Lecture with technical background
WP	Elective subject

Summary of curriculum data

Description	WSH	AWSH	ALVS	ECTS
Total number of courses over all semesters	52	55	825	120
Total number of courses in 1st year of study	32	33	495	60
Total number of courses in 2nd year of study	20	22	330	60
Total number of courses in 3rd year of study				
Total number of technical events over all semesters	36			92
Percentage of technical courses over all semesters based on WSH / ECTS	69.23%			76.67%
Total number of courses in English over all semesters	17			32
Proportion of courses in English over all semesters based on WSH / ECTS	32.69%			26.67%
Proportion of eLearning units over all semesters based on WSH / ECTS	15.35%			12.68%

2.4 Module descriptions

Module number:	**Software Engineering**	**Scope:**	
SE		**12**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	1st semester		
	2nd semester		
Level	1st semester: 2. Study cycle, Master / 1st semester: 2. Study cycle, Master / 2nd semester: 2. Master study cycle		
Previous knowledge	1st semester: none / 1st semester: Students bring the following requirements to the course: - Students understand the basics of software engineering. - Students understand object-oriented design using UML. - Students understand Java, inheritance and polymorphism. / 2nd semester: Students bring the following requirements to the course: - Students understand software engineering and object-oriented software development.		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Concept and design of technical systems /ILV / Course no.: SE.1 / 1st semester / ECTS: 3 - Achouri C. (2011) Wenn Sie wollen, nennen Sie es Führung: Systemisches Management im 21. Jahrhundert. 1st edition, Gabal, Offenbach (ISBN: 978-3-86936-174-1). - Achouri C. (2015) Systemisches Management. In: Human Resources Management: Eine praxisbasierte Einführung. 2nd edition, Gabler, Wiesbaden (ISBN: 978-3834947390). - Bergmann, G.; Daub, J. (2008) Systemisches Innovations- und Kompetenzmanagement: Grundlagen - Prozesse - Perspektiven. 2nd edition, Gabler, Wiesbaden (ISBN: 978-3834910592). - Brenner, W.; Uebernickel, F. (2016) Design Thinking for Innovation: Research and Practice. 1st edition, Springer, Berlin (ISBN: 978-3319260983). - Brown, T. (2012) Change by Design: how design thinking transforms organizations and inspires innovation. 2nd edition, Harper Business, New York (ISBN: 978-3319260983). - Kearney, E. (2013) Diversity und Innovation, Seite 175 in Krause D. E. (publisher) Kreativität, Innovation, Entrepreneurship. 1st edition, Springer Gabler, Wiesbaden (ISBN: 978-3658025502). - Orloff, M. A. (2010) Inventive Thinking through TRIZ: A Practical Guide. 1st edition, Springer, Berlin (ISBN: 978-3642069802). - Orloff, M. A. (2012) Modern TRIZ: A Practical Course with EASyTRIZ Technology. 1st edition, Springer, Berlin (ISBN: 978-3642252174). - Tidd, J.; Bessant, J. (2013) Managing Innovation: Integrating Technological, Market and Organizational Change. 5th edition, Wiley, Chichester (ISBN: 978-1118360637). - Leinonen, Miikka (2015): melt. As material and immaterial worlds melt, new business opportunities arise. Publisher: Lulu.com. (ISBN-13: 9781312462649)		
	Special topics of software engineering /ILV / Course no.: SE.2 / 1st semester / ECTS: 6 - Sommerville: Software engineering, 10th updated edition, PEARSON, 2018. - B. Bruges, A. H. Dutoit: Objektorientierte Softwaretechnik mit UML, Entwurfsmustern und Java, PEARSON, 2004.		
	Modern software architecture /ILV / Course no.: SE.3 / 2nd semester / ECTS: 3 - Bass, Len et al.: Software Architecture in Practice, Third Edition, SEI Series in Software Engineering, Addison –Wesley (2012) - Starke, Gernot: Effektive Softwarearchitekturen: Ein praktischer Leitfaden, Carl Hanser Verlag, 8th edition (2017) - Zörner, Stefan: Softwarearchitekturen dokumentieren und kommunizieren: Entwürfe, Entscheidungen und Lösungen nachvollziehbar und wirkungsvoll festhalten, Carl Hanser Verlag, 2nd edition (2015)		

Skills acquisition	Concept and design of technical systems /ILV / Course no.: SE.1 / 1st semester / ECTS: 3 Graduates are familiar with basic concepts and methods from the subject areas of Systematic Inventive Thinking, Systemic Management and Innovation Management. They are able to apply specific creative techniques for designing technical systems (e.g. Design Thinking, TRIZ, MELT Frame). In addition, they have a holistic understanding of the subject areas of the program and are therefore able to identify cross-departmental innovation potential.
	Special topics of software engineering /ILV / Course no.: SE.2 / 1st semester / ECTS: 6 The following learning outcomes are developed in the course: - Building on the fundamentals of software engineering, students have in-depth knowledge of selected topics related to the development and evolution of software systems. - Students know advanced methods of requirements analysis and are able to apply them efficiently - Students have sound knowledge in the detailed design of software systems using design patterns. - The students know procedures for the automation and support of large software systems.
	Modern software architecture /ILV / Course no.: SE.3 / 2nd semester / ECTS: 3 The following learning outcomes are developed in the course: - Students know factors that influence the architecture of a software and can explain them. - Students can describe the central role software architecture plays in the development process. - Students can apply familiar architectural patterns when creating software architecture. - Students are familiar with modern software architectures.

Skills acquisition	- Students are able to describe aspects of software systems and to provide solutions for them. - Students can document software architectures with current description methods.
Course contents	Concept and design of technical systems /ILV / Course no.: SE.1 / 1st semester / ECTS: 3 This course provides students with an overview of the options available when designing new interactive systems or revising existing ones. The focus lies on creative techniques, concepts and methods with which ideas can be generated that enable both more intuitive operation and more innovative use of existing and new interactive systems. In addition, it will be worked out how innovations can be implemented in a practical way from a management perspective. The course content covers the following subject areas in particular: - Developing a holistic understanding of the topics of systemic management. - Methods for generating innovative ideas (e.g. Systematic Inventive Thinking, TRIZ, Design Thinking). - Project structures and management methods for the practical implementation of innovations (e.g. MELT Frame). The course content enables students to apply creative techniques in a structured way, to generate innovations and to accompany their implementation.
	Special topics of software engineering /ILV / Course no.: SE.2 / 1st semester / ECTS: 6 Further and advanced topics in the field of software engineering are taught in this course. This includes the following focal points: In-depth topics in the fields of requirements analysis (e.g. SOPHIST rules, goal modelling) and design (e.g. design patterns, design principles); in-depth knowledge of agile development methods; procedures in the development of extensible software systems; automation in the development of large software systems (e.g. unit tests, continuous integration and DevOps).
	Modern software architecture /ILV / Course no.: SE.3 / 2nd semester / ECTS: 3

	Advanced topics in the field of software architecture are taught in this course. This includes the following focal points: - Role of software architecture in the software development process - Design of software architectures - Architectural patterns and architectural aspects, such as internationalization - Use of modern software architectures - Documentation of software architectures using UML
Teaching and learning methods	Concept and design of technical systems /ILV / Course no.: SE.1 / 1st semester / ECTS: 3 Lecture, group work, presentation and discussion of tasks
	Special topics of software engineering /ILV / Course no.: SE.2 / 1st semester / ECTS: 6 Lecture, quiz, presentation and discussion of task solutions
	Modern software architecture /ILV / Course no.: SE.3 / 2nd semester / ECTS: 3 Lecture, quiz and discussion of solutions of tasks
Evaluation Methods Criteria	Concept and design of technical systems /ILV / Course no.: SE.1 / 1st semester / ECTS: 3 Seminar thesis
	Special topics of software engineering /ILV / Course no.: SE.2 / 1st semester / ECTS: 6 Written exam
	Modern software architecture /ILV / Course no.: SE.3 / 2nd semester / ECTS: 3 Written exam

Module number:	**Software Development**	**Scope:**	
SWE		**12**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	1st semester		
	2nd semester		
Level	1st semester: Master's course / 2nd semester: 2. Master study cycle		
Previous knowledge	1st semester: not applicable / 2nd semester: Courses of the previous semester successfully completed.		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Software development with web-based technologies /ILV / Course no.: SWE.1 / 1st semester / ECTS: - Pureval, S.: Learning Web App Development. 2014 - Frisbie, M.: Professional JavaScript for Web Developers. 2019		
	Software development for mobile and embedded systems /ILV / Course no.: SWE.2 / 2nd semester / - Vollmer, G.: Mobile App Engineering: Eine systematische Einführung – von den Requirements zum Go Live, dpunkt.verlag 2017 - Liebel, Chr.: Progressive Web Apps, Rheinwerk Verlag 2018 - Guinard, D. D.; Trifa, V. M.: Building the Web of Things, Manning Publications 2016 - Knott, D.: Mobile App Testing: Praxisleitfaden für Softwaretester und Entwickler mobiler Anwendungen, dpunkt.verlag 2016		
Skills acquisition	Software development with web-based technologies /ILV / Course no.: SWE.1 / 1st semester / ECTS: The following learning outcomes are developed in the course: - Students have in-depth knowledge of programming and designing innovative web applications - Students have in-depth knowledge of modern web-based programming languages - Students can use web-based technologies in a targeted manner and know their advantages and disadvantages - Students know common frameworks for front-end and back-end development and can use them in a targeted manner - Students know common tools and best practices of web-based software development		
	Software development for mobile and embedded systems /ILV / Course no.: SWE.2 / 2nd semester /		

	Students acquire knowledge of the design, development, testing and operation of mobile applications for smartphones, tablets and similar devices. In addition, technical systems with extended control and programming functionalities and which communicate with the help of Internet technologies are also addressed. These "Internet of Things Applications" are discussed on the level of individual programming and coordination, but there is no provision for programming close to the hardware. The students: - can use device-specific functions of mobile or IoT application platforms programmatically (e.g. positioning by GPS, short-range radio systems such as RFID, different sensors) - know different approaches to mobile cross-platform development and can assess their advantages and disadvantages for specific project plans - know different network protocols for communication with IoT applications and can use them (e.g. within a mobile application) - know the special requirements of developing, testing and publishing apps for different application platforms
Course contents	Software development with web-based technologies /ILV / Course no.: SWE.1 / 1st semester / ECTS: Students are introduced to software development with web based technologies during the lecture. This includes front-end and back-end software development. Students will acquire in-depth knowledge of the structure (HTML), design (CSS and preprocessors), and dynamic aspects (JavaScript and TypeScript) of web applications, as well as their backend development with current and modern programming languages (e.g. Node.js, Python). Students therefore gain an overview of the entire development of web applications. Additional content such as front-end frameworks (e.g. Stencil.js, Angular, Vue) is discussed. Furthermore, students are introduced to methods and tools that simplify software development and increase the quality of the code. This includes methods such as code management, code formatting, linting, automation, bundler modules and package management. In addition, students are introduced to different architectures (client/server, 3-tier model) and implementations of web applications (e.g. headless). The content learned is put into practice and consolidated by the students with exercises.
	Software development for mobile and embedded systems /ILV / Course no.: SWE.2 / 2nd semester / [illegible] - Challenges of mobile and IoT-based software development - Software architectures of mobile and IoT application platforms - Mobile GIS systems for outdoor and indoor positioning, map display and route calculation - Communication protocols in connection with mobile and IoT systems (MQTT, HTTP, CoAP) - Processing of current research literature in the field of mobile and IoT-based software development
Teaching and learning methods	Software development with web-based technologies /ILV / Course no.: SWE.1 / 1st semester / ECTS: Lecture, group work, presentation and discussion of tasks

Teaching and learning methods	Software development for mobile and embedded systems /ILV / Course no.: SWE.2 / 2nd semester / Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	Software development with web-based technologies /ILV / Course no.: SWE.1 / 1st semester / ECTS: Seminar thesis
	Software development for mobile and embedded systems /ILV / Course no.: SWE.2 / 2nd semester / Seminar thesis

Module number:	**Web-based systems**	**Scope:**	
WEB		**26**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	1st semester		
	2nd semester		
	3rd semester		
Level	1st semester: 2. Study cycle, Master / 2nd semester: 2. Study cycle, Master / 2nd semester: 2. Study cycle, Master / 2nd semester: Master's course		
Previous knowledge	1st semester: not applicable / 2nd semester: none / 2nd semester: no prerequisites / 2nd semester: Not applicable		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Content and Communication Oriented Systems (E) /ILV / Course no.: WEB.1 / 1st semester / ECTS: 4 - Sprechener, Stefan: Content Management Systeme, Springer Gabler, 2019 - Michl, Irene; Löffler, Miriam: Think Content!, Rheinwerk Computing, 2019 - Riggert, Wolfgang: ECM – Enterprise Content Management, Springer Vieweg, 2019 - Shivakumar, S. K.: Enterprise Content and Search Management for Building Digital Platforms, IEEE COMPUTER SOC PR, 2016 - Peter Saint-Andre, Kevin Smith, Remko Tronçon: XMPP: The Definitive Guide, Building Real-Time Applications with Jabber Technologies, O'Reilly Media, Inc, 2009 - T. Groß, M. Koch, M. Herczeq: Computer-Supported Cooperative Work, Verlag Oldenbourg, 2007.		
	Cloud Foundation and Infrastructures /ILV / Course no.: WEB.2 / 2nd semester / ECTS: 6 PRIMARY LITERATURE: - Erl, T., Puttini, R., Mahmood, Z: Cloud Computing: Concepts, Technology and Architecture. 2013 - Rafaels, R.: Cloud Computing: 2018. 2018 - Jackson, K., Goessling, S.: Architecting Cloud Computing Solutions: Build cloud strategies that align technology and economics while effectively managing risk. 2018		
	e-Business / e-Shopping Applications /ILV / Course no.: WEB.3 / 2nd semester / ECTS: 4 PRIMARY LITERATURE: - Meier, A.; Stormer, H. (2012): eBusiness & eCommerce: Management der digitalen Wertschöpfungskette (Ed. 3), Springer, Berlin (ISBN: 978-3-642-29801-1) - Bocij, P. (2019): E-Business: Technology, Strategy and Management (Ed. 1), Routledge, London (ISBN: 978-0415532327)		
	Mixed Reality Technologies and Applications (E) /ILV / Course no.: WEB.4 / 2nd semester / ECTS: 6 - Glover, J.; Linowes, J. (2019): Complete Virtual Reality and Augmented Reality Development with Unity: Leverage the power of Unity and become a pro at creating mixed reality applications. Pact Publishing, 1st edition, ISBN: 978-1838648183 - Schart, D.; Tschanz, N. (2017): Augmented und Mixed Reality: für Marketing, Medien und Public Relations. UVK Verlag, 2nd edition, ISBN: 978-3867648226		

Skills acquisition	Content and Communication Oriented Systems (E) /ILV / Course no.: WEB.1 / 1st semester / ECTS: 4 Graduates have a sound overview of business activities in the field of information management and are familiar with the various forms of content management systems in practice (Enterprise CMS, Web CMS, editorial systems, etc.). Based on this well-founded overview, graduates are able to analyze and classify available systems and use them for their own specific needs. In addition, graduates are able to map intra- and interorganizational information and communication processes in a task-adequate (effective) and economic (efficient) manner.
	Cloud Foundation and Infrastructures /ILV / Course no.: WEB.2 / 2nd semester / ECTS: 6 The following learning outcomes are developed in the course: - Students have a sound overview of the concepts of cloud computing - Students know the effects and benefits on/for the economy (e.g. cost pressure and energy) and society (e.g. data protection). - Students know the fundamental concepts (IaaS, PaaS, SaaS, etc.) of cloud computing or infrastructure management (virtualization, configuration tools, monitoring tools, etc.). - Students have an overview of advanced concepts and service models. - Through practical exercises, the students have gained a basic understanding of the technologies and their benefits.
	e-Business / e-Shopping Applications /ILV / Course no.: WEB.3 / 2nd semester / ECTS: 4 The following learning outcomes are developed in the course: - Students know the functionalities and specifics of electronic markets. - Students know key technologies that are used in the context of electronic markets. - Students are familiar with the current common tools for operating an electronic market. - Students can compare tools with regard to their suitability. - Students can use the above-mentioned tools to solve a given problem.

Skills acquisition	Mixed Reality Technologies and Applications (E) /ILV / Course no.: WEB.4 / 2nd semester / ECTS: 6 Students acquire basic knowledge of the conception and development of applications in the field of Mixed Reality (Augemented Reality, Virtual Reality). The students: - know the basic fields of mixed reality applications. - know the conception and development process of mixed reality applications.
Course contents	Content and Communication Oriented Systems (E) /ILV / Course no.: WEB.1 / 1st semester / ECTS: 4 This integrated course teaches basic topics in the field of information management. This includes the following focal points: Introduction of information management from a business perspective (procurement, production, sales) and its cross-functions (logistics, finance, human resources, etc.); introduction of a "Content-Management-System" (CMS); core processes and functions (content acquisition/maintenance/retrieval, user administration, workflow management, release mechanisms, etc.); technologies in the field of CMS (content storage and administration (databases, streaming server, etc.) Presentation of content (static and dynamic document generation), security, quality assurance, performance, versioning, etc.); Specialist requirements for CMS; Technical requirements for CMS; XML as the basic technology of content management; Practical application (usability, accessibility, addition of practical aspects such as research using suitable CMS, open and closed source, etc.); Content management using the example of Typo3, ICContent 5.0, Apache Stanbol (IKS)
	Cloud Foundation and Infrastructures /ILV / Course no.: WEB.2 / 2nd semester / ECTS: 6 This course teaches fundamental topics in the field of Cloud Computing and infrastructure management. This includes the following focal points: - History and overview - Cloud Computing concepts such as service models, deployment models - Basic technologies of Cloud Computing (virtualization, infrastructure management) - New developments in Cloud Computing, such as containerization, serverless computing - Strategies and tasks, problems, risks in Cloud Sourcing

	e-Business / e-Shopping Applications /ILV / Course no.: WEB.3 / 2nd semester / ECTS: 4 The following contents will be discussed in the lecture: - Digital markets and how they work - Business models in digital markets - Differences between traditional and digital business models - E-business infrastructures (e.g. backend, middleware, frontend) - E-business frameworks (e.g. established shop systems)
	Mixed Reality Technologies and Applications (E) /ILV / Course no.: WEB.4 / 2nd semester / ECTS: 6 In this course, students will get to know the concept of Mixed Reality and will be able to classify the different forms of Augmented Reality and Virtual Reality. The respective available technologies in terms of hardware and software systems (e.g. development environments) are introduced and the basic implementation techniques are described using specific examples. The course deals with the conceptual level of mixed reality applications (e.g. story development and interaction options) as well as the implementation of the applications (e.g. 3D modelling and programming).
Teaching and learning methods	Content and Communication Oriented Systems (E) /ILV / Course no.: WEB.1 / 1st semester / ECTS: 4 Lecture, group work, presentation and discussion of tasks
	Cloud Foundation and Infrastructures /ILV / Course no.: WEB.2 / 2nd semester / ECTS: 6 Lecture, group work, presentation and discussion of tasks
	e-Business / e-Shopping Applications /ILV / Course no.: WEB.3 / 2nd semester / ECTS: 4 The following methods are used: - Lecture with discussion - Interactive workshop
	Mixed Reality Technologies and Applications (E) /ILV / Course no.: WEB.4 / 2nd semester / ECTS: 6 Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	Content and Communication Oriented Systems (E) /ILV / Course no.: WEB.1 / 1st semester / ECTS: 4 Seminar thesis
	Cloud Foundation and Infrastructures /ILV / Course no.: WEB.2 / 2nd semester / ECTS: 6 Seminar thesis
	e-Business / e-Shopping Applications /ILV / Course no.: WEB.3 / 2nd semester / ECTS: 4 Written exam
	Intelligent and Adaptive Systems (E) /ILV / Course no.: WEB.3 / 3rd semester / ECTS: 6 Written exam
	Mixed Reality Technologies and Applications (E) /ILV / Course no.: WEB.4 / 2nd semester / ECTS: 6 Seminar thesis

Module number:	**Practice Transfer and Empirical Work**	**Scope:**	
PXT		**11**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	1st semester		
	2nd semester		
	3rd semester		
Level	1st semester: 2. Study cycle, Master / 2nd semester: 2. Study cycle, Master / 3rd semester: 2. Master study cycle		
Previous knowledge	1st semester: Active reflection of the course content taking place during the semester with regard to individual knowledge deficits and options of advancing the contents / 2nd semester: Active reflection of the course content taking place during the semester with regard to individual knowledge deficits and options of advancing the contents / 2nd semester: not applicable / 3rd semester: successful completion of the course of the previous semester		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Proseminar I /SE / Course no.: PX.1 / 1st semester / ECTS: 2 The relevant specialist literature from the field of web-based systems is selected individually by the lecturer according to the chosen content focus.		
	Proseminar II /SE / Course no.: PXT.2 / 2nd semester / ECTS: 2 The relevant specialist literature from the field of web-based systems is selected individually by the lecturer according to the chosen content focus.		
	Study trip (E) /ILV / Course no.: PXT.3 / 2nd semester / ECTS: 3 - Dumetz, J; Trompenaars, F.; Dumetz, J.; Saginova, O.; Covey, S.; Hampden-Turner, S.; Woolliams, P.; Schmitz, J.; Foster, D.; Belbin, M; Schein, E.: "Cross-cultural management textbook: Lessons from the world leading experts in cross-cultural management", CreateSpace Independent Publishing Platform, 2012 - Thomas, A. (eds.) (2003): Handbuch Interkulturelle Kommunikation und Kooperation. Bd. 1: Grundlagen und Praxisfelder. Vandenhoeck&Ruprecht - Thomas, A. (publisher) (2003): Handbuch Interkulturelle Kommunikation und Kooperation. Bd. 2: Grundlagen und Praxisfelder. Vandenhoeck and Ruprecht - Jones, E. (2006). Cultures Merging. Princeton, Princeton University Press		
	Practical Project /PT / Course no.: PXT.4 / 3rd semester / ECTS: 4 - Tiemeyer, E. (2018): Handbuch IT-Projektmanagement: Vorgehensmodelle, Managementinstrumente, Good Practices. Carl Hanser Verlag, 3rd edition, ISBN: 978-3446446021 - Holger Timinger; H. (2017): Modernes Projektmanagement: Mit traditionellem, agilem und hybridem Vorgehen zum Erfolg, Wiley-Verlag, 1st edition, ISBN: 978-3527530489		
Skills acquisition	Proseminar I /SE / Course no.: PX.1 / 1st semester / ECTS: 2		

	The students expand their knowledge of the courses of the current semester by discussing the contents of the course in detail, therefore consolidating their knowledge. In addition, students use the course to develop subject-specific content of the semester beyond the scope of the individual courses and to network across courses. This also serves to strengthen the students' ability to reflect in an interdisciplinary context and to develop their problem-solving skills.
	Proseminar II /SE / Course no.: PXT.2 / 2nd semester / ECTS: 2 The students expand their knowledge of the courses of the current semester by discussing the contents of the course in detail, therefore consolidating their knowledge. In addition, students use the course to develop subject-specific content of the semester beyond the scope of the individual courses and to network across courses. This also serves to strengthen the students' ability to reflect in an interdisciplinary context and to develop their problem-solving skills.
	Study trip (E) /ILV / Course no.: PXT.3 / 2nd semester / ECTS: 3 Students have an understanding of the main cultural trends, the relevant discourse and the economic organization in the respective foreign country.
	Practical Project /PT / Course no.: PXT.4 / 3rd semester / ECTS: 4 Students synthesize specialist and theoretical knowledge from the courses in the previous semesters to develop the ability to independently set up, organize, implement and evaluate complex projects.
Course contents	Proseminar I /SE / Course no.: PX.1 / 1st semester / ECTS: 2 The content of the course is based on the course contents of the current semester, especially the topics development, engineering and web-based systems. The following objectives are pursued during the coaching model and are worked on in small groups: 1) Strengthening the ability to reflect by considering the course contents of the semester in an interdisciplinary context to further consolidate and clarify open questions. This can be done, for example, through further exercises or workshop-like formats. 2) Advanced development of problem-solving skills by advancing/networking subject areas across different courses, which are dealt with in an in-depth work and thus

Course contents	provide further insights for the students; if necessary, also prepare them for their own academic methods. Work, e.g. in preparation for the Master thesis. In this seminar, the focus lies on topics related to development and engineering, as well as web-based systems. 3) Linking practical information from the profession with your own knowledge. Own work: Enabling the connection of practical work-related experience from the students' field of activity with the contents of the courses of the semester in the form of a more systematic/scientific form, which, similar to point 2, leads to a preparation of one's own knowledge.
	Proseminar II /SE / Course no.: PXT.2 / 2nd semester / ECTS: 2

	The content of the course is based on the course contents of the current semester, especially the topics of architecture, cloud and e-business. The following objectives are pursued during the coaching model and are worked on in small groups: 1) Strengthening the ability to reflect by considering the course contents of the semester in an interdisciplinary context to further consolidate and clarify open questions. This can be done, for example, using further exercises or workshop-like formats. 2) Deeper development of problem-solving competence by specializing/networking of subject areas across different courses, which are dealt with in an in-depth work, therefore providing further insights for the students; if necessary, also preparatory work for their own knowledge. Work, e.g. in preparation for the Master thesis. In this seminar, the focus lies on topics related to development and engineering, as well as web-based systems. 3) Linking practical information from the profession with your own knowledge. Own work: Enabling the connection of practical work-related experience from the students' field of activity with the contents of the courses of the semester in the form of a more systematic/scientific form, which, similar to point 2, leads to a preparation of one's own knowledge.
	Study trip (E) /ILV / Course no.: PXT.3 / 2nd semester / ECTS: 3 The study trip gives part-time students the opportunity to acquire intercultural competence. Under the guidance of the lecturer, the students find out about potential study destinations, research relevant data and facts about the destination country and organize the program: The week in an international environment includes visits to companies, lectures at partner universities as well as lectures and events in the field of Social Skills. The aim is to ensure that students acquire an understanding of the cultural mainstream of the country in question. Discussions with specialists and executives, visits to foreign trade centers, business and social associations round off the international and personality-building experiences of the study trip.
	Practical Project /PT / Course no.: PXT.4 / 3rd semester / ECTS: 4 Through independent implementation, the students acquire skills in implementing the acquired knowledge. The entire implementation of a complex project is carried out independently by the students - this includes the conception, budgeting and implementation as well as the evaluation and interpretation of the results. In order to also build on the students' social skills, the projects are carried out in student teams under independent management and team building. Particularly important are skills such as the analysis of recipient behavior, economically responsible decision-making, risk management, intercultural competence, organizational and social skills, budgeting skills, sponsoring and project management. The abovementioned learning and teaching objectives are ensured by an actual implementation of the solution approach.
Teaching and learning methods	Proseminar I /SE / Course no.: PX.1 / 1st semester / ECTS: 2 Lecture, group work, presentation and discussion of tasks integrated into a coaching model by the lecturer
	Proseminar II /SE / Course no.: PXT.2 / 2nd semester / ECTS: 2 Lecture, group work, presentation and discussion of tasks integrated into a coaching model by the lecturer
	Study trip (E) /ILV / Course no.: PXT.3 / 2nd semester / ECTS: 3 Lecture, group work, presentation and discussion of tasks
	Practical Project /PT / Course no.: PXT.4 / 3rd semester / ECTS: 4 Lecture, group work, presentation and discussion of tasks

Evaluation Methods Criteria	Proseminar I /SE / Course no.: PX.1 / 1st semester / ECTS: 2 Seminar thesis
	Proseminar II /SE / Course no.: PXT.2 / 2nd semester / ECTS: 2 Seminar thesis
	Study trip (E) /ILV / Course no.: PXT.3 / 2nd semester / ECTS: 3 Seminar thesis
	Practical Project /PT / Course no.: PXT.4 / 3rd semester / ECTS: 4 Project work

Module number:	**Project Support and Management Aspects for Web Projects**	**Scope:**	
PMS		**7**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	1st semester		
	3rd semester		
Level	1st semester: 2. Master study cycle		
Previous knowledge	1st semester: Not applicable		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Tool-driven project management for web-based architectures /ILV / Course no.: PMS.1 / 1st semester - Rubin, K.: Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley, 2012. - Johannsen, A.; Kramer A.; Kostal, H.; Sadowicz, E.: Basiswissen für Softwareprojektmanager im klassischen und agilen Umfeld, dpunkt-Verlag, 2017 - Vigenschow, U.; Schneider, B.; Meyrose, I.: Soft Skills für Softwareentwickler, dpunkt-Verlag, 2019 - Preißel, R.; Stachmann, B.: Git - Dezentrale Versionsverwaltung im Team - Grundlagen und Workflows, dpunkt-Verlag, 2019		
Skills acquisition	Tool-driven project management for web-based architectures /ILV / Course no.: PMS.1 / 1st semester Students achieve the following learning objectives: - Students are familiar with various project management tools. - Students know the advantages and disadvantages of common tools and can select suitable tools. - Students know how to link and integrate tools with each other.		
Course contents	Tool-driven project management for web-based architectures /ILV / Course no.: PMS.1 / 1st semester The course provides students with options of how the management of software projects can be supported with tools. For this purpose, different parts of the project management are identified (e.g. source code management, bug tracking, testing, deployment). Tools for these parts are then discussed, such as GitLab for source code management or Jenkins for CI/CD. In addition, we will demonstrate how individual tools can be linked together to provide a better overview during the project, such as integrating GitLab with Mattermost. The students put the theoretical contents into practice during exercises.		
Teaching and learning methods	Tool-driven project management for web-based architectures /ILV / Course no.: PMS.1 / 1st semester Lecture, group work, presentation and discussion of tasks		
Evaluation Methods Criteria	Tool-driven project management for web-based architectures /ILV / Course no.: PMS.1 / 1st semester Written exam		
	Operational and Strategic Management of Web Applications (E) /ILV / Course no.: PMS.2 / 3rd se- Written exam		

Module number:	**Data and Information Engineering and Security**	**Scope:**	
DTS		**15**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-time		
Position in the curriculum	1st semester		
	3rd semester		
	4th semester		
Level	1st semester: 2. Study cycle, Master / 3rd semester: 2. Study cycle, Master / 4th semester: 2. Master study cycle		
Previous knowledge	1st semester: Not applicable / 3rd semester: not applicable / 4th semester: not applicable		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Data modelling and storage /ILV / Course no.: DTS.1 / 1st semester / ECTS: 6 PRIMARY LITERATURE: - Kleppmann, M. (2017): Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems (Ed. 1), O'Reilly Media, Farnham (ISBN: 978-1449373320) SECONDARY LITERATURE: - Celko, J. (2013): Joe Celko's Complete Guide to NoSQL: What Every SQL Professional Needs to Know about Non-Relational Databases (Ed. 1), Morgan Kaufmann, Waltham (ISBN: 978-0124071926)		
	Information and Knowledge Retrieval (E) /ILV / Course no.: DTS.2 / 3rd semester / ECTS: 6 - C. D. Manning, P. Raghavan, H. Schütze: Introduction to Information Retrieval, Cambridge University Press, 2008; - B. Croft, D. Metzler, T. Strohman: Search Engines: Information Retrieval in Practice. Addison-Wesley, 2009		
	Web Security and IT Governance (E) /ILV / Course no.: DTS.3 / 4th semester / ECTS: 3 - Stuttard, D., Pinto, M.: The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws. 2011 - Hoffman, A. Web Application Security: Exploitation and Countermeasures for Modern Web Applications. 2020 - Eckert, C.: IT-Sicherheit: Konzepte - Verfahren - Protokolle. 2018 - Kern, C., Kesavan, A., Daswani, N.: Foundations of Security: What Every Programmer Needs to Know (Expert's Voice). 2007 - Johannsen, W., Goeken, M.: Referenzmodelle für IT-Governance: Methodische Unterstützung der Unternehmens-IT mit COBIT, ITIL & Co. 2010 - Weill, P., Ross, J.: IT Governance: How Top Performers Manage IT Decision Rights for Superior Results. 2004		
Skills acquisition	Data modelling and storage /ILV / Course no.: DTS.1 / 1st semester / ECTS: 6 The following learning outcomes are developed in the course: - Students know the central concepts of data modelling. - Students can independently develop data models for a given scenario. - Students know different solutions for data storage. - Students can compare different storage solutions with regard to their suitability for a given scenario.		
	Information and Knowledge Retrieval (E) /ILV / Course no.: DTS.2 / 3rd semester / ECTS: 6		

	Graduates know the complexities and application areas of known or fundamental algorithms in information retrieval. Students are able to analyze and search for limited or unstructured data and to evaluate and assess existing or their own designed and developed systems.
	Web Security and IT Governance (E) /ILV / Course no.: DTS.3 / 4th semester / ECTS: 3 The following learning outcomes are developed in the course: - Students have detailed knowledge of security concepts on the client side, server side and on the transport level within web applications. - Students know the most important cryptographic procedures in theory and practice and can use them specifically in the web environment. - Students have detailed knowledge of current attack methods and suitable protection mechanisms in different web application areas. - Students know options for testing web applications for security risks. - Students know organizational structures and processes for supporting corporate strategy and goals, through IT. - Students know procedures and standards for IT governance.
Course contents	Data modelling and storage /ILV / Course no.: DTS.1 / 1st semester / ECTS: 6 The following content is discussed in the course: - Data modelling for relational data structures - Database interaction in SQL (DDL, DML, DQL) - Non-relational data storage concepts (NoSQL databases) - Implementing data structures - Integrating data structures into applications
	Information and Knowledge Retrieval (E) /ILV / Course no.: DTS.2 / 3rd semester / ECTS: 6 The integrated course teaches basic topics in the field of information retrieval. This includes the following focal points: Retrieval models (Boolean, vector space, probabilistic, etc.); the

Course contents	Implementation of IR systems (layer model, visualization, access paths, algorithms); content representation (free text search, documentation languages, special logics, indexing, etc.); web retrieval (link analysis, crawling); content-based search in multimedia documents
	Web Security and IT Governance (E) /ILV / Course no.: DTS.3 / 4th semester / ECTS: 3

	The course teaches basic topics in the field of web security. This includes cryptographic procedures, security in transport protocols (HTTPS, SSL and TLS), threats (e.g. code injection, cross site scripting, cross site request forgery) and appropriate countermeasures. Using ready-made, prepared web applications (e.g. JuiceShop), students attempt to exploit threats and security holes to gain a better understanding of the security of web applications. Based on these examples, countermeasures for selected threats are discussed (e.g. input validation, prepared statements). Students are also introduced to security problems at network level (e.g. ARP spoofing, denial-of-service attacks, etc.). In the subject area of IT Governance, students are taught the basics of IT governance. To this end, important processes and organizational structures are discussed so that business and IT can be aligned with each other. Basic terms are discussed, as well as the classification of IT governance into corporate governance. Furthermore, frameworks and standards (e.g. Cobit, ITIL) are discussed.
Teaching and learning methods	Data modelling and storage /ILV / Course no.: DTS.1 / 1st semester / ECTS: 6 The following methods are used: - Lecture with discussion - Processing of exercises - Interactive workshop
	Information and Knowledge Retrieval (E) /ILV / Course no.: DTS.2 / 3rd semester / ECTS: 6 Lecture, group work, presentation and discussion of tasks
	Web Security and IT Governance (E) /ILV / Course no.: DTS.3 / 4th semester / ECTS: 3 Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	Data modelling and storage /ILV / Course no.: DTS.1 / 1st semester / ECTS: 6 Written exam
	Information and Knowledge Retrieval (E) /ILV / Course no.: DTS.2 / 3rd semester / ECTS: 6 Seminar thesis
	Web Security and IT Governance (E) /ILV / Course no.: DTS.3 / 4th semester / ECTS: 3 Written exam

Module number:	**Elective courses**	**Scope:**	
WPF		**11**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	3rd semester		
	4th semester		
Level	3rd semester: 2. Study cycle, Master / 3rd semester: Master's course / 4th semester: Master / 4th semester: Master's course / 4th semester: Master's course		
Previous knowledge	3rd semester: none / 3rd semester: no prerequisites / 3rd semester: No prerequisites / 3rd semester: not applicable / 4th semester: not specified / 4th semester: no prerequisites / 4th semester: No prerequisites		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Process automation (elective) /ILV / Course no.: WPF.1 / 3rd semester / ECTS: 4 * Rich M., Weber B.: Enabling Flexibility in Process-aware Information Systems, Springer 2012, chapters 2-4 * Quarre, F.: Robotic Process Automation, O'Reilly, 2019 * Critchley, S.; Dynamics 365 CE Essentials: Administering and Configuring Solutions, Apress; 2018 * Yapa, S.; Customizing Dynamics 365: Implementing and Releasing Business Solutions, Apress; 2019 * Salatino, M., Aliverti, E.: jBPM 6 Developer Guide; Packt Publishing, 2014 * Allweyer, Thomas: BPMN 2.0 - Business Process Model and Notation: Einfuehrung in den Standard fu?r die Geschaeftsprozessmodellierung.- Books on Demand, 2015		
	Data Visualization and Visual Analytics (elective) /ILV / Course no.: WPF.10 / 3rd semester / ECTS: 4 PRIMARY LITERATURE: - Chang, W. (2013): R Graphics Cookbook: Practical Recipes for Visualizing Data (Ed. 1), O'Reilly, Farnham (ISBN: 978-1449316952) - Chen, C.; Härdle, W. K.; Unwin, A. (2008): Handbook of Data Visualization (Ed. 1), Springer, Berlin (ISBN: 978-3-662-50074-3) SECONDARY LITERATURE: - Dale, K. (2016): Data Visualization with Python and Javascript: Scrape, Clean, Explore and Transform Your Data (Ed. 1), O'Reilly, Farnham (ISBN: 978-1491920510) - Murray, S. (2017): Interactive Data Visualization for the Web: An Introduction to Designing with D3 (Ed. 2), O'Reilly, Farnham (ISBN: 978-1491921289)		
	Trends in Data Science (elective) /ILV / Course no.: WPF.10 / 4th semester / ECTS: 3 Due to the changeability of the content, only a few web sources are listed here as examples, which are currently strongly represented in the area of Data Science Trends: - Medium (2020): Towards Data Science (Ed. 1), online, https://towardsdatascience.com/. - KDNuggets (2020): Knowledge Discovery Nuggets (Ed. 1), online, https://www.kdnuggets.com/.		
	Agile Product Development (elective) /ILV / Course no.: WPF.11 / 3rd semester / ECTS: 4		

	* Pfeffer J.; Produkt-Entwicklung: Lean & Agile; München; 2019 * Schröder A.; Agile Produktentwicklung: Schneller zur Innovation – erfolgreicher am Markt; 2018
	Trends in Smart Products (elective) /ILV / Course no.: WPF.11 / 4th semester / ECTS: 3 - Huber W.; Industrie 4.0 kompakt – Wie Technologien unsere Wirtschaft und unsere Unternehmen verändern: Transformation und Veränderung des gesamten Unternehmens; Wiesbaden; 2018 - Iyer B., Venkatraman V.; "What comes after smart products?", Havard Business Review; 2015 - Roth A.; Einführung und Umsetzung von Industrie 4.0: Grundlagen, Vorgehensmodell und Use Cases aus der Praxis; Wiesbaden; 2016
	Trends in Web Technologies (elective) /ILV / Course no.: WPF.12 / 4th semester / ECTS: 3 PRIMARY LITERATURE: - European Journal of Information Systems - Information Systems Journal - Information Systems Research - Journal of AIS - Journal of Information Technology - Journal of MIS - Journal of Strategic Information Systems - MIS Quarterly
	Application-oriented analysis platforms (elective) /ILV / Course no.: WPF.2 / 3rd semester / ECTS: 4 PRIMARY LITERATURE: - Mishra, A. (2019): Machine Learning in the AWS Cloud: Add Intelligence to Applications with Amazon SageMaker and Amazon Rekognition (Ed. 1), Wiley, Chichester (ISBN: 978-1119556718) - Klinkenberg, R., Hofmann, M. (2016): RapidMiner (Ed. 1), Chapman and Hall, Farnham (ISBN: 978-1482205503) SECONDARY LITERATURE: - Lakshmanan, V. (2017): Data Science on the Google Cloud Platform: Implementing End-to-End Real-Time Data Pipelines: From Ingest to Machine Learning (Ed. 1), O'Reilly Media, Farnham (ISBN: 978-1491974537)
	Internet of Things (elective) /ILV / Course no.: WPF.3 / 3rd semester / ECTS: 4 Perry L.; Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security; Birmingham; 2018 Sinclair B.; IoT Inc: How Your Company Can Use the Internet of Things to Win in the Outcome Economy; 2017 Thomas O., Nüttgens M., Fellmann M. (editor); Smart Service Engineering: Concepts and

Literature recommendation	Anwendungsszenarien für die digitale Transformation; Wiesbaden; 2017
	Business Platforms and Cloud Computing (elective) /ILV / Course no.: WPF.4 / 3rd semester / ECTS: 4 PRIMARY LITERATURE: - Erl, T., Puttini, R., Mahmood, Z: Cloud Computing: Concepts, Technology and Architecture. 2013 - Jackson, K., Goessling, S.: Architecting Cloud Computing Solutions: Build cloud strategies that align technology and economics while effectively managing risk. 2018 - Evans, D., Schmalensee, R.: Matchmakers: The New Economics of Multisided Platforms. 2016
	Human-Computer Interaction (elective) /ILV / Course no.: WPF.8 / 3rd semester / ECTS: 4 - A. Dix, J. Finlay, G.D. Abowd, R. Beale: Human-Computer Interaction.Third Edition, Prentice Hall 2003, ISBN 978-0130461094 - Cooper, Reimann, and Cronin; About Face 3: The Essentials of Interaction Design; Wiley, 2007. ISBN 0470084111 - Lazar, Feng, and Hochheiser; Research Methods in Human-Computer Interaction; Wiley, 2010. ISBN 0470723378 - Stone, Jarrett, Woodruffe, and Minocha; User Interface Design and Evaluation; Morgan Kaufmann, March 2005. ISBN 0120884364 - A. Kerren, A. Ebert, J. Meyer: Human-Centered Visualization Environments.Springer 2007, ISBN 978-3540719489 - Sarodnick, F., & Brau, H.: Methoden der Usability-Evaluation. Bern: Hans Huber, 2011. - Shneiderman, B., and Plaisant, C.: Designing the user interface (5th ed.). Boston: Addison-Wesley, 2009. - Nielsen, Jakob: Designing Web Usability, engl. Issue, Market and Technology, 2004
	Quantitative Process and Quality Management (Six Sigma) (elective) /ILV / Course no.: WPF.9 / 3rd Töpferer, A.; Six Sigma Konzeption und Erfolgsbeispiele für praktizierende Null-Fehler-Qualität; Berlin/Heidelberg/New York 2007; 4th edition George M.; Rowlands D.; Price M.; Maxey J.; The Lean Six Sigma Pocket Toolbook; New York; 2005 Lunau St. (publisher); Six Sigma + Lean Toolset; 5th edition; Heidelberg; 2014
	Trends in ERP (elective) /ILV / Course no.: WPF.9 / 4th semester / ECTS: 3 not specified
Skills acquisition	Process automation (elective) /ILV / Course no.: WPF.1 / 3rd semester / ECTS: 4 The students: - know the challenges of process automation. - know how to select processes for automation. - know the procedure and factors for successful process automation. - know how to create process automations in selected software. - know interfaces to ERP and CRM systems. - know the procedures of interprocess communication and can implement them. - know the basic structure of cloud-based IT applications for process automation in the operational environment using the example of Microsoft Dynamics 365. - know basic and advanced functionalities of process automation under Microsoft Dynamics 365. - can implement UIs for process automation based on browser and apps using Microsoft technologies.

	Data Visualization and Visual Analytics (elective) /ILV / Course no.: WPF.10 / 3rd semester / ECTS: 4 The following learning outcomes are developed in the course: - Students have basic knowledge of data visualization and visual communication. - Students can develop visualizations independently and use them for communication purposes. - Students can work with different presentation tools and presentation libraries to present data and analysis results in a meaningful way.
	Trends in Data Science (elective) /ILV / Course no.: WPF.10 / 4th semester / ECTS: 3 The following learning outcomes are developed in the course: - Students are familiar with current thematic trends in the field of data science. - Students are familiar with current technological developments in the field of data science. - Students are familiar with current practical issues in the field of data science.
	Agile Product Development (elective) /ILV / Course no.: WPF.11 / 3rd semester / ECTS: 4 The students: - know agile procedure methods. - know organizational roles in the agile process. - know the process of an agile project (sprints, dailies, demos, retros). - know how to coach an agile project (e.g. question techniques). - know the experiences of agile projects from software development. - know the challenges of developing smart products. - know methods of product development (e.g. FMEA, TRIZ). - know the advantages of hybrid procedure methods. - know the role of management in the agile process.
	Trends in Smart Products (elective) /ILV / Course no.: WPF.11 / 4th semester / ECTS: 3 The following learning outcomes are developed in the course: - Students will understand the concepts of smart applications such as Smart House, Smart City, Smart Production, Connected Vehicles etc.- Students know and understand the latest trends in the field of these applications.
	Trends in Web Technologies (elective) /ILV / Course no.: WPF.12 / 4th semester / ECTS: 3 The following learning outcomes are developed in the course: - Students will be aware of current thematic trends in the field of web technologies and applications. - Students are familiar with current technological developments in the field of web technologies and applications. - Students are familiar with current practical issues in the field of web technologies and applications.
Skills acquisition	Application-oriented analysis platforms (elective) /ILV / Course no.: WPF.2 / 3rd semester / ECTS: 4

	The following learning outcomes are developed in the course: - Students are familiar with a range of application-oriented analysis platforms (e.g. KNIME, RapidMiner, Grafana). - Students can compare the analysis platforms they have learned with regard to their suitability for a specific application. - Students have gained first application experience with the platforms presented.
	Internet of Things (elective) /ILV / Course no.: WPF.3 / 3rd semester / ECTS: 4 The students: - know basic IOT architectures. - know methods of data generation. - know the basics of data transmission. - know the options of data storage. - know the forms of data visualization. - understand challenges of data security.
	Business Platforms and Cloud Computing (elective) /ILV / Course no.: WPF.4 / 3rd semester / ECTS: The following learning outcomes are developed in the course: - Students will know common business platforms. - Students will know the advantages and disadvantages of business platforms and can select suitable platforms. - Students will know the basics of cloud computing and cloud platforms. - Students will become aware of the options. Defining interfaces and using them.
	Human-Computer Interaction (elective) /ILV / Course no.: WPF.8 / 3rd semester / ECTS: 4 Graduates know the basics of designing web-based or mobile interaction interfaces and are able to apply them independently in the context of interactive systems. In this context, graduates acquire knowledge of the basic concepts of the work and research field of human-computer interaction: Usability, user experience and user interface design. Graduates acquire the basic knowledge to design interactive applications according to a human-centred design process and to analyze and evaluate user interfaces with usability evaluation methods.
	Quantitative Process and Quality Management (Six Sigma) (elective) /ILV / Course no.: WPF.9 / 3rd The students: - know the basics of descriptive and conclusive statistics. - know how to examine measuring arrangements for repeatability and reproducibility. - know how to calculate sample sizes. - know how to monitor the stability of process results using statistical monitoring methods. - know how to evaluate the ability of processes to meet customer requirements. - know methods to search for the deviation causes in results using test procedures. - know basic functionalities of the "Minitab" statistics software. - know how to use "Minitab" in the context of process analysis.
	Trends in ERP (elective) /ILV / Course no.: WPF.9 / 4th semester / ECTS: 3 Knows current trends in the field of ERP systems
Course contents	Process automation (elective) /ILV / Course no.: WPF.1 / 3rd semester / ECTS: 4

	- Basic terms: Business process, workflow, BPMS, WFMS, RPA, etc. - Selection criteria for workflow engines for process automation - Architecture and integration of workflows for process automation - Overview of interprocess communication - Transactional properties of processes, simulation and code generation - Basics of Microsoft Dynamics 365: Modules and navigation, basic entities and standard workflows - Organizational and technical implementation with configuration and declarative programming
	Data Visualization and Visual Analytics (elective) /ILV / Course no.: WPF.10 / 3rd semester / ECTS: 4 The following content is discussed in the course: - Evaluation tools with visual orientation, e.g. BI tools such as MS PowerBI, Tableau, QlikView - Display libraries, e.g. matplotlib.pyplot, gglot2 - Rules of visual communication, e.g. Hichert SUCCESSSS
	Trends in Data Science (elective) /ILV / Course no.: WPF.10 / 4th semester / ECTS: 3 The contents of this course are not set, but will be adapted to the current prevailing trends. Content examples may include: - New technologies in the field of Big Data Processing - Trends in programming languages in data analysis - New concepts of data processing (e.g. Data Lake) - New questions in the field of data science research - New questions in data science practice

Course contents	Agile Product Development (elective) /ILV / Course no.: WPF.11 / 3rd semester / ECTS: 4 - Overview of agile process methods - Roles in the agile process - Flow of an agile project (Sprins, Dailies, Demos, Retros) - Coaching of an agile project (e.g. question techniques) - Experiences with agile projects from software development - Challenges in developing smart products - Methods of product development (e.g. FMEA, TRIZ) - Advantages of hybrid process methods - Role of management in the agile process
	Trends in Smart Products (elective) /ILV / Course no.: WPF.11 / 4th semester / ECTS: 3 The contents of this course are not set, but will be adapted to the current prevailing trends. Content examples may include: - Current best practice approaches and concepts in application areas (e.g. Smart Home, Smart City, Smart Production, Connected Vehicles etc.) - Current best practice approaches with regard to development processes and tools - Current research and development activities or research and development results
	Trends in Web Technologies (elective) /ILV / Course no.: WPF.12 / 4th semester / ECTS: 3

	The contents of this course are not set, but will be adapted to the current prevailing trends. Content examples may include: - New technologies in the field of web architectures - Trends in the field of programming languages on the web - New design concepts in the field of web applications - New questions in the field of research in web technologies and applications - New questions in the field of web development practice
	Application-oriented analysis platforms (elective) /ILV / Course no.: WPF.2 / 3rd semester / ECTS: 4 The following content is discussed in the course: - Presentation of different user-oriented analysis platforms (e.g. KNIME, RapidMiner, Grafana) - Presentation of different cloud solutions for data analysis (e.g. Google Cloud, AWS, Azure) - Application of the platforms presented using the example of analysis data sets - Discussion of the different approaches
	Internet of Things (elective) /ILV / Course no.: WPF.3 / 3rd semester / ECTS: 4 Introduction - IoT architecture (e.g. reference models) - Requirements for IOT systems - IOT data transmission protocols - Use of IOT in an industrial context (examples) - Basics of sensor technology - Basics of embedded systems Implementation - Procedure for implementing IOT - Prototypical implementation of IOT - Selection of sensors - Data collection, visualization and evaluation - Challenges in implementation
	Business Platforms and Cloud Computing (elective) /ILV / Course no.: WPF.4 / 3rd semester / ECTS: Students are given an overview of common business platforms and cloud computing. In addition, the advantages and disadvantages of the respective platforms are discussed. Students are therefore able to select suitable platforms for a given problem. Students gain practical experience with selected platforms using case studies. In addition, methods for defining interfaces are discussed with the students.
	Human-Computer Interaction (elective) /ILV / Course no.: WPF.8 / 3rd semester / ECTS: 4

	The lecture teaches basic concepts from the field of human-computer interaction (usability, user experience, user interface design) and information visualization. This includes the following focal points: User interface architectures; design criteria, guidelines and standards for the creation and modelling of user interfaces of interactive systems; approaches and methods (quantitative and qualitative) for the evaluation of user interfaces of interactive systems; web style guides and evaluation criteria for websites (e.g. with regard to accessibility); basics of information presentation and data visualization; interactive information visualization; the theoretical lecture contents are prepared in the exercise using practical examples and implemented in a small project (usability evaluation) in a team.
	Quantitative Process and Quality Management (Six Sigma) (elective) /ILV / Course no.: WPF.9 / 3rd The following contents will be discussed in the lecture: - Fundamentals of descriptive statistics - Measurement system analysis - Sample determination - Statistical process control - Process control charts

Course contents	- Process capability analysis - Components of Variants Analysis (COV) - Repetition of basics of concluding statistics - Failure cause determination via hypothesis testing (T-test, Chi-Sq, ANOVA) - Multiple regression analysis
	Trends in ERP (elective) /ILV / Course no.: WPF.9 / 4th semester / ECTS: 3 - Current developments in the field of business application systems with special reference to ERP systems and business process management - Models, examples, best - practice cases
Teaching and learning methods	Process automation (elective) /ILV / Course no.: WPF.1 / 3rd semester / ECTS: 4 Lecture, discussions, practical examples, PC exercises
	Data Visualization and Visual Analytics (elective) /ILV / Course no.: WPF.10 / 3rd semester / ECTS: 4 The following methods are used: - Lecture with discussion - Interactive workshop - Case studies
	Trends in Data Science (elective) /ILV / Course no.: WPF.10 / 4th semester / ECTS: 3 The following methods are used: - Lecture with discussion - Interactive workshop
	Agile Product Development (elective) /ILV / Course no.: WPF.11 / 3rd semester / ECTS: 4 Lecture, group work, presentation and discussion of tasks
	Trends in Smart Products (elective) /ILV / Course no.: WPF.11 / 4th semester / ECTS: 3 Lecture, exercise
	Trends in Web Technologies (elective) /ILV / Course no.: WPF.12 / 4th semester / ECTS: 3

	The following methods are used: - Lecture with discussion - Interactive workshop
	Application-oriented analysis platforms (elective) /ILV / Course no.: WPF.2 / 3rd semester / ECTS: 4 The following methods are used: - Lecture with discussion - Processing of exercises
	Internet of Things (elective) /ILV / Course no.: WPF.3 / 3rd semester / ECTS: 4 Lecture, individual work with software, group work, presentation and discussion of tasks
	Business Platforms and Cloud Computing (elective) /ILV / Course no.: WPF.4 / 3rd semester / ECTS: Lecture, group work, presentation and discussion of tasks
	Human-Computer Interaction (elective) /ILV / Course no.: WPF.8 / 3rd semester / ECTS: 4 Lecture, group work (project), presentation and discussion of tasks
	Quantitative Process and Quality Management (Six Sigma) (elective) /ILV / Course no.: WPF.9 / 3rd Lecture, individual work with software, group work, presentation and discussion of tasks
	Trends in ERP (elective) /ILV / Course no.: WPF.9 / 4th semester / ECTS: 3 Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	Process automation (elective) /ILV / Course no.: WPF.1 / 3rd semester / ECTS: 4 Seminar thesis or exam
	Data Visualization and Visual Analytics (elective) /ILV / Course no.: WPF.10 / 3rd semester / ECTS: 4 Seminar thesis or exam
	Trends in Data Science (elective) /ILV / Course no.: WPF.10 / 4th semester / ECTS: 3 Seminar thesis
	Agile Product Development (elective) /ILV / Course no.: WPF.11 / 3rd semester / ECTS: 4 Written exam

	Trends in Smart Products (elective) /ILV / Course no.: WPF.11 / 4th semester / ECTS: 3 Seminar thesis
	Trends in Web Technologies (elective) /ILV / Course no.: WPF.12 / 4th semester / ECTS: 3 Seminar thesis
	Application-oriented analysis platforms (elective) /ILV / Course no.: WPF.2 / 3rd semester / ECTS: 4 Seminar thesis or exam
	Internet of Things (elective) /ILV / Course no.: WPF.3 / 3rd semester / ECTS: 4 Written exam
Evaluation Methods Criteria	Business Platforms and Cloud Computing (elective) /ILV / Course no.: WPF.4 / 3rd semester / ECTS: Seminar thesis
	Human-Computer Interaction (elective) /ILV / Course no.: WPF.8 / 3rd semester / ECTS: 4 Seminar thesis
	Quantitative Process and Quality Management (Six Sigma) (elective) /ILV / Course no.: WPF.9 / 3rd Written exam
	Trends in ERP (elective) /ILV / Course no.: WPF.9 / 4th semester / ECTS: 3 Seminar thesis

Module number:	**Master thesis and academic methods**	**Scope:**	
MWA		**26**	**ECTS**
Degree program	University of Applied Sciences Master's Course - Web Communication & Information Systems Part-		
Position in the curriculum	3rd semester		
	4th semester		
Level	3rd semester: 2. Study cycle, Master / 4th semester: 2. Master study cycle		
Previous knowledge	3rd semester: Students bring the following requirements to the course: - Basic principles and techniques of academic methods (Bachelor level) - Ability to write shorter scientific papers (e.g. Bachelor thesis) / 4th semester: Students bring the following requirements to the course: - Basic principles and techniques of academic methods (Bachelor level) - Ability to write shorter scientific papers (e.g. Bachelor thesis) / 4th semester: Students bring the following requirements to the course: - Basic principles and techniques of academic methods (Bachelor level) - Ability to write shorter scientific papers (e.g. Bachelor thesis)		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	Academic Methods /SE / Course no.: MWA.1 / 3rd semester / ECTS: 2 - Atteslander, P. (2010): Methoden der empirischen Sozialforschung. 13th edition, ESV - Eco, U. (2003): Wie man eine wissenschaftliche Abschlussarbeit schreibt. 10th edition, C.F. Müller -Theuerkauf, J. (2012): Schreiben im Ingenieurstudium: Effektiv und effizient zu Bachelor-, Master- und Doktorarbeit. 1st edition, von Judith, UTB Verlag, ISBN: 978-3825236441 - Karmasin M.; Ribing, R. (2011): Die Gestaltung wissenschaftlicher Arbeiten. 6th edition, facultas WUV - Leopold-Wildburger, U.; Schütze, J. (2002): Verfassen und Vortragen: Wissenschaftliche Arbeiten und Vorträge leicht gemacht. Springer		
	Master thesis /SE / Course no.: MWA.2 / 4th semester / ECTS: 22 - Atteslander, P. (2010): Methoden der empirischen Sozialforschung. 13th edition, ESV - Eco, U. (2003): Wie man eine wissenschaftliche Abschlussarbeit schreibt. 10th edition, C.F. Müller -Theuerkauf, J. (2012): Schreiben im Ingenieurstudium: Effektiv und effizient zu Bachelor-, Master- und Doktorarbeit. 1st edition, von Judith, UTB Verlag, ISBN: 978-3825236441 - Karmasin M.; Ribing, R. (2011): Die Gestaltung wissenschaftlicher Arbeiten. 6th edition, facultas WUV - Leopold-Wildburger, U.; Schütze, J. (2002): Verfassen und Vortragen: Wissenschaftliche Arbeiten und Vorträge leicht gemacht. Springer		
	Colloquium for the Master thesis /SE / Course no.: MWA.3 / 4th semester / ECTS: 2		

	- Atteslander, P. (2010): Methoden der empirischen Sozialforschung. 13th edition, ESV - Eco, U. (2003): Wie man eine wissenschaftliche Abschlussarbeit schreibt. 10th edition, C.F. Müller -Theuerkauf, J. (2012): Schreiben im Ingenieurstudium: Effektiv und effizient zu Bachelor-, Master- und Doktorarbeit. 1st edition, von Judith, UTB Verlag, ISBN: 978-3825236441 - Karmasin M.; Ribing, R. (2011): Die Gestaltung wissenschaftlicher Arbeiten. 6th edition, facultas WUV - Leopold-Wildburger, U.; Schütze, J. (2002): Verfassen und Vortragen: Wissenschaftliche Arbeiten und Vorträge leicht gemacht. Springer
Skills acquisition	Academic Methods /SE / Course no.: MWA.1 / 3rd semester / ECTS: 2 The following learning outcomes are developed in the course: - Students are able to formulate research questions and to design research projects derived from them. - They can assess the suitability of different methodological research approaches for discussing specific research questions and designing an appropriate methodological approach. - Students are proficient in researching relevant specialist literature and handling sources and evidence appropriately. - Students are able to statistically evaluate collected data.
	Master thesis /SE / Course no.: MWA.2 / 4th semester / ECTS: 22 - Students are able to independently design complex research projects, to choose a suitable methodology to answer a research question they have designed themselves, and to systematically and scientifically implement the chosen methodological approach correctly. Students can adequately present the results of their research work and the necessary theoretical foundations in a written paper.
	Colloquium for the Master thesis /SE / Course no.: MWA.3 / 4th semester / ECTS: 2 The following learning outcomes are developed in the course: - Students are able to present their research concept, the chosen methodology and the results of their research work. - They can critically reflect and discuss the essential aspects of their own research projects in connection with the Master thesis, as well as the concepts of other students.
Course contents	Academic Methods /SE / Course no.: MWA.1 / 3rd semester / ECTS: 2 Students gain in-depth knowledge in the field of academic methods by means of a research project to be worked on in a small group. Building on the basic knowledge of techniques and rules of academic methods

Course contents	Students are trained in the field of data analysis including conclusive statistics. This gives students the ability to work on complex scientific questions and to create research designs. This implies both structure and content as well as style and language at a high level. The practical development of the above-mentioned knowledge prepares students both formally and methodically for preparing the Master thesis. The discussion and critical questioning of the scientific methodology of a Master thesis is also included. In order to support the students in their search for relevant and high quality questions, possible topics and hypotheses are discussed and debated.
	Master thesis /SE / Course no.: MWA.2 / 4th semester / ECTS: 22

	The topic of the Master thesis is to be chosen from the subject area of the Web Communications and IT Systems degree program. The research question is prepared based on a scientific paper - this is done independently and without external help (with the sources and aids indicated). This way of working ensures that the students are able to work on an issue in a scientific and application-oriented manner. The search for topics, structure and time planning should be developed independently by the students - this is carried out above all through critical examination of possible questions and hypotheses. The supervisors guide the students in this process. Scientific methodology and the formal design are discussed in the context of individual coaching, as are questions of time management. The thesis can be written in German or English. The 22 ECTS for the Master thesis are divided into 20 ECTS for the Master thesis and 2 ECTS for the final examination.
	Colloquium for the Master thesis /SE / Course no.: MWA.3 / 4th semester / ECTS: 2 Within the framework of the colloquium on the Master thesis, students are supervised and supported in the preparation of their Master thesis in addition to the individual supervision of the Master thesis in the form of seminars. This will be an opportunity to present the research concept and already developed results and to discuss and critically reflect on them in the group.
Teaching and learning methods	Academic Methods /SE / Course no.: MWA.1 / 3rd semester / ECTS: 2 The following methods are used: - Lecture with discussion - Interactive workshop
	Master thesis /SE / Course no.: MWA.2 / 4th semester / ECTS: 22 The following methods are used: - Coaching within the scope of the Master thesis preparation
	Colloquium for the Master thesis /SE / Course no.: MWA.3 / 4th semester / ECTS: 2 Seminar accompanying the Master thesis with short presentations by the students including reflection and discussion in the group, if necessary writing and evaluating extended abstracts of the respective Master thesis.
Evaluation Methods Criteria	Academic Methods /SE / Course no.: MWA.1 / 3rd semester / ECTS: 2 Student research project
	Master thesis /SE / Course no.: MWA.2 / 4th semester / ECTS: 22 Master thesis
	Colloquium for the Master thesis /SE / Course no.: MWA.3 / 4th semester / ECTS: 2 Seminar thesis

2.5 Internship

Internship (semester information, duration in weeks per semester)	No	No

2.6 Semester Abroad

Obligatory semester abroad (semester specification)	No	No

3 ADMISSION REQUIREMENTS

The general admission requirements are regulated by section 4 of the FHG (Fachhochschule Studies Act) as amended, according to which the subject-related admission requirement for a Fachhochschule Master's course is a completed University of Applied Sciences Bachelor degree program relevant to the subject or the completion of an equivalent degree program at a recognized domestic or foreign post-secondary educational institution.

1. For the purposes of the present application, bachelor's degree programs or equivalent post-secondary educational qualifications are deemed to be relevant to the subject area if they cover the subject areas of information technologies (based on ISCED 2013, Fields of Education and Training No. 061 - Information and Communication Technologies (ICTs)), database and network technologies, software development and general computer architectures (based on ISCED 2013 Fields of Education and Training No. 0611,0612,0613), are considered relevant to the subject area in question, in summary, in a total amount of at least 10 ECTS. In addition, such bachelor's degree programs (courses) or equivalent post-secondary educational qualifications from the field of social and economic sciences (based on ISCED 2013, Fields of Education and Training 03/04), which cover the core subjects of marketing, communication, management and business administration (based on ISCED 2013, Fields of Education and Training 031/032/041) are considered relevant to the subject area in question, in summary, in a total amount of at least 10 ECTS.
   Those who are unable to prove these subject-relevant requirements during their first degree course can prove their subject-relevant qualification[1] for admission to the Master's Course using subject-related external further training in the above-mentioned areas (e.g. certificate courses) or subject-specific qualification (e.g. using a qualified service record). The examinations of the above-mentioned relevant qualifications are checked and documented during the admission procedure.

2. The FH Kufstein Tirol provides in its course architecture for a networking of the Bachelor and Master programs in the sense of the Bologna process: Following successful completion of a Bachelor program, graduates have several options for a Master's degree course at and outside the FH Kufstein Tirol. Graduates of the following FH Kufstein Tirol degree programs (irrespective of the organizational form) would be admitted to the present Master's course based on the above-mentioned professional qualifications:
   - Web Business and Technology
   - Industrial Engineering and Management

   Students of the following courses of study are admitted to the Master's Course of study after having completed the above-mentioned further education:
   - Energy and Sustainability Management
   - Facility and

     Real Estate Management
   - International Business and Management
   - Marketing and Communication Management
   - Sports, Culture and Event Management
   - Business Management

[1] To help support these interested parties, there are plans to offer further education courses at the FH Kufstein Tirol International Business School as introductory courses in the thematic areas of software development, web technologies and the basics of information technology.

3. The languages of instruction and examination at the FH Kufstein Tirol are German and English across all degree programs. Students from non-German speaking countries must therefore provide appropriate evidence of their German language skills. The necessary English language skills are randomly evaluated in the admission interview and, if necessary, a recommendation for further extracurricular language training is made.

4. The examination of the fulfilment of the admission requirements is the responsibility of the course administration of the Master's course in Web Communication and Information Systems.