

Study regulations of the Master's course

Smart Products & AI-driven Development

To obtain the academic degree

Master of Science in Engineering
abbreviated MSc

as an appendix to the statutes of the
HOK | University of Applied Sciences Kufstein Tirol

Organizational form: full-time

Duration: 4 semesters

Scope: 120 ECTS

Places for beginners per academic year: 30

Version 1

Adopted by the Faculty on June 24, 2026

Program starts WS 2027/28

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1 OCCUPATIONAL PROFILES

1.1 Career opportunities

Graduates of the Master's program in Smart Products & AI-driven Development can, thanks to their broad-based technical and business education, generally work in any industry related to smart products and solutions based on them.

However, employees and managers are in particularly high demand in the following core industries:

- Mechanical and Plant Engineering
- Device manufacturers
- Vehicle manufacturers
- Energy sector
- Logistics, Transportation
- Management Consulting

Classifying graduates by industry is complicated by the fact that, thanks to technological change, smart products and related solutions are becoming increasingly relevant for all types of companies. As a result, graduates can enter a wide variety of companies: Large corporations as well as small and medium-sized enterprises are looking for qualified graduates in the technical and engineering fields.

Based on the educational goal of training generalists, the range of possible career paths is very broad. Key characteristics of these professional fields include:

- Work on technically oriented tasks at the intersection of technology and business
- Management roles in which graduates can apply their skills. These can be utilized in freelance work as well as within a corporate structure at the middle or upper management levels.

The interviews mentioned above with experts from five internationally active Tyrolean companies revealed a wide range of positions that graduates of this program can fill. These include the following:

- Development and implementation of smart products and solutions
- Automation and process optimization
- Data management and analysis
- Project management and interdisciplinary collaboration
- Artificial intelligence and machine learning
- Product Development and Design

After a training period, graduates of this program are prepared to assume leadership roles. Below are some examples of typical positions.

Technical Project Management

Technical project management is a job description that applies to leadership roles in all technical fields. Project managers have extensive decision-making authority within their respective areas of responsibility.

Specific responsibilities include:

- Serving as the liaison between clients/subject matter experts and developers
- Drafting requirements documents/specifications and technical documentation
- Contract management as well as opportunity and risk management
- Project coordination and communication
- Project-Specific Controlling and Reporting
- Coordination and leadership of the internal project team
- Representing projects to supervisors and clients

Product Management

Product management is a multifaceted role that requires not only an understanding of the market and customers but, above all, an understanding of the underlying technical details. This enables you to align what is “technically feasible” with what “customers want.”

Specific tasks include:

- Monitoring and evaluating market trends
- Monitoring and evaluating customer trends
- Defining product requirements/additions
- Preparation of requirements specifications and technical documentation
- Supporting development and ensuring the required characteristics
- Planning the market launch

Digital Transformation Manager

The responsibilities of Digital Transformation Managers are diverse and, due to the short time frame in which the role has been established within companies, are still being defined. Generally speaking, those in this role play a transformative part, meaning they are responsible for the digital aspects of the business. At the same time, they are also tasked with further developing the company’s organizational structure to meet the demands of digitalization.

Specific responsibilities include:

- Developing a digitalization strategy
- Defining organizational structures and processes
- Supporting implementation at various levels
- Initiating and supporting process changes
- Supporting organizational development
- Contributor to digital innovations

Innovation and Technology Management

The core focus is on understanding and evaluating technology, architectures, and business models within the context of the company, such as corporate and product strategy, positioning, market and competitive dynamics, etc.

Specific tasks in this area include:

- Monitoring and evaluating trends
- Monitoring, evaluating, and developing technologies
- Brainstorming & Concept Development
- Building early prototypes for validation
- Consulting with internal departments
- Preparing analyses, requirements specifications, and concepts
- Studies, as well as current state and environmental analyses
- Presenting concepts and solutions

Technical Consulting

Technical consultants primarily advise industrial and commercial companies on technical innovations, potential applications, and the benefits of specific technical solutions. They develop technical concepts for their clients and oversee their implementation.

Specific tasks include:

- Consulting
- Acquiring and carrying out consulting projects
- Technical analysis and implementation tasks
- Preparation of proposals

- Development of product strategies and feasibility studies
- Design, implementation of previously defined requirements, and technical documentation
- Requirements analysis
- Technical specifications
- Technical support in various areas of the value chain

Other career fields include:

Product Development
Entrepreneurs
Research in the field of smart products and solutions

1.2 Qualification profile

The qualification objectives and learning outcomes of the master's program [Topic] correspond to both academic and professional requirements and to ISCED level 0788 (International Standard Classification of Education). The content taught qualifies graduates for the professional fields mentioned in previous chapters.

Professional Fields	Responsibilities	Competency Description	Competency Mapping	Curriculum/Modules
Technical Project Manager	Drafting requirements documents/specifications Setting up projects (goals, team, plan) Coordinating the project team Communicating with stakeholders	Can gather requirements Can create requirements documents Can plan and monitor projects Can handle resistance Can communicate with customers	Technical and Scientific Personal and Social	Product Development Product management Social Skills
Product Manager	Tracking market and customer trends Defining product requirements Creating requirements specifications Communicate with internal/external stakeholders	Can analyze trends Can identify and prioritize product requirements Can create requirements specifications Can coordinate the internal departments involved Can represent the product	Technical and Scientific Personal and Social	Product Management Social Skills
Digital Transformation Manager	Monitoring technological trends	Is familiar with current technological trends	Technical and Scientific	Digital Transformation

	Developing digitalization strategies Identifying opportunities for digitalization Monitoring, coordinating, and leveraging the digital transformation project portfolio Supporting the implementation of new solutions Initiate, communicate, and gain buy-in for digital transformation projects and solutions	Can derive a digital transformation strategy from business unit strategy Can identify opportunities for digital transformation Can monitor project portfolios Can inspire stakeholders to embrace new projects	Personal and Social	Social Skills
Product Developer	Developing smart products Translating requirements into technical specifications Selecting system architecture Simulating and developing prototypes Conducting feasibility studies Presenting concepts	Is familiar with technical solutions in the areas of sensor technology, data transmission, actuator technology, and embedded systems Can evaluate and select IoT architectures Can create product designs Can build and test prototypes Can present convincingly	Technical and Scientific	Data Management and Product Development
Technical Consultant	Advising on the selection of technical solutions Developing product strategies and feasibility studies Designing solutions Preparing technical documentation	Has knowledge of technical solutions in the field of smart products Can develop concepts based on requirements Can define product strategies Can evaluate the quality and risks of solutions Can create technical documentation	Technical and Scientific	Digital Transformation Product Development Data management Product management

2 CURRICULUM

2.1 Curriculum data

	FT	Comments (if any)
First Year of Study (YYYY/MM ₊₁)	2027/28	
Standard duration of study (Number of semesters)	4	
SWS (Total for all semesters)	48.5	
ASWS (Total for all semesters)	50.5	
ECTS (Total for all semesters)	120	
Winter Semester Start (Date, Note: possibly calendar week)	Calendar Week 40	
Winter semester end (Date, Note: possibly calendar week)	Calendar Week 5	
Start of summer semester (Date, Note: possibly calendar week)	Calendar Week 11	
End of semester (Date, Note: possibly calendar week)	Calendar Week 28	
Winter Semester Weeks	15	
SS weeks	15	
Mandatory semester abroad (Semester specification)	No	
Language of Instruction (Specify)	English	
Professional Internship (Semester, duration in weeks per semester)	No	

2.2 Curriculum matrix

The curriculum matrix for the Smart Products & AI-driven Development master's program is presented below. The following overview of courses does not include the workload associated with supervising master's theses. For each thesis supervised, a workload of 0.6 SWS is allocated; that is, with 30 accredited student slots, this results in an additional ASWS workload of 18 ASWS. Based on a total of 50.5 ASWS (excluding the Master's thesis), this results in a final total of 68.5 ASWS across all 4 semesters, including Master's thesis supervision.

The 22 ECTS for the master's thesis are divided into 20 ECTS for the thesis itself and 2 ECTS for the final examination before a committee.

The program includes a large, customizable component worth 12 ECTS. Depending on their individual educational goals, students can choose courses from four different tracks (Smart Products & AI-Driven Development, Data Science & Intelligent Analytics, AI Systems Engineering, and ERP Systems & Business Process Management). These specializations are offered in the 3rd and 4th semesters.

1. Semester

Course no.	Course title	LV-Typ	T	E	WSH	No. of groups	ASWS	ALVS	MODUL	ECTS
DAT.1	Coding & Applied AI	ILV	X	X	2.5	1	2.5	37.5	DAT	5
DIT.1	Digital Transformation & Change Management	ILV		X	2.5	1	2.5	37.5	DIT	5
DIT.4	Fundamentals of AI	ILV	X	X	2.5	1	2.5	37.5	DIT	5
PDE.1	Smart Product Development	ILV	X	X	2.5	1	2.5	37.5	PDE	5
PDE.2	Sensors & Actuators	ILV	X	X	2.5	1	2.5	37.5	PDE	5
PDE.3	Embedded Systems & Edge Analytics	ILV	X	X	2.5	1	2.5	37.5	PDE	5
Total line:					15.0		15.0	225.0		30
Course hours = Total WSH x course weeks					225.0					

2. Semester

Course no.	Course title	LV-Typ	T	E	WSH	No. of groups	ASWS	ALVS	MODUL	ECTS
DAT.2	Connectivity & Security	ILV	X	X	2.5	1	2.5	37.5	DAT	5
PDE.5	AI-based Product Design	ILV	X	X	2.5	1	2.5	37.5	PDE	6
PDE.6	Rapid Prototyping	ILV	X	X	2.5	1	2.5	37.5	PDE	6
PRM.2	Risk Management & Compliance	ILV		X	2.5	1	2.5	37.5	PRM	5
PXT.1	Study Trip	ILV	X	X	2	1	2	30	PXT	3
SSK.1	Project Management & Team Leadership	ILV		X	2.5	1	2.5	37.5	SSK	5
Total line:					14.5		14.5	217.5		30
Course hours = Total WSH x course weeks					217.5					

3. Semester

Course no.	Course title	LV-Typ	T	E	WSH	No. of groups	ASWS	ALVS	MODUL	ECTS
DAT.3	Data Analytics & Visualization	ILV	X	X	2.5	1	2.5	37.5	DAT	5
DIT.2	Strategy & Business Model & Organisation	ILV		X	1	1	1	15	DIT	2
MA.1	Research Methods	SE		X	1	1	1	15	MA	2
PDE.7	Manufacturing & Material Science for Smart Products	ILV	X	X	2.5	1	2.5	37.5	PDE	5
PRM.1	Product Management	ILV		X	1.5	1	1.5	22.5	PRM	3
PXT.2	Business Project	PT	X	X	2	2	4	60	PXT	5
WPF.1	Quantitative Process- & Quality Management (WP)*	ILV		X	2	1	2	30	WPF	4
WPF.2	Application-oriented analysis platforms (elective)* (WP)*	ILV		X	2	1	2	30	WPF	4
WPF.3	Internet of Things (elective)* (WP)*	ILV	X	X	2	1	2	30	WPF	4
WPF.4	Operational & Strategic Management of Applications (WP)*	ILV	X	X	2	1	2	30	WPF	4
WPF.5	Process Automation	ILV	X	X	2	1	2	30	WPF	4
WPF.6	Data Visualization & Visual Analytics (elective) (WP)*	ILV	X	X	2	1	2	30	WPF	4
WPF.7	Digital Twin & Simulation (WP)*	ILV		X	2	1	2	30	WPF	4
WPF.8	Human AI Interaction (WP)*	ILV		X	2	1	2	30	WPF	4
Total line:					14.5		16.5	247.5		30
Course hours = Total WSH x course weeks					217.5					

4. Semester

Course no.	Course title	LV-Typ	T	E	WSH	No. of groups	ASWS	ALVS	MODUL	ECTS
DIT.3	Ethics & Privacy	ILV		X	1.5	1	1.5	22.5	DIT	3
MA.2	Master Thesis Colloquium	SE		X	1	1	1	15	MA	2
MA.3	Master Thesis	UE		X	0	1	0	0	MA	22*
WPF.10	Trends in Data Science (elective) (WP)*	ILV		X	2	1	2	30	WPF	3
WPF.11	Trends in Smart Products (elective) (WP)*	ILV		X	2	1	2	30	WPF	3
WPF.12	Trends in AI Engineering (WP)*	ILV		X	2	1	2	30	WPF	3
WPF.9	Trends in ERP Systems (WP)*	ILV		X	2	1	2	30	WPF	3
Total line:					4.5		4.5	67.5		30
Course hours = Total WSH x course weeks					67.5					

* The 22 ECTS credits for the master's thesis are divided into 20 ECTS credits for the thesis itself and 2 ECTS credits for the final oral examination

Abbreviations	
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 curriculum data

Description	WSH	ASWS	ALVS	ECTS
Total number of courses over all semesters	48.5	50.5	757.5	120
Total number of courses in 1st year of study	29.5	29.5	442.5	60
Total number of courses in 2nd year of study	19	21	315	60
Total number of courses in 3rd year of study				
Total number of technical events over all semesters	31			64
Percentage of technical courses over all semesters based on WSH / ECTS	63.92 %			53.33 %
Total number of specialized courses in English over all semesters	48.5			120
Proportion of specialized courses in English over all semesters (Calculation excluding language courses)	100 %			100 %

2.3 Modularization

Module number:	Product Development	Scope:	
PDE		11	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	1. Semester		
	2. Semester		
	3. Semester		
Level	1. Semester: second cycle, Master / 1. Semester: Second cycle, Master / 2. Semester: second cycle, Master / 2. Semester: second cycle. Master / 3. Semester: -		
Previous knowledge	1. Semester: According to admission requirements / 1. Semester: According to admission requirements / 2. Semester: none / 3. Semester: None		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> - Gerhard H., Lanz M., Pretenthaler M.; Design Basics: von der Idee zum Produkt; 2018 - Follet J.; Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things; 2014		
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> - Runco M. A.; Creativity : Theories and Themes: Research, Development, and Practice; Amsterdam; 2007 - Wypych G.; Handbook of Polymers for Electronics; 2021 - Edwards P.; Manufacturing Technology in the Electronics Industry; 2021 - Proes F.W.; Additive Manufacturing of Mechatronic Integrated Devices; 2022		
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> - Marwedel, P.: Embedded system design : embedded systems foundations of cyber-physical systems, and the Internet of Things; 2021 - Heath, S.; Embedded systems design; 2003 - Ganssle, J. G.; The art of designing embedded systems; 2000		
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> - Bryden D.; CAD and Rapid Prototyping for Product Design; London; 2014 - Gebhardt A.; Additive Fertigungsverfahren : Additive Manufacturing und 3D-Drucken für Prototyping - Tooling – Produktion; München; 2016 - Runco M. A.; Creativity : Theories and Themes: Research, Development, and Practice; Amsterdam; 2007		
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> - Czichos H.; Mechatronik: Grundlagen und Anwendungen technischer Systeme; Wiesbaden; 2019, 4th Edition - Heinrich B., Linke P., Glöckler M.; Grundlagen Automatisierung: Sensorik, Regelung, Steuerung; Wiesbaden; 2017, 2nd Edition - Tränkler H., Reindl L.; Sensortechnik: Handbuch für Praxis und Wissenschaft; Berlin; 2018, 2nd Edition		
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> - Arreola-Risa, A.; Designing Supply Chains for New Product Development; 2013 - Golder, P.N., Mitra D.; Handbook of Research on New Product Development; 2018 - Mihm J.; Complexity in New Product Development Mastering the Dynamics of Engineering Projects; 2012 - Smith P.G.; Flexible Product Development - Building Agility for Changing Markets; 2007 - Douglass, B. P.; Agile model-based systems engineering cookbook : improve system development by applying proven recipes for effective agile systems engineering; 2021 - Dori, D.; Object-process methodology : a holistics systems paradigm; 2002		
Acquisition of skills	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> The participants: - can explain design guidelines and contexts for product design - can develop concepts based on requirements and evaluate them - can independently carry out an industrial design project - can use the necessary tools, such as generative AI, correctly		

	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> The participants: • gain understanding of manufacturing and assembly processes in product development • able to select appropriate materials for different product applications • understand how material science influences product design and manufacturing • explore sustainable manufacturing practices and how to incorporate eco-friendly materials and processes into product development • are introduced to manufacturing technologies such as additive manufacturing (3D printing), nanotechnology, and
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Acquisition of skills	smart materials • gain skills in cost-benefit analyses of manufacturing processes and material choices • know about quality control measures and testing protocols
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> The participants: • know the architecture and components of embedded systems and can justify the advantages and disadvantages of different designs • know the development process and tools • can define the requirements for an embedded system, evaluate concepts and make a selection • are able to set up the development environment for an embedded system • are able to create and implement simple programs regarding control, processing of sensor data, control of actuators and communication
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> The participants: • know common prototyping technologies • can apply them fundamentally • can create a simple digital model
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> The participants: • know the process chain between sensors and actuators • can characterize the wide range of sensors • can formulate advantages and disadvantages of different sensors for a given application and select sensors suitable for the application • acquire the ability to describe the structure of sensors, interpret data sheets and carry out measurements • can interpret measurement results and know their formats in order to optimize further data processing
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> The participants: • know different approaches to the product development process • know traditional and agile product development methods as well as the dependencies of the process on product type, batch size and other dependencies • can name the different phases of the product development process and derive necessary activities • know AI-based tools for solving problems in the product development process • know systematic methods of product development for the different phases of the overall process • can define a smart communicating product • are familiar with the concepts of digital twin, condition monitoring, predictive maintenance • know the specific challenges of smart products and their influence on the product development process
Course contents	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> • Definition/delimitation of product design • Classification in the product development process • Procedure, approaches/principles and tools for product design with focus on generative AI • Evaluation criteria and the evaluation of developed or existing concepts
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> • Understanding Manufacturing Processes and Assembly Techniques • Material Selection and Application • Integration of Material Science in Design • Sustainability in Manufacturing • Innovative Manufacturing Technologies • Cost Analysis and Efficiency • Quality Control and Testing
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> • System solutions and architecture of embedded systems and characteristics • Embedded hardware (processors, memory, I/O, busses) • Embedded software (operating system, middleware, application, drivers) • Real-time operation (classification, implementation) • Multi-processor operation • Getting to know simple platforms (e.g. Raspberry Pi, Arduino, FPGA) and the development environment • Implementing simple use cases concerning the processing of sensors and the control of actuators • Implementing different possibilities of data transmission • Realization of a more complex final project
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u>

	• Laser engravers (LaserCut) • Additive manufacturing methods (e.g. 3D printing) • Digital prototypes (e.g. Click Dummies for Apps) • Scan technologies • Basics of CAx • Virtual prototyping • Design thinking • Creativity methods • Creating a Prototype
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> • Definition/classification of sensors • Structure and function of a measuring chain

Course contents	• Fields of application and functional principles of sensors • Basics of microsensors • Sensor properties (static and dynamic behavior, reliability, etc.) • Measurement errors and sources of error • Calibration • Signal transmission/processing • Basic terms of relevant measurement technology • Application of sensors for different areas (e.g. temperature, weight, pressure, acceleration, position, etc.) • Analysis and evaluation of functional principles and sensor properties • Structure and properties of data transmission and data processing in a measurement chain • Evaluation, interpretation and storage of measurements
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> • Types of product development processes for different products, markets and companies • Traditional PE vs. Agile PE vs. Mixed - which concept under which conditions • Design Thinking as a central development concept • Methods of product development: • Ideating and creative methods for solving problems like: Ishikawa, root-cause, risk management, functional analysis, SWOT, FMEA,..... • Requirements engineering • Market and patent analysis • Concept • Systematical finding of technical solutions using AI • Evaluation of ideas and concepts • Design • Simulation of functional aspects (stress/strain, displacements, movement,....) • Prototyping • Testing • Special aspects of smart products
Teaching and learning methods	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> English version available soon
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> Project
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> written exam
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> Exam Project
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> English version available soon
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> Exam
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> Exam Presentation
Literature recommendation	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u>

	• Gerhard H., Lanz M., Prettenthaler M.; Design Basics: von der Idee zum Produkt; 2018 • Follet J.; Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things; 2014
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	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> The participants: • know the architecture and components of embedded systems and can justify the advantages and disadvantages of different designs • know the development process and tools • can define the requirements for an embedded system, evaluate concepts and make a selection • are able to set up the development environment for an embedded system • are able to create and implement simple programs regarding control, processing of sensor data, control of actuators and communication
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u>

	The participants: • know common prototyping technologies • can apply them fundamentally • can create a simple digital model
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> The participants: • know the process chain between sensors and actuators • can characterize the wide range of sensors • can formulate advantages and disadvantages of different sensors for a given application and select sensors suitable for the application • acquire the ability to describe the structure of sensors, interpret data sheets and carry out measurements

Acquisition of skills	• can interpret measurement results and know their formats in order to optimize further data processing
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> The participants: • know different approaches to the product development process • know traditional and agile product development methods as well as the dependencies of the process on product type, batch size and other dependencies • can name the different phases of the product development process and derive necessary activities • know AI-based tools for solving problems in the product development process • know systematic methods of product development for the different phases of the overall process • can define a smart communicating product • are familiar with the concepts of digital twin, condition monitoring, predictive maintenance • know the specific challenges of smart products and their influence on the product development process
Course contents	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> • Definition/delimitation of product design • Classification in the product development process • Procedure, approaches/principles and tools for product design with focus on generative AI • Evaluation criteria and the evaluation of developed or existing concepts
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> • Understanding Manufacturing Processes and Assembly Techniques • Material Selection and Application • Integration of Material Science in Design • Sustainability in Manufacturing • Innovative Manufacturing Technologies • Cost Analysis and Efficiency • Quality Control and Testing
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> • System solutions and architecture of embedded systems and characteristics • Embedded hardware (processors, memory, I/O, busses) • Embedded software (operating system, middleware, application, drivers) • Real-time operation (classification, implementation) • Multi-processor operation • Getting to know simple platforms (e.g. Raspberry Pi, Arduino, FPGA) and the development environment • Implementing simple use cases concerning the processing of sensors and the control of actuators • Implementing different possibilities of data transmission • Realization of a more complex final project
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> • Laser engravers (Lasercut) • Additive manufacturing methods (e.g. 3D printing) • Digital prototypes (e.g. Click Dummies for Apps) • Scan technologies • Basics of CAx • Virtual prototyping • Design thinking • Creativity methods • Creating a Prototype
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> • Definition/classification of sensors • Structure and function of a measuring chain • Fields of application and functional principles of sensors • Basics of microsensors • Sensor properties (static and dynamic behavior, reliability, etc.) • Measurement errors and sources of error • Calibration • Signal transmission/processing • Basic terms of relevant measurement technology • Application of sensors for different areas (e.g. temperature, weight, pressure, acceleration, position, etc.) • Analysis and evaluation of functional principles and sensor properties • Structure and properties of data transmission and data processing in a measurement chain • Evaluation, interpretation and storage of measurements
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u>

	• Types of product development processes for different products, markets and companies • Traditional PE vs. Agile PE vs. Mixed - which concept under which conditions • Design Thinking as a central development concept • Methods of product development: • Ideating and creative methods for solving problems like: Ishikawa, root-cause, risk management, functional analysis, SWOT, FMEA,..... • Requirements engineering • Market and patent analysis • Concept • Systematical finding of technical solutions using AI • Evaluation of ideas and concepts • Design • Simulation of functional aspects (stress/strain. displacements. movement.....)
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Course contents	• Prototyping • Testing • Special aspects of smart products
Teaching and learning methods	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> English version available soon
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>AI-based Product Design /ILV / LV-Nr: PDE.5 / 2.Semester / ECTS: 6</u> Project
	<u>Manufacturing & Material Science for Smart Products /ILV / LV-Nr: PDE.7 / 3.Semester / ECTS: 5</u> written exam
	<u>Embedded Systems & Edge Analytics /ILV / LV-Nr: PDE.3 / 1.Semester / ECTS: 5</u> Exam Project
	<u>Rapid Prototyping /ILV / LV-Nr: PDE.6 / 2.Semester / ECTS: 6</u> English version available soon
	<u>Sensors & Actuators /ILV / LV-Nr: PDE.2 / 1.Semester / ECTS: 5</u> Exam
	<u>Smart Product Development /ILV / LV-Nr: PDE.1 / 1.Semester / ECTS: 5</u> Exam Presentation

Module number:	Digital Transformation	Scope:	
DIT		2	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	1. Semester		
	3. Semester		
	4. Semester		
Level	1. Semester: second cycle, Master / 1. Semester: Second cycle, Master / 3. Semester: second cycle, Master / 4. Semester: second cycle, Master		
Previous knowledge	1. Semester: According to admission requirements / 3. Semester: - / 4. Semester: None		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Clement R., Schreiber D.; Internet-Ökonomie: Grundlagen und Fallbeispiele der vernetzten Wirtschaft; Berlin; 2016 3. Auflage Hoffmeister Ch.; Digital Business Modelling: Digitale Geschäftsmodelle entwickeln und strategisch verankern; München; 2015 McGrath R. G.; The End of Competitive Advantage: How to Keep Your Strategy Moving as Fast as Your Business; Massachusetts; 2013 Ries E.; The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses; St. Ives; 2013 Slama D., Puhlmann F., Mirrish J., Bhatnagar R.; Enterprise IoT: Strategies and Best Practices for Connected Products and Services; 2015		
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> • Caudron J., Van Peteghem D.V.; Digital Transformation: A Model to Master Digital Disruption; BookBaby; 2016 • Rauser A.; Digital Strategy: A Guide to Digital Business Transformation; North Charleston; 2016 • Doppler K., Lauterburg Ch.; Change Management: Den Unternehmenswandel gestalten; Campus, 13. Auflage, 2014 • Berner W., Change!: 15 Fallstudien zu Sanierung, Turnaround, Prozessoptimierung, Reorganisation und Kulturveränderung, Schäfer Pöschl, 2. Auflage, 2015 • Kotter J.P.; Leading Change; Harvard, 2011		
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> • Heesen J. (publisher); Handbuch Medien- und Informationsethik; Stuttgart; 2016 • Davisson A., Booth P. (publisher); Controversies in Digital Ethics; New York; 2016 • Ess C.; Digital Media Ethics; Cambridge; 2014		
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> • Patrick D. Smith. (2018). Hands-on artificial intelligence for beginners: an introduction to AI concepts, algorithms, and their implementation (1st edition.). • Géron, A. (2023). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: concepts, tools, and techniques to build intelligent systems (Third edition). • Park, K. R., Kim, E., & Lee, S. (2023). Image and Video Processing and Recognition Based on Artificial Intelligence. (Volume II).		
Acquisition of skills	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u>		

	The participants: • understand the basics of the digital economy • know the relationships between strategy, business model, business process model and process and methods to develop them • know the requirements and elements of a business plan and can evaluate it • can develop business models suitable for identified framework conditions and transfer them into a business process model • are able to develop a business plan based on this
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> The participants: • know significant trends in the field of digitalization for companies • can evaluate the potential that digital transformation offers companies and describe development paths for their own company • know the challenges that digital transformation poses to traditional companies • know the importance of smart products in the context of digitalization • can derive a digitalization strategy from a divisional strategy • know the importance of change management for the introduction of products / services • know the most important approaches, models and terms • understand the individual and social aspects of change and knows the main causes of resistance and conflicts • know procedural models or methods, techniques and tools for change management • can integrate the topic of change management in change projects and can apply procedural models or methods, techniques and tools to specific practical cases
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> The participants:

Acquisition of skills	• have a good understanding of the fundamental laws, regulations and strategies in data protection • can explain basic positions of technical and business ethics using examples • can describe the steps of ethical judgement and argumentation and apply them in case studies from economic and technical practice • know the effects of technological change on work-life balance and family <u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> The participants: • understand the basics of artificial intelligence • are able to identify areas of application for artificial intelligence • are able to create content (text, images, audio) using artificial intelligence • can assess the advantages and disadvantages of artificial intelligence in the development of smart products • know restrictions and limitations of artificial intelligence
Course contents	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> • Fundamentals of the digital economy and trends • Digital business models • Importance of data • Approaches to developing strategies, business models and business process models • Business plans • Risk reduction/implementation
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> • Digital trends and waves of change • Difference between digital and traditional companies or their development paths • Design levels, framework conditions and challenges of digital change • Frameworks for the assessment of digital maturity • Smart products • Development • Ecosystem IoT and data • Use cases of smart products and solutions • Importance of change management • Individual and social aspects of change • Resistance, conflict and crisis • Basic approaches to change management • Types of change • Models of change (e.g. Lewin, GE-CAP, etc.) • (Project) management of change: Generic phase • Models of change (e.g. Lewin, GE-CAP, etc.) • (Project) management of change: Generic phase model and integration in projects • Techniques and tools of change (e.g: Target circle, change stretch, WIIFM, empathy map, etc.)
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> • Introduction to data protection and its implementation • Definitions: personal data, data registers, publicly accessible data, pseudonymization • Informational self-determination, laws and regulations on data protection • Rights of those concerned • Organizational measures for the protection of personal data • Criminal/civil law aspects: Trade secrets, refusal to testify • Introduction to ethics as the science of good and right decisions and actions • Relevant factors of ethical judgement • Methods of ethical argumentation • Concept of responsibility • Business and technical ethics as sub-disciplines of ethics • Ethical challenges in digitalized and global information and knowledge societies • Effects of technological change on work life balance and family
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u>

	• Overview of terms and definitions • Basic algorithms and models • Identification and evaluation of application areas in the context of the product development process of smart products • Limitations of AI • Generation and modification of texts • Generation and modification of images and videos • Audio generation and modification • Prompting strategies (e.g. retrieval augmented prompting) • Use and interaction with AI • Local vs. Hosted AI Models • Quality assurance of AI models • Ethical considerations and implications when using AI models • Limitations of different models and strategies
Teaching and learning methods	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Lecture, group work, presentation and discussion of tasks
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks

Teaching and learning methods	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Exam Presentation
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> Exam Seminar paper
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> exam
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> Project Presentation
Literature recommendation	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Clement R., Schreiber D.; Internet-Ökonomie: Grundlagen und Fallbeispiele der vernetzten Wirtschaft; Berlin; 2016 3. Auflage Hoffmeister Ch.; Digital Business Modelling: Digitale Geschäftsmodelle entwickeln und strategisch verankern; München; 2015 McGrath R. G.; The End of Competitive Advantage: How to Keep Your Strategy Moving as Fast as Your Business; Massachusetts; 2013 Ries E.; The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses; St. Ives; 2013 Slama D., Puhlmann F., Mirrish J., Bhatnagar R.; Enterprise IoT: Strategies and Best Practices for Connected Products and Services; 2015
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> • Caudron J., Van Peteghem D.V.; Digital Transformation: A Model to Master Digital Disruption; BookBaby; 2016 • Rauser A.; Digital Strategy: A Guide to Digital Business Transformation; North Carlestone; 2016 • Doppler K., Lauterburg Ch.; Change Management: Den Unternehmenswandel gestalten; Campus, 13. Auflage, 2014 • Berner W., Change!: 15 Fallstudien zu Sanierung, Turnaround, Prozessoptimierung, Reorganisation und Kulturveränderung, Schäfer Poschl, 2. Auflage, 2015 • Kotter J.P.; Leading Change; Harvard, 2011
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> • Heesen J. (publisher); Handbuch Medien- und Informationsethik; Stuttgart; 2016 • Davisson A., Booth P. (publisher); Controversies in Digital Ethics; New York; 2016 • Ess C.; Digital Media Ethics; Cambridge; 2014
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> • Patrick D. Smith. (2018). Hands-on artificial intelligence for beginners: an introduction to AI concepts, algorithms, and their implementation (1st edition.). • Géron, A. (2023). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: concepts, tools, and techniques to build intelligent systems (Third edition). • Park, K. R., Kim, E., & Lee, S. (2023). Image and Video Processing and Recognition Based on Artificial Intelligence. (Volume II).
Acquisition of skills	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> The participants: • understand the basics of the digital economy • know the relationships between strategy, business model, business process model and process and methods to develop them • know the requirements and elements of a business plan and can evaluate it • can develop business models suitable for identified framework conditions and transfer them into a business process model • are able to develop a business plan based on this
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u>

	The participants: • know significant trends in the field of digitalization for companies • can evaluate the potential that digital transformation offers companies and describe development paths for their own company • know the challenges that digital transformation poses to traditional companies • know the importance of smart products in the context of digitalization • can derive a digitalization strategy from a divisional strategy • know the importance of change management for the introduction of products / services • know the most important approaches, models and terms • understand the individual and social aspects of change and knows the main causes of resistance and conflicts • know procedural models or methods, techniques and tools for change management
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Acquisition of skills	• can integrate the topic of change management in change projects and can apply procedural models or methods, techniques and tools to specific practical cases
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> The participants: • have a good understanding of the fundamental laws, regulations and strategies in data protection • can explain basic positions of technical and business ethics using examples • can describe the steps of ethical judgement and argumentation and apply them in case studies from economic and technical practice • know the effects of technological change on work-life balance and family
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> The participants: • understand the basics of artificial intelligence • are able to identify areas of application for artificial intelligence • are able to create content (text, images, audio) using artificial intelligence • can assess the advantages and disadvantages of artificial intelligence in the development of smart products • know restrictions and limitations of artificial intelligence
Course contents	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> • Fundamentals of the digital economy and trends • Digital business models • Importance of data • Approaches to developing strategies, business models and business process models • Business plans • Risk reduction/implementation
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> • Digital trends and waves of change • Difference between digital and traditional companies or their development paths • Design levels, framework conditions and challenges of digital change • Frameworks for the assessment of digital maturity • Smart products • Development • Ecosystem IoT and data • Use cases of smart products and solutions • Importance of change management • Individual and social aspects of change • Resistance, conflict and crisis • Basic approaches to change management • Types of change • Models of change (e.g. Lewin, GE-CAP, etc.) • (Project) management of change: Generic phase • Models of change (e.g. Lewin, GE-CAP, etc.) • (Project) management of change: Generic phase model and integration in projects • Techniques and tools of change (e.g: Target circle, change stretch, WIIFM, empathy map, etc.)
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> • Introduction to data protection and its implementation • Definitions: personal data, data registers, publicly accessible data, pseudonymization • Informational self-determination, laws and regulations on data protection • Rights of those concerned • Organizational measures for the protection of personal data • Criminal/civil law aspects: Trade secrets, refusal to testify • Introduction to ethics as the science of good and right decisions and actions • Relevant factors of ethical judgement • Methods of ethical argumentation • Concept of responsibility • Business and technical ethics as sub-disciplines of ethics • Ethical challenges in digitalized and global information and knowledge societies • Effects of technological change on work life balance and family
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u>

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| | <ul style="list-style-type: none">• Overview of terms and definitions• Basic algorithms and models• Identification and evaluation of application areas in the context of the product development process of smart products• Limitations of AI• Generation and modification of texts• Generation and modification of images and videos• Audio generation and modification• Prompting strategies (e.g. retrieval augmented prompting)• Use and interaction with AI• Local vs. Hosted AI Models• Quality assurance of AI models• Ethical considerations and implications when using AI models• Limitations of different models and strategies |
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Teaching and learning methods	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Lecture, group work, presentation and discussion of tasks
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>Strategy & Business Model & Organisation /ILV / LV-Nr: DIT.2 / 3.Semester / ECTS: 2</u> Exam Presentation
	<u>Digital Transformation & Change Management /ILV / LV-Nr: DIT.1 / 1.Semester / ECTS: 5</u> Exam Seminar paper
	<u>Ethics & Privacy /ILV / LV-Nr: DIT.3 / 4.Semester / ECTS: 3</u> exam
	<u>Fundamentals of AI /ILV / LV-Nr: DIT.4 / 1.Semester / ECTS: 5</u> Project Presentation

Module number:	Data Management	Scope:	
DAT		5	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	1. Semester		
	2. Semester		
	3. Semester		
Level	1. Semester: second cycle, Master / 2. Semester: second cycle, Master / 3. Semester: second cycle, Master		
Previous knowledge	1. Semester: According to admission requirements / 2. Semester: none / 3. Semester: none		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> • Badach A., Hoffmann E.; Technik der IP-Netze: Internet-Kommunikation in Theorie und Einsatz; München; 2019, 4. Auflage • Freyer U.; Nachrichten-Übertragungstechnik: Grundlagen, Komponenten, Verfahren und Anwendungen der Informations-, Kommunikations- und Medientechnik; München; 2017, 7. Auflage • Gessler R., Krause Th.; Wireless-Netzwerke für den Nahbereich: Eingebettete Funksysteme: Vergleich von standardisierten und proprietären Verfahren; Wiesbaden; 2015, 2. Auflage • Tanenbaum A.S., Wetherall D.J.; Computernetzwerke; München; 2012, 5. Auflage		
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> • Ziadé, T.; Expert Python programming learn best practices to designing, coding, and distributing your Python software; 2008 • Nguyễn, Q.; Hands-on application development with pycharm : accelerate your python applications using practical coding techniques in pycharm; 2019 • Anaya, M.; Clean code in Python : develop maintainable and efficient code; 2020 • Perrotta P.; Machine Learning für Softwareentwickler: Von der Python-Codezeile zur Deep-Learning-Anwendung; 2020		
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> • Runkler Th.; Information Mining; vieweg; 2000 • Langit L.; Smart Business Intelligence Solutions with Microsoft SQL Server; Microsoft Press; 2008 • Petersohn H.; Data Mining; Oldenbourg; 2005 • Provost F., Fawcett T.; Data Science for Business; O'Reilly; 2013 • Milton M.; Head First Data Analysis; O'Reilly; 2009		
Acquisition of skills	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> The participants: • understand the characteristics of various data transmission technologies • can define data transmission requirements • are familiar with relevant evaluation criteria (latency, availability, data transfer rate, etc.) for selecting approaches and evaluating requirements and approaches • can evaluate transmission technologies and protocols based on these requirements • are familiar with architectures, methods, and protocols • can select transmission technologies and build prototypes		
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> The participants: • have an overview of programming languages • know the structure and structure of programs • can create programs in a high-level language • can use the development environment for a programming language • can implement manageable problems in a program • can use generative language models to produce program code		
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> The participants: • can describe the contents, results/applications and working methods of Data Science • can convert "questions" into requirements in the context of Data Science • can define the process and tools based on these and implement / use them • knows a software with libraries for implementing data analysis and evaluation • can use appropriate software • can carry out suitable evaluations and analyses using the software for defined examples		

Course contents	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> • Fundamentals of data transmission • Wired data transmission • Wireless communication • Technologies and applications of modern networks • OSI, hybrid and TCP/IP reference model • Wired data transmission (I2C communication, serial communication) • Wireless networks • Sensor networks and approaches (e.g. MANET, WMN) • End-to-end protocols: UDP, TCP • Selected protocols of the application layer (e.g. FTP, HTTP, HTTPS, SMTP, MQTT) • Security concepts and access procedures • Release updates for networks
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Course contents	• Elements of a measurement report • Selection of transmission technologies and protocols
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> • Programming languages (classification, principles, history) • Detailed consideration of a modern programming language (e.g. Python) • Overview and selection of a coding assistant • Structure of programs • Data types, operators, flow structures • Development environment • Typical work steps • Setting up the development environment • AI enabled Programming (input, debugging, execution) • Independent planning and programming based on the programming languages taught in the lecture • Development of AI-enhanced programs
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> • Introduction (data, information, knowledge, temporal components, objectives) • Data process (collection, preparation, analysis, presentation) • Data preparation (cleansing, transformation, rescaling, storage) • Approaches for the analysis of data • Presentation/visualization of results • Software (open source and proprietary software) • Machine Learning - process, approaches, implementation • Introduction to the software used e.g. Python • Collecting and preparing data using software • Analysis and presentation of sample data using various approaches (e.g. regression, decision trees, etc.)
Teaching and learning methods	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> exam
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> Exam
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> exam
Literature recommendation	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> • Badach A., Hoffmann E.; Technik der IP-Netze: Internet-Kommunikation in Theorie und Einsatz; München; 2019, 4. Auflage • Freyer U.; Nachrichten-Übertragungstechnik: Grundlagen, Komponenten, Verfahren und Anwendungen der Informations-, Kommunikations- und Medientechnik; München; 2017, 7. Auflage • Gessler R., Krause Th.; Wireless-Netzwerke für den Nahbereich: Eingebettete Funkssysteme: Vergleich von standardisierten und proprietären Verfahren; Wiesbaden; 2015, 2. Auflage • Tanenbaum A.S., Wetherall D.J.; Computernetzwerke; München; 2012, 5. Auflage
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> • Ziadé, T.; Expert Python programming learn best practices to designing, coding, and distributing your Python software; 2008 • Nguyễn, Q.; Hands-on application development with pycharm : accelerate your python applications using practical coding techniques in pycharm; 2019 • Anaya, M.; Clean code in Python : develop maintainable and efficient code; 2020 • Perrotta P.; Machine Learning für Softwareentwickler: Von der Python-Codezeile zur Deep-Learning-Anwendung; 2020
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u>

	• Runkler Th.; Information Mining; vieweg; 2000 • Langit L.; Smart Business Intelligence Solutions with Microsoft SQL Server; Microsoft Press; 2008 • Petersohn H.; Data Mining; Oldenbourg; 2005 • Provost F., Fawcett T.; Data Science for Business; O'Reilly; 2013 • Milton M.; Head First Data Analysis; O'Reilly; 2009
Acquisition of skills	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> The participants: • understand the characteristics of various data transmission technologies • can define data transmission requirements • are familiar with relevant evaluation criteria (latency, availability, data transfer rate, etc.) for selecting approaches and evaluating requirements and approaches • can evaluate transmission technologies and protocols based on these requirements • are familiar with architectures, methods, and protocols

Acquisition of skills	• can select transmission technologies and build prototypes
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> The participants: • have an overview of programming languages • know the structure and structure of programs • can create programs in a high-level language • can use the development environment for a programming language • can implement manageable problems in a program • can use generative language models to produce program code
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> The participants: • can describe the contents, results/applications and working methods of Data Science • can convert "questions" into requirements in the context of Data Science • can define the process and tools based on these and implement / use them • knows a software with libraries for implementing data analysis and evaluation • can use appropriate software • can carry out suitable evaluations and analyses using the software for defined examples
Course contents	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> • Fundamentals of data transmission • Wired data transmission • Wireless communication • Technologies and applications of modern networks • OSI, hybrid and TCP/IP reference model • Wired data transmission (I2C communication, serial communication) • Wireless networks • Sensor networks and approaches (e.g. MANET, WMN) • End-to-end protocols: UDP, TCP • Selected protocols of the application layer (e.g. FTP, HTTP, HTTPS, SMTP, MQTT) • Security concepts and access procedures • Release updates for networks • Elements of a measurement report • Selection of transmission technologies and protocols
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> • Programming languages (classification, principles, history) • Detailed consideration of a modern programming language (e.g. Python) • Overview and selection of a coding assistant • Structure of programs • Data types, operators, flow structures • Development environment • Typical work steps • Setting up the development environment • AI enabled Programming (input, debugging, execution) • Independent planning and programming based on the programming languages taught in the lecture • Development of AI-enhanced programs
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> • Introduction (data, information, knowledge, temporal components, objectives) • Data process (collection, preparation, analysis, presentation) • Data preparation (cleansing, transformation, rescaling, storage) • Approaches for the analysis of data • Presentation/visualization of results • Software (open source and proprietary software) • Machine Learning - process, approaches, implementation • Introduction to the software used e.g. Python • Collecting and preparing data using software • Analysis and presentation of sample data using various approaches (e.g. regression, decision trees, etc.)
Teaching and learning methods	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> Lecture, individual work with software, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>Connectivity & Security /ILV / LV-Nr: DAT.2 / 2.Semester / ECTS: 5</u> exam

	<u>Coding & Applied AI /ILV / LV-Nr: DAT.1 / 1.Semester / ECTS: 5</u> Exam
	<u>Data Analytics & Visualization /ILV / LV-Nr: DAT.3 / 3.Semester / ECTS: 5</u> exam

Module number:	Social Skills	Scope:	
SSK		5	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	2. Semester		
Level	2. Semester:		
Previous knowledge	2. Semester: none		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Project Management & Team Leadership /ILV / LV-Nr: SSK.1 / 2.Semester / ECTS: 5</u> • Barker St., Cole R.; Brilliant Project Management, What the best project managers know, do and say; Pearson; 2012 • Ding R.; Key Project Management based on effective project thinking; Springer; 2019 • Karlgaard R., Malone M.S.; Team Genius: The New Science of High Performing Organisations; 2015 • Marle F., Vidal A.; Managing complex, high risk projects, Springer; 2016 • Schwindt Ch., Zimmermann J.; Handbook on Project Management and Scheduling Vol 2; Springer; 2015 • N.N.; PMBOOK guide; A guide to the project management body of knowledge; Project Management Institute; 2013 • Roudias J.; Mastering principles and practices in PMBOK, PRINCE2, and Scrum; Pearson FT Press; 2013		
Acquisition of skills	<u>Project Management & Team Leadership /ILV / LV-Nr: SSK.1 / 2.Semester / ECTS: 5</u> The participants: • can apply the approaches, functions, methods and tools of project management • can work, organize and form teams in a project-oriented way and lead them appropriately • know tools and documentation standards • can apply PM tools and standards • know frameworks for project management • know the basic communication, moderation and negotiation techniques as well as the most important leadership tools • can use these tools in steering project teams and coordinating with stakeholders in a way that is appropriate for the situation and the employees • can monitor project portfolios		
Course contents	<u>Project Management & Team Leadership /ILV / LV-Nr: SSK.1 / 2.Semester / ECTS: 5</u> • Basics of project management • Project management methods and tools • Roles in projects; communication and documentation • Problem, conflict, risk and crisis management • Theories/models and procedures for teambuilding • Tools for supporting teambuilding		
Teaching and learning methods	<u>Project Management & Team Leadership /ILV / LV-Nr: SSK.1 / 2.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks		
Evaluation Methods Criteria	<u>Project Management & Team Leadership /ILV / LV-Nr: SSK.1 / 2.Semester / ECTS: 5</u> Project		

Module number:	Product Management	Scope:	
PRM		3	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	2. Semester		
	3. Semester		
Level	2. Semester: second cycle, Master / 3. Semester: second cycle, Master		
Previous knowledge	2. Semester: None / 3. Semester: According to admission requirements		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> • Aumayr K.J.; Erfolgreiches Produktmanagement: Tool-Box für das professionelle Produktmanagement und Produktmarketing; Wiesbaden; 2019 5. Auflage • Hermann A., Albers S.; Handbuch Produktmanagement: Strategieentwicklung – Produktplanung – Organisation – Kontrolle; Wiesbaden; 2018 7. Auflage • Pichler R.; Agiles Produktmanagement mit Scrum: Erfolgreich als Product Owner arbeiten; Heidelberg; 2013 2. Auflage		
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> • Börcsök, J.; Functional Safety: Basic Principles of Safety-related Systems; 2020 • Kobes, P; Guideline Industrial Security: IEC 62443 is easy; 2017 • Tolonen; Brig's Handbook of Methods & Research in Product Management and Quality Control; 2018 • Stamatis D.H.; Advanced Product Quality Planning: The Road to Success; Boca Raton; 2018		
Acquisition of skills	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> The participants: • knows the tasks of product management • knows the process and related tools and can apply them • knows the specifics of product management of smart products and solutions		
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> The participants: • can consider important criteria such as quality, safety, reliability, availability and resource consumption in product development • know methods for assessing product quality and product risk		
Course contents	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> • Special features of smart products • New product management approaches • Market research • Product strategy • Purchase decision criteria or acceptance (drivers, obstacles) • Special features of introduction and marketing • Data-based decisions • Life cycle management		
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> • Product & process life cycle • Risk determination strategies • Planning of safe systems (concepts & strategies) • Planning of secure systems (threat analysis, countermeasures) • Structure & concepts of reliable control systems		
Teaching and learning methods	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks		
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks		
Evaluation Methods Criteria	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> Exam		
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> Exam		
Literature recommendation	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u>		

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| | <ul style="list-style-type: none">• Aumayr K.J.; Erfolgreiches Produktmanagement: Tool-Box für das professionelle Produktmanagement und Produktmarketing; Wiesbaden; 2019 5. Auflage• Hermann A., Albers S.; Handbuch Produktmanagement: Strategieentwicklung – Produktplanung – Organisation – Kontrolle; Wiesbaden; 2018 7. Auflage• Pichler R.; Agiles Produktmanagement mit Scrum: Erfolgreich als Product Owner arbeiten; Heidelberg; 2013 2. Auflage |
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Literature recommendation	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> • Börcsök, J.; Functional Safety: Basic Principles of Safety-related Systems; 2020 • Kobes, P; Guideline Industrial Security: IEC 62443 is easy; 2017 • Tolonen; Brig's Handbook of Methods & Research in Product Management and Quality Control; 2018 • Stamatis D.H.; Advanced Product Quality Planning: The Road to Success; Boca Raton; 2018
Acquisition of skills	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> The participants: • knows the tasks of product management • knows the process and related tools and can apply them • knows the specifics of product management of smart products and solutions
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> The participants: • can consider important criteria such as quality, safety, reliability, availability and resource consumption in product development • know methods for assessing product quality and product risk
Course contents	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> • Special features of smart products • New product management approaches • Market research • Product strategy • Purchase decision criteria or acceptance (drivers, obstacles) • Special features of introduction and marketing • Data-based decisions • Life cycle management
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> • Product & process life cycle • Risk determination strategies • Planning of safe systems (concepts & strategies) • Planning of secure systems (threat analysis, countermeasures) • Structure & concepts of reliable control systems
Teaching and learning methods	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> Lecture, group work, presentation and discussion of tasks
Evaluation Methods Criteria	<u>Product Management /ILV / LV-Nr: PRM.1 / 3.Semester / ECTS: 3</u> Exam
	<u>Risk Management & Compliance /ILV / LV-Nr: PRM.2 / 2.Semester / ECTS: 5</u> Exam

Module number:	Practice transfer	Scope:	
PXT		8	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	2. Semester		
	3. Semester		
Level	2. Semester: - / 3. Semester: Master		
Previous knowledge	2. Semester: none / 3. Semester: none		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Study Trip /ILV / LV-Nr: PXT.1 / 2.Semester / ECTS: 3</u> • Thomas D.C., Peterson M.F.; Cross-Cultural Management: Essential Concepts; Los Angeles; 2017 • Beise M.; Lead Markets. Country-Specific Success Factors of the Global Diffusion of Innovations; Berlin; 2014		
	<u>Business Project /PT / LV-Nr: PXT.2 / 3.Semester / ECTS: 5</u> • Patzak G., Rattay G.; Projekt Management. Leitfaden zum Management von Projekten, Projektportfolios und projektorientierten Unternehmen; Wien; 2017, 7. Auflage • Schöneck N.M., Voß W.; Das Forschungsprojekt: Planung, Durchführung und Auswertung einer quantitativen Studie; Wiesbaden; 2013 2. Auflage		
Acquisition of skills	<u>Study Trip /ILV / LV-Nr: PXT.1 / 2.Semester / ECTS: 3</u> The participants: • knows the cultural specifics of the respective country in terms of innovation, legal framework and management • knows the specifics of the host country regarding smart products and solutions (technology, acceptance, business models, etc.) • knows and understands the research strategy/research system of the host country regarding smart products and solutions		
	<u>Business Project /PT / LV-Nr: PXT.2 / 3.Semester / ECTS: 5</u> The participants: • can question and define tasks accordingly • can derive a suitable scientific methodology based on the task • can carry out intensive study of literature (state of the art approaches) • can transfer research results to applied problems • can lead projects with relevant content concerning the study • can structure projects/project teams (results, times, resources) • know the tasks and responsibilities as a project member		
Course contents	<u>Study Trip /ILV / LV-Nr: PXT.1 / 2.Semester / ECTS: 3</u> • International management in a country-specific context • R&D strategy and systems at country level • Technology and innovation approaches		
	<u>Business Project /PT / LV-Nr: PXT.2 / 3.Semester / ECTS: 5</u> • Working in a team and team organization • Deducing a problem • Choosing a suitable methodology and corresponding tools • Planning, implementing and managing projects • Integrative applications of acquired skills and knowledge • Preparing and communicating results • Self-reflection		
Teaching and learning methods	<u>Study Trip /ILV / LV-Nr: PXT.1 / 2.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks		
	<u>Business Project /PT / LV-Nr: PXT.2 / 3.Semester / ECTS: 5</u> Group work		
Evaluation Methods Criteria	<u>Study Trip /ILV / LV-Nr: PXT.1 / 2.Semester / ECTS: 3</u> Report		
	<u>Business Project /PT / LV-Nr: PXT.2 / 3.Semester / ECTS: 5</u> Project		

Module number:	Elective	Scope:	
WPF		11	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	3. Semester		
	4. Semester		
Level	3. Semester: English version available soon / 3. Semester: Master / 3. Semester: second cycle, Master / 4. Semester: Master		
Previous knowledge	3. Semester: none / 3. Semester: None / 4. Semester: none / 4. Semester: None		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Quantitative Process- & Quality Management (WP)* /ILV / LV-Nr: WPF.1 / 3.Semester / ECTS: 4</u> • Töpferer, A.; Six Sigma Konzeption und Erfolgsbeispiele für praktizierende Null-Fehler-Qualität; Berlin/Heidelberg/New York 2007; 4. Auflage • George M.; Rowlands D.; Price M.; Maxey J.; The Lean Six Sigma Pocket Toolbook; New York; 2005 • Lunau St. (Hrsg.); Six Sigma + Lean Toolset; 5. Auflage; Heidelberg; 2014		
	<u>Trends in Data Science (elective) (WP)* /ILV / LV-Nr: WPF.10 / 4.Semester / ECTS: 3</u> 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/.		
	<u>Trends in Smart Products (elective) (WP)* /ILV / LV-Nr: WPF.11 / 4.Semester / ECTS: 3</u> • 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?"; Harvard Business Review; 2015 • Roth A.; Einführung und Umsetzung von Industrie 4.0: Grundlagen, Vorgehensmodell und Use Cases aus der Praxis; Wiesbaden; 2016		
	<u>Trends in AI Engineering (WP)* /ILV / LV-Nr: WPF.12 / 4.Semester / ECTS: 3</u> • 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		
	<u>Application-oriented analysis platforms (elective)* (WP)* /ILV / LV-Nr: WPF.2 / 3.Semester / ECTS: 4</u> • 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) • 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)		
	<u>Internet of Things (elective)* (WP)* /ILV / LV-Nr: WPF.3 / 3.Semester / ECTS: 4</u> • 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. (Herausgeber); Smart Service Engineering: Konzepte und Anwendungsszenarien für die digitale Transformation; Wiesbaden; 2017		
	<u>Operational & Strategic Management of Applications (WP)* /ILV / LV-Nr: WPF.4 / 3.Semester / ECTS: 4</u> • Thomas Söbbing, Axel Funk, Wolfgang Fritzemeyer, Holger Heinbuch, Sandra Neuhaus, Robert Niedermeier, Joachim Schrey: Handbuch IT-Outsourcing: Recht, Strategie, Prozesse, IT, Steuern samt Business Process Outsourcing (Recht in der Praxis), C.F. Müller, 3.Auflage, 2006. • Ernst Tiemeyer: Handbuch IT-Management. Konzepte, Methoden, Lösungen und Arbeitshilfen für die Praxis. Hanser Fachbuch; 2009. • Wolfgang Johannsen, Matthias Goeken: Referenzmodelle für IT-Governance. Strategische Effektivität und Effizienz mit COBIT, ITIL & Co, Dpunkt Verlag, 2007. • Olaf Resch: Einführung in das IT-Management: Grundlagen, Umsetzung, Best Practice, Erich Schmidt Verlag, 2009.		

	<u>Process Automation /ILV / LV-Nr: WPF.5 / 3.Semester / ECTS: 4</u> • Reicher M., Weber B.: Enabling Flexibility in Process-aware Information Systems, Springer 2012, Kapitel 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: Einführung in den Standard für die Geschäftsprozessmodellierung.- Books on Demand, 2015
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Literature recommendation	<u>Data Visualization & Visual Analytics (elective) (WP)* /ILV / LV-Nr: WPF.6 / 3.Semester / ECTS: 4</u> • 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) • Dale, K. (2016): Data Visualization with Python and Javascript: Scrape, Clean, Explore & 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)
	<u>Digital Twin & Simulation (WP)* /ILV / LV-Nr: WPF.7 / 3.Semester / ECTS: 4</u> • Nath, S. V. (2021). Building Industrial Digital Twins : Design, Develop, and Deploy Digital Twin Solutions for Real-World Industries Using Azure Digital Twins. • Zhang, Y. (2024). Digital Twin Architectures, Networks, and Applications (1st ed. 2024). • Blaschke, F. (2024). Implementation and Benefits of Digital Twin on Decision Making and Data Quality Management. (1st ed.). • Digital Twin Technology. (2023). IntechOpen. • Tao, F., Zhang, M., & Nee, A. Y. C. (2019). Digital twin driven smart manufacturing.
	<u>Human AI Interaction (WP)* /ILV / LV-Nr: WPF.8 / 3.Semester / ECTS: 4</u> • Norman, D. (2013): The Design of Everyday Things • Rogers, Y., Sharp, H. (2023): Interaction Design: Beyond Human-Computer Interaction • Shneiderman, B. (2013): Designing the User Interface • Kempka, D., Nudelman, G. (2025): UX for AI • Shneiderman, B. (2022): Human-Centered AI • Rahwan, I. (2018): Society-in-the-loop: programming the algorithmic social contract
	<u>Trends in ERP Systems (WP)* /ILV / LV-Nr: WPF.9 / 4.Semester / ECTS: 3</u> None
Acquisition of skills	<u>Quantitative Process- & Quality Management (WP)* /ILV / LV-Nr: WPF.1 / 3.Semester / ECTS: 4</u> The participants: • know the basics of descriptive and conclusive statistics • know how to examine measurement setups for repeatability and reproducibility • can calculate sample sizes • can control the stability of process results using statistical control methods • can evaluate the ability of processes to meet customer requirements • knows methods to search for the causes of result deviations using test procedures • knows the basic functions of the Minitab statistics software • can use Minitab in process analysis
	<u>Trends in Data Science (elective) (WP)* /ILV / LV-Nr: WPF.10 / 4.Semester / ECTS: 3</u> The participants: • are familiar with current thematic trends in the field of data science. • are familiar with current technological developments in the field of data science. • are familiar with current practical issues in the field of data science.
	<u>Trends in Smart Products (elective) (WP)* /ILV / LV-Nr: WPF.11 / 4.Semester / ECTS: 3</u> The participants: • understand the concepts of smart applications such as Smart House, Smart City, Smart Production, Connected Vehicles etc. • know and understand the latest trends in the field of these applications
	<u>Trends in AI Engineering (WP)* /ILV / LV-Nr: WPF.12 / 4.Semester / ECTS: 3</u> The participants: • are able to identify current thematic trends in the field of AI engineering, modern software development, and applications • are able to identify current technological developments in the field of AI engineering, modern software development, and applications • are able to identify current practical issues in the field of AI engineering, modern software development, and applications
	<u>Application-oriented analysis platforms (elective)* (WP)* /ILV / LV-Nr: WPF.2 / 3.Semester / ECTS: 4</u> The participants: • Students are familiar with different, 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.

	<u>Internet of Things (elective)* (WP)* /ILV / LV-Nr: WPF.3 / 3.Semester / ECTS: 4</u> The participants: • know basic IoT architectures • know methods of data generation • know basics of data transmission • know options of data storage • know forms of data visualization • understand challenges of data security
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Acquisition of skills	<u>Operational & Strategic Management of Applications (WP)* /ILV / LV-Nr: WPF.4 / 3.Semester / ECTS: 4</u> The participants: • are able to describe the operational design and control options within an IT organisation • are able to describe details of IT management areas such as personnel planning, quality management, portfolio management, IT strategy management, IT governance, and compliance concepts
	<u>Process Automation /ILV / LV-Nr: WPF.5 / 3.Semester / ECTS: 4</u> The participants: • know challenges in process automation • can select processes for automation • knows procedures and factors for successful process automation • can create process automation in selected software • knows interfaces to ERP and CRM systems • knows procedures for interprocess communication and can implement them • knows the basic structure of cloud computing-based IT applications for process automation in the operational environment using Microsoft Dynamics 365 as an example • knows basic and advanced functionalities of process automation under Microsoft Dynamics 365
	<u>Data Visualization & Visual Analytics (elective) (WP)* /ILV / LV-Nr: WPF.6 / 3.Semester / ECTS: 4</u> The participants: • can describe data visualization and visual communication. • can develop visualizations independently and use them for communication purposes. • can work with different presentation tools and presentation libraries to present data and analysis results in a meaningful way.
	<u>Digital Twin & Simulation (WP)* /ILV / LV-Nr: WPF.7 / 3.Semester / ECTS: 4</u> The participants: • understand the basics of modeling and can apply these • know typical applications and advantages of simulations • know simulation areas and simulation software for smart products and solutions • can create models and simulation processes • can interpret simulation results • can define a smart communicating product • are familiar with the concepts of digital twin, condition monitoring, predictive maintenance
	<u>Human AI Interaction (WP)* /ILV / LV-Nr: WPF.8 / 3.Semester / ECTS: 4</u> The participants: • are able to explain the basic principles of human–AI interaction and can apply these to modern AI systems such as LLMs, chatbots, agents, and decision-making systems • are able to analyse user needs, tasks, and usage contexts when interacting with AI • are able to develop interaction models and UX patterns for AI systems • are able to analyse the distribution of roles between humans and machines and can design various application scenarios
	<u>Trends in ERP Systems (WP)* /ILV / LV-Nr: WPF.9 / 4.Semester / ECTS: 3</u> The participants: • know current trends in the field of ERP systems
Course contents	<u>Quantitative Process- & Quality Management (WP)* /ILV / LV-Nr: WPF.1 / 3.Semester / ECTS: 4</u> • Basics of Descriptive Statistics • Measurement System Analysis • Sampling • Statistical Process Control • Process Control Charts • Process Capability Analysis • Components of Variants Analysis (COV) • Repetition Basics of Concluding Statistics • Failure Cause Determination via Hypothesis Testing (T-test, Chi-Sq, ANOVA) * Multiple Regression Analysis
	<u>Trends in Data Science (elective) (WP)* /ILV / LV-Nr: WPF.10 / 4.Semester / ECTS: 3</u> • 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
	<u>Trends in Smart Products (elective) (WP)* /ILV / LV-Nr: WPF.11 / 4.Semester / ECTS: 3</u> • 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
	<u>Trends in AI Engineering (WP)* /ILV / LV-Nr: WPF.12 / 4.Semester / ECTS: 3</u>

	• New technologies in the field of AI Engineering • Trends in the field of programming languages for AI • New design concepts in the field of AI • New questions in the field of research in AI • New questions in the field of AI practice
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Course contents	<u>Application-oriented analysis platforms (elective)* (WP)* /ILV / LV-Nr: WPF.2 / 3.Semester / ECTS: 4</u> • 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
	<u>Internet of Things (elective)* (WP)* /ILV / LV-Nr: WPF.3 / 3.Semester / ECTS: 4</u> • 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 • Procedure for implementing IOT systems • Prototypical implementation of IOT systems • Selection of sensors • Collection, visualization and evaluation of data • Implementation challenges
	<u>Operational & Strategic Management of Applications (WP)* /ILV / LV-Nr: WPF.4 / 3.Semester / ECTS: 4</u> • personnel deployment planning and resource management • contract management and finance management (cost and activity accounting) • quality management and quality assurance (reviews, audits, etc.) • staff information and communication; IT strategy and IT portfolio management; • risk management; IT governance and compliance • ITIL, CoBIT • service level agreements and outsourcing • balanced score card methodology • IT management tools (ADOit, etc.)
	<u>Process Automation /ILV / LV-Nr: WPF.5 / 3.Semester / ECTS: 4</u> • 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
	<u>Data Visualization & Visual Analytics (elective) (WP)* /ILV / LV-Nr: WPF.6 / 3.Semester / ECTS: 4</u> • Evaluation tools with visual orientation, e.g. BI tools such as MS PowerBI, Tableau, QlikView • Display libraries, e.g. matplotlib, pyplot, ggplot2 • Rules of visual communication, e.g. Hichert SUCCESSSS
	<u>Digital Twin & Simulation (WP)* /ILV / LV-Nr: WPF.7 / 3.Semester / ECTS: 4</u> • Introduction to digital twins, their importance and areas of application • Communication of the theoretical principles and methods of modeling • Overview of simulation techniques and their typical applications • Getting to know various simulation software and practical exercises • Creating and analyzing models for smart, communicating products • Integration of digital twins into IoT systems and their advantages • Introduction to advanced topics such as condition monitoring and predictive maintenance • Discussion about the role of digital twins in future technology development. • Planning and implementing your own digital twin project to apply what you have learned
	<u>Human AI Interaction (WP)* /ILV / LV-Nr: WPF.8 / 3.Semester / ECTS: 4</u>

	• Fundamentals of Human–AI Interaction • Human cognition, mental models, decision-making behavior • HCI principles for AI systems • UX Design for AI • Interaction patterns (conversational UI, agents, multimodal interfaces) • Prompt design, system messages, feedback loops • Trust and user acceptance • Human-in-the-Loop & Human-on-the-Loop • Alignment of human–machine roles • Task distribution, limits of automation • Error prevention & recovery design • Empathetic & Social Aspects of AI Interaction • Social responses, trust • Persuasive and adaptive systems • Methods & Tools • Usability testing for AI systems • Prototyping tools • Evaluation methods (task success, trust metrics, cognitive load)
	<u>Trends in ERP Systems (WP)* /ILV / LV-Nr: WPF.9 / 4.Semester / ECTS: 3</u> • Current developments in the area of business application systems with special emphasis on ERP-systems. Models, examples, best practice cases

Teaching and learning methods	<u>Quantitative Process- & Quality Management (WP)* /ILV / LV-Nr: WPF.1 / 3.Semester / ECTS: 4</u> Lecture, group work, presentation and discussion of tasks
	<u>Trends in Data Science (elective) (WP)* /ILV / LV-Nr: WPF.10 / 4.Semester / ECTS: 3</u> Lecture with discussion, interactive workshop
	<u>Trends in Smart Products (elective) (WP)* /ILV / LV-Nr: WPF.11 / 4.Semester / ECTS: 3</u> Lecture, group work, presentation and discussion of tasks
	<u>Trends in AI Engineering (WP)* /ILV / LV-Nr: WPF.12 / 4.Semester / ECTS: 3</u> Lectures, Group Work, discussions
	<u>Application-oriented analysis platforms (elective)* (WP)* /ILV / LV-Nr: WPF.2 / 3.Semester / ECTS: 4</u> Lecture with discussion, processing of exercises, interactive workshop
	<u>Internet of Things (elective)* (WP)* /ILV / LV-Nr: WPF.3 / 3.Semester / ECTS: 4</u> Lecture, individual work with software, group work, presentation and discussion of tasks
	<u>Operational & Strategic Management of Applications (WP)* /ILV / LV-Nr: WPF.4 / 3.Semester / ECTS: 4</u> Lecture, group work, presentation and discussion of tasks
	<u>Process Automation /ILV / LV-Nr: WPF.5 / 3.Semester / ECTS: 4</u> Lecture, group work, presentation and discussion of tasks
	<u>Data Visualization & Visual Analytics (elective) (WP)* /ILV / LV-Nr: WPF.6 / 3.Semester / ECTS: 4</u> Lecture with discussion, interactive workshop, case studies
	<u>Digital Twin & Simulation (WP)* /ILV / LV-Nr: WPF.7 / 3.Semester / ECTS: 4</u> Lecture, group work, presentation and discussion of tasks
	<u>Human AI Interaction (WP)* /ILV / LV-Nr: WPF.8 / 3.Semester / ECTS: 4</u> Lecture, group work, presentation and discussion of tasks
	<u>Trends in ERP Systems (WP)* /ILV / LV-Nr: WPF.9 / 4.Semester / ECTS: 3</u> Lecture, Discussions, Group work
Evaluation Methods Criteria	<u>Quantitative Process- & Quality Management (WP)* /ILV / LV-Nr: WPF.1 / 3.Semester / ECTS: 4</u> Exam
	<u>Trends in Data Science (elective) (WP)* /ILV / LV-Nr: WPF.10 / 4.Semester / ECTS: 3</u> Seminar thesis
	<u>Trends in Smart Products (elective) (WP)* /ILV / LV-Nr: WPF.11 / 4.Semester / ECTS: 3</u> Seminar thesis
	<u>Trends in AI Engineering (WP)* /ILV / LV-Nr: WPF.12 / 4.Semester / ECTS: 3</u> Seminar paper
	<u>Application-oriented analysis platforms (elective)* (WP)* /ILV / LV-Nr: WPF.2 / 3.Semester / ECTS: 4</u> Seminar paper
	<u>Internet of Things (elective)* (WP)* /ILV / LV-Nr: WPF.3 / 3.Semester / ECTS: 4</u> written exam
	<u>Operational & Strategic Management of Applications (WP)* /ILV / LV-Nr: WPF.4 / 3.Semester / ECTS: 4</u> Seminar paper
	<u>Process Automation /ILV / LV-Nr: WPF.5 / 3.Semester / ECTS: 4</u> Exam
	<u>Data Visualization & Visual Analytics (elective) (WP)* /ILV / LV-Nr: WPF.6 / 3.Semester / ECTS: 4</u> Seminar paper
	<u>Digital Twin & Simulation (WP)* /ILV / LV-Nr: WPF.7 / 3.Semester / ECTS: 4</u>

	Project Presentation
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Evaluation Methods Criteria	<u>Human AI Interaction (WP)* /ILV / LV-Nr: WPF.8 / 3.Semester / ECTS: 4</u> Seminar paper
	<u>Trends in ERP Systems (WP)* /ILV / LV-Nr: WPF.9 / 4.Semester / ECTS: 3</u> Seminar paper

Module number:	Master's Thesis	Scope:	
MA		26	ECTS
Degree program	University of Applied Sciences Master's Program Smart Products & AI-driven Development full-time		
Position in the curriculum	3. Semester		
	4. Semester		
Level	3. Semester: Master / 4. Semester: second cycle, Master		
Previous knowledge	3. Semester: none / 4. Semester: According to admission requirements / 4. Semester: none		
Blocked	no		
Participant group	Bachelor graduates, beginners		
Literature recommendation	<u>Research Methods /SE / LV-Nr: MA.1 / 3.Semester / ECTS: 2</u> • Schütz M., Röbbken H.; Bachelor- und Masterarbeiten verfassen: Abschlussarbeiten in Organisationen; Springer Gabler; 2020; 2nd edition • Theisen M. R.; Wissenschaftliches Arbeiten: Erfolgreich bei Bachelor- und Masterarbeit; Vahlen; 2017; 17th edition		
	<u>Master Thesis Colloquium /SE / LV-Nr: MA.2 / 4.Semester / ECTS: 2</u> • Atteslander, P.; Methoden der empirischen Sozialforschung (13. A.). Berlin: Erich Schmidt Verlag; 2010 • Bänsch, A.; Wissenschaftliches Arbeiten (11. A.). Berlin: De Gruyter Oldenbourg; 2013 • Mayring, P.; Die Praxis der Qualitativen Inhaltsanalyse (2. A.). Weinheim, Basel: Beltz Verlag; 2008 • Theisen, M. R.; Wissenschaftliches Arbeiten: Technik - Methodik - Form (15. A.). München: Vahlen; 2011		
	<u>Master Thesis /UE / LV-Nr: MA.3 / 4.Semester / ECTS: 22</u> • Atteslander, P.; Methoden der empirischen Sozialforschung (13. A.). Berlin: Erich Schmidt Verlag; 2010 • Bänsch, A.; Wissenschaftliches Arbeiten (11. A.). Berlin: De Gruyter Oldenbourg; 2013 • Mayring, P.; Die Praxis der Qualitativen Inhaltsanalyse (2. A.). Weinheim, Basel: Beltz Verlag; 2008 • Theisen, M. R.; Wissenschaftliches Arbeiten: Technik - Methodik - Form (15. A.). München: Vahlen; 2011		
Acquisition of skills	<u>Research Methods /SE / LV-Nr: MA.1 / 3.Semester / ECTS: 2</u> The participants: • know scientific methods • can formulate research questions and write an exposé on a specialist topic • can work on a specialist topic using scientific methods • can research literature independently • can write a scientific poster on a specialist topic		
	<u>Master Thesis Colloquium /SE / LV-Nr: MA.2 / 4.Semester / ECTS: 2</u> The participants: • know how scientific reviews are conducted • know how to present results to a scientific community • can critically question scientific findings		
	<u>Master Thesis /UE / LV-Nr: MA.3 / 4.Semester / ECTS: 22</u> The participants: • can independently write a scientific paper on a specialist topic in the field of product development, product management, smart products		
Course contents	<u>Research Methods /SE / LV-Nr: MA.1 / 3.Semester / ECTS: 2</u> • Advancing the methods and approaches of scientific work • Research design for scientific questions • Qualitative and quantitative research methods • Use of methods and tools • State of the art literature research and use of citation tools e.g. Citavi • Preparation of the exposé for the Master thesis • Notes on the formal design of the Master thesis		
	<u>Master Thesis Colloquium /SE / LV-Nr: MA.2 / 4.Semester / ECTS: 2</u> • Support of the students during the preparation of the Master thesis • Presentation and discussion of the question/ hypothesis, structure of the Master thesis, scientific methodology and formal design of the Master thesis		
	<u>Master Thesis /UE / LV-Nr: MA.3 / 4.Semester / ECTS: 22</u>		

	• Supervising the students during the preparation of the Master thesis • Presentation and discussion of the question/hypothesis, structure of the Master thesis, scientific methodology and formal design of the Master thesis • Review of the analysis part and critical reflection for evaluation • Structure of the thesis, appropriate division, clear result structure and conclusion • Short overview of the Master's examination and its requirements
Teaching and learning methods	<u>Research Methods /SE / LV-Nr: MA.1 / 3.Semester / ECTS: 2</u> Lecture, individual work, presentation and discussion of tasks
	<u>Master Thesis Colloquium /SE / LV-Nr: MA.2 / 4.Semester / ECTS: 2</u> Lecture, presentation and discussion of tasks

Teaching and learning methods	<u>Master Thesis /UE / LV-Nr: MA.3 / 4.Semester / ECTS: 22</u>
	Master thesis
Evaluation Methods Criteria	<u>Research Methods /SE / LV-Nr: MA.1 / 3.Semester / ECTS: 2</u>
	Student research project
	<u>Master Thesis Colloquium /SE / LV-Nr: MA.2 / 4.Semester / ECTS: 2</u>
	Presentation
	<u>Master Thesis /UE / LV-Nr: MA.3 / 4.Semester / ECTS: 22</u>
	Master thesis

3 ADMISSION REQUIREMENTS

The general admission requirements are governed by Section 4 of the University of Applied Sciences Act (FHG) as amended; accordingly, the subject-specific admission requirement for a master's program at a university of applied sciences is a completed, relevant bachelor's degree from a university of applied sciences or the completion of an equivalent program comprising at least 180 ECTS credits at a recognized domestic or foreign postsecondary educational institution.

1. For the purposes of this application, bachelor's degree programs or equivalent postsecondary educational qualifications in economic and technical fields (based on ISCED 2013, Fields of Education and Training 03/04) that cover the core subject areas 04–07—corresponding to ISCED 2013, Fields of Education and Training 031/032/041—with a total credit load of at least 30 ECTS.
2. In its program architecture, Kufstein University of Applied Sciences in Tyrol provides for the integration of bachelor's and master's programs in accordance with the Bologna Process: Upon successful completion of a bachelor's degree, graduates have several options for pursuing a master's degree both at and outside of Kufstein University of Applied Sciences in Tyrol. For this Master's program, graduates of the following degree programs at Kufstein University of Applied Sciences in Tyrol (regardless of the program's organizational structure) would be eligible for admission based on the aforementioned academic background:
 - a. Energy & Sustainability Management
 - b. Facility Management & Real Estate Management
 - c. International Business Management
 - d. Leadership & Business Management
 - e. Coding & Digital Design
 - f. Drone Engineering
 - g. Industrial Engineering
 - h. Business Psychology & Management
3. The languages of instruction and examination at Kufstein University of Applied Sciences in Tyrol are German and English across all degree programs. Therefore, students from non-German-speaking countries must provide proof of proficiency in German.
4. For English-language master's programs, proof of English proficiency must be provided. The language of instruction is 100% English. A proven language proficiency level of at least B2 is therefore required.
5. Verification of compliance with the admission requirements is the responsibility of the program director of the Smart Products & AI-driven Development master's program.