

Module Manual Information Technology

3IM-IMP-10	Imperative Programming	
<p>Students are introduced to the imperative and procedural approach both theoretically and by means of practical examples. The implementation requires an understanding of how to develop an algorithm to solve a practical problem. For this purpose, the module imparts knowledge of graphical tools (flow charts, structural diagrams). The confident handling of control structures for structured programming forms the prerequisite for the subsequent modules on software development.</p>	1st Semester	6 ECTS
3IM-MATHE-10	Algebra/Analysis	
<p>The module aims to impart fundamental knowledge of mathematical operations using methods of discrete mathematics as well as analysis in order to be able to mathematically formulate and solve engineering tasks. This module is a prerequisite for the modules "Scientific Foundations", "Image Processing and Pre-Press Printing" and "Applied Mathematics" and supports the knowledge transfer in subsequent modules.</p>	1st Semester	6 ECTS
3IM-TGINF-10	Theoretical Foundations of Computer Science	
<p>The module imparts theoretical foundations of computer science. With this module, students are familiarized with important concepts and mechanisms of modern formal methods by examining essential areas such as set theory, mathematical logic, theory of formal languages and automata, computability, complexity theory and semantics of programming languages. This enables students to solve computer science problems in a methodically exact and logically secure way using various formalisms.</p>	1st Semester	6 ECTS

3IM-OOP-20	Object-oriented Programming and Development Environments	
<p>This module introduces students to the essential skills of designing data structures and algorithms in connection with problem solving with the aid of a computer. To this end, students learn the most important algorithms for manipulating the information contained in a data structure and understand the performance parameters of a data structure and the associated algorithms in order to be able to select suitable structures and algorithms in the working process.</p> <p>The module conveys basic terms, knowledge and skills of the object-oriented paradigm.</p> <p>Furthermore, students acquire the ability to develop a program using the object-oriented paradigm.</p>	2nd Semester	6 ECTS
3IM-GLDB-30	Foundations of Databases	
<p>The module imparts knowledge and skills concerning the modelling, implementation and administration of relational database systems. In practical exercises, students can test their skills on a concrete database management system and deepen their theoretical knowledge.</p>	3rd Semester	5 ECTS
3IM-ANGMA-30	Applied Mathematics	
<p>The module aims to provide students with the ability to work confidently in the field of statistics and to use probability theory. Furthermore, students gain an insight into the complexity of problems and the analysis of solution algorithms. This is achieved by working on strongly application-oriented problems from the fields of operations research and numerical mathematics.</p>	3rd Semester	5 ECTS
3IM-BERN-40	Operating Systems and Computer Networks	
<p>Students are familiar with current computer architectures and understand the essential tasks and concepts of operating systems. They are able to assess the areas of application of operating systems and evaluate the interaction of other program systems with the operating system.</p> <p>Students acquire knowledge and skills for the application and development of modern heterogeneous communication and data networks (computer networks). In practical exercises, students can test their skills on concrete network applications and services and deepen their knowledge. Focus is placed on</p>	4th Semester	5 ECTS

architectural concepts and sample protocols from the Internet. Furthermore, the module discusses principles and systems for computer network applications, in particular multimedia and mobile computing.		
3IM-DSDS-50	Data Protection, Data Security	
The ever-increasing penetration of information technology in both business and private areas is constantly increasing the need for protection of the collected data. Against this background, the module focuses on the problems of data protection and data security. Students are enabled to understand legal problems and to consider them when making appropriate decisions in business practice. Further emphasis is put on the mathematical and information-technical basics of cryptographic procedures.	5th Semester	6 ECTS
3IM-BATHV-60	Bachelor Thesis	
With the bachelor thesis, students demonstrate their ability to independently solve, critically evaluate and develop a practice-related problem within a given period of time. They apply previously acquired practical and theoretical knowledge and scientific methods and are able to present their findings in a presentation.	6th Semester	12 ECTS
Information engineering		
3IT-INGT-12	Engineering Foundations	
The module aims to provide an understanding of electrical engineering and physics as the physical and technical basis of information technology. For this purpose, the module draws on previously attained mathematical skills in order to provide an algebraically abstract basis for electrotechnical modelling.	1st Semester	6 ECTS
3IT-WISSA-20	Scientific Working and English for Computer Science	
Students develop the ability to determine the goal and purpose of scientific work and learn the principles and essential methods of scientific thinking and working. Students expand their foreign-language, communicative and intercultural skills in a professional context. They acquire specialist, media and language skills and acquire language learning techniques for independent foreign	1st Semester	6 ECTS

language and knowledge acquisition (lifelong autonomous learning).		
3IT-ALGD-20	Algorithms and Data Structures	
Data structures and algorithms are the basic elements from which large and complex software is built. In this module, students acquire the essential skills required to design data structures and algorithms in connection with problem solving with the aid of a computer.	2nd Semester	6 ECTS
3IT-ST-20	Foundations of Circuit Technology	
Building on previously acquired basic knowledge, the module deals with the clamping behavior of electronic components and introduces the analysis of simple circuits. Furthermore, students are familiarized with the behavioral and structural description of logic facts on the basis of binary logic. Examples for the analysis and synthesis of combinatorial circuits are used to illustrate practical significance.	2nd Semester	6 ECTS
3IT-MRGP-30	Modelling and Legal Framework of Business Processes	
Software solutions can only be successfully implemented if they support the objectives and processes of the company in a meaningful way. Students know the most important concepts and standards for process modeling and are able to use them in a methodologically justifiable manner. They understand processes in companies as a framework for the use of IT solutions and, at the same time, as an object of constructive description of IT systems with the focus on the description of software. The module enables them to plan and carry out complex tasks as the technical content of projects and to monitor and control the technical project process through controlling approaches. In this context, students become familiar with proven concepts and standards of project management. Apart from structure, process and schedule planning, special emphasis is placed on risk, cost and quality management. Furthermore, the module deals with current software tools for the target-oriented execution of projects. As one of the most important laws in the legal system of the Federal Republic of Germany, the German Civil Code (BGB) regulates legal relationships between natural and legal persons. Students acquire normative knowledge and	3rd Semester	5 ECTS

develop an understanding of the structure of the BGB and its subsidiary laws.		
3IT-ES-30	Embedded Systems	
The students are familiarized with the architecture of a microcontroller. Using the example of a current microcontroller, the module consolidates the programming of both the controller and various functional units.	3rd Semester	4 ECTS
3IT-ANGEE-3	Applied Electronics	
Students are enabled to apply the methods presented in the module " Foundations of Circuit Technology in Bipolar and CMOS Technology" to analyze and dimension circuits. They learn to explore any OPV applications and to compose such applications themselves. A planned and well-planned approach to circuit and fault analysis introduces the students to systematic and scientific working methods. Furthermore, they are familiarized with the analysis and synthesis of sequential systems. Key points include the behavioral and structural descriptions of digital automata. For the realization of such automaton	3rd Semester	5 ECTS
3IT-MEHA-40	Metrology and Hardware Technology	
Students are able to understand complex hardware architecture concepts from a black- and white box perspective and to describe them electrically, mathematically as well as from a digital and information technological viewpoint. They know and understand various current computer architectures, their structure and the interaction of their components including peripheral components and are able to classify and evaluate corresponding architectures. Graduates understand measurement technology as a special task of information technology which involves obtaining information from technically concrete analog signals, storing and processing it by computer, and outputting results.	4th Semester	5 ECTS
3IT-SIGN-40	Signals and Systems	
Especially in technical sciences, the concept of the system represents a central and basic concept of engineering thinking and acting. Students acquire the principles of signal and system theory and their technical application in modern information and communication	4th Semester	5 ECTS

technology. They are enabled to describe and analyze analog and discrete signals and systems.		
3IT-SWEE-40	Software Engineering	
<p>The students are able to plan and implement software projects from an engineering perspective.</p> <p>They use forms and checklists as tools for organization and documentation and are able to decide which documents have to be created, managed and maintained in which form and to what extent and how, in order to be able to economically produce and maintain an information technology-based product.</p> <p>Students are familiar with software-technological procedure models, project-organizational models and processes that combine both ideas. They are able to select and implement a suitable procedure for specific project classes.</p>	4th Semester	5 ECTS
3IT-HAPRO-50	Embedded Programming	
<p>Students are familiar with the structure and characteristics of current processor architectures and are able to understand, classify and evaluate future architectures. By dealing with processor-oriented programming techniques, students learn about the inner processes in a computer using an example computer (PC, emulated computer, etc.).</p> <p>By studying and applying the basic commands of an example processor, students gain a better understanding of the internal structure and operation of processors, up to an understanding of the mapping of programs of higher programming languages to internal instruction sets.</p>	5th Semester	6 ECTS
3IT-EDB-50	Planning and Implementation of Extended Database Solutions	
<p>The module aims to provide knowledge and skills related to the planning and implementation of advanced database solutions. Based on the knowledge of modelling, implementation and administration of relational database systems, the module introduces program and control structures, discusses access and control options to database systems and describes possibilities for physical data organization. All topics are trained on the basis of practical examples.</p>	5th Semester	6 ECTS

3IT-MTIT-60	Modern Information Technologies	
The module deals with special aspects of information technology. This includes the consideration of current development trends or short-term needs of the practice partners. Under the guidance of a lecturer, students acquire special knowledge which they represent and discuss in the group.	6th Semester	6 ECTS
3IT-FOPRO-60	Advanced Programming	
With this module, students are introduced to essential programming paradigms and the principles of parallel programming. The module teaches basic concepts, knowledge and skills of the functional paradigm. Students are enabled to develop a program using the functional paradigm.	6th Semester	6 ECTS
3IT-MS-40	Mechatronic Systems	
The functional and spatial integration of mechanics, electronics and information technology results in both improved technical product properties and economic advantages. Based on the requirements for information processing in mechatronic systems, the module examines typical hardware/software solutions with regard to their characteristics, their advantages and disadvantages and their areas of application. Students are enabled to work and communicate across the technical domains required for mechatronics.	4th Semester	4 ECTS
3IT-PMA-40	Programming of Mobile Applications	
This module imparts knowledge and skills in the development of modern mobile applications and aims to familiarize students with the problems, concepts and solution approaches in the development of mobile applications. Focus is laid on basic requirements and basic technologies of mobile devices as well as the exemplary implementation of different aspects of a mobile application on a selected operating platform. Furthermore, students are enabled to evaluate the requirements of a mobile application and to put them into practice on the basis of a sufficient conceptual foundation.	4th Semester	4 ECTS

3IT-MK-40	Mobile Communication	
Students are introduced to future-oriented radio-based communication systems in many different variants and the related specific safety aspects. The module includes seminar-like exercises and laboratory experiments with different test equipment.	4th Semester	4 ECTS
3IT-ROB1-50	Robotics 1	
Robots are complex mechatronic systems that interact with their physical environment using sensors, actuators and information processing. Such systems are becoming increasingly important not only in industrial production (industrial robots), but also in areas such as medicine, household management, agriculture and logistics. This module provides participants with all necessary foundations of robot applications.	5th Semester	6 ECTS
3IT-EVSA-50	Design of Software Architectures	
Students acquire knowledge of pattern-based construction of software architectures. They are able to create and describe such architectures using pattern catalogs and evaluate them for practical use. UML is used as a descriptive tool. The patterns are examined from the perspective of architectural development and the documentation of architectures as well as architectural elements. Students are able to describe software architectures in relation to operational environments and the system landscape on the hardware side, and to map this connection appropriately. Apart from their process and deployment context, software architectures are also seen from the perspective of the operation of the entire system within the framework of ITIL-based processes. The module also addresses copyright law and related legal issues.	5th Semester	6 ECTS

3IT-VSIT-50	Distributed Systems and Internet of Things	
<p>The module imparts knowledge and skills concerning the application and development of modern distributed systems in heterogeneous computer networks and aims to familiarize students with the problems, concepts and solutions for the development of distributed systems. Focus is placed on elementary principles, architectural concepts and basic techniques as well as current standards. Furthermore, students are enabled to analyze the requirements of a distributed (web) application, evaluate existing solutions and implement them in practice on the basis of a sufficient conceptual foundation. Moreover, the module addresses the specifics for the application in the field of mobile computing.</p> <p>The course also aims to convey comprehensive knowledge of wireless sensor networks, their architectures, energy-efficient protocols and applications.</p> <p>The module provides a targeted practical consolidation of knowledge in the field of the Internet of Things. This includes the development of software for distributed systems that can communicate with intelligent objects.</p>	5th Semester	6 ECTS
3IT-ROB2-60	Robotics 2 and Visualization of Work Processes	
<p>The module focuses on mobile robots and the visualization of the working processes of robots. The module addresses various recent developments, including the increasingly close interaction between robots and humans in industrial production. For this purpose, robots must be able to perceive their environment in a three-dimensional way and anticipate the movements of their human colleagues. The module also deals with the trend towards miniaturization in the field of robotics.</p>	6th Semester	6 ECTS
3IT-VPD-60	Processing of Polystructured Data Sets	
<p>The topic of " Big Data" is becoming increasingly important in business practice. New fields of application continuously and automatically generate huge polystructured data volumes from various data sources. The evaluation of this data pushes traditional IT to its limits. This module introduces students to the concept of big data and shows the limits of traditional relational database systems. Depending on the structure of the data and the required evaluation speed, the NoSQL approach, InMemory database systems,</p>	6th Semester	6 ECTS

and Complex Event Processing are presented theoretically and practiced accordingly.		
3IT-NP-60	Network Practice and Applied IT Security	
The module focuses on the planning, construction and IT security of corporate networks as well as current developments in the field of Internet protocols. Particular emphasis is placed on the topics of high availability, software-defined networking, network management as well as the planning and implementation of quality-of-service guarantees. Furthermore, the module addresses security problems in IT infrastructures and the procedure for security audits. Students are enabled to independently plan, secure and manage computer networks and to assess current developments in the Internet sector. The topics are introduced in a practice-oriented way. Both the construction of a network and the protection of IT infrastructures against attacks are practiced with up-to-date tools.	6th Semester	6 ECTS
3IT-PMIT1-10	Practical Module 1 "Corporate IT Processes"	
In the first practical phase, the students get to know their workplace, their practice company as well as elementary procedures and activities. They familiarize themselves with the information systems used in the company and are able to use them to solve upcoming tasks. Students are directly involved in practical teams and thus receive essential impulses for the development of new or the consolidation of previously acquired social skills. Moreover, students expand the specialist knowledge gained in the theoretical modules.	1st Semester	6 ECTS
3IT-PMIT2-20	Practical Module 2 "Company-specific Software and Hardware"	
In this practical phase, students are introduced to the possible applications and functions of existing hardware/software solutions. They expand their basic skills in the evaluation of technical documentation with regard to its information content for relevant assemblies and products. Furthermore, students deepen the knowledge acquired in the theoretical modules and apply this knowledge in a practical presentation.	2nd Semester	6 ECTS

3IT-PMIT3-30	Practical Module 3 "Engineering Work"	
This practical phase familiarizes students with engineering contexts. They are able to gather and categorize the necessary input information for internal documentation processing. They are enabled to develop necessary solutions from the customer's or contractor's point of view and take the first steps towards their implementation.	3rd Semester	6 ECTS
3IT-PMIT4-40	Practical Module 4 " Autonomous Engineering Work"	
Upon completion of this module, students are able to apply and use professional skills. They can work scientifically on complex tasks and participate constructively in the solution of tasks. Students work on more detailed problems and can present them in an oral examination.	4th Semester	6 ECTS
3IT-PMIT5-50	Practical Module 5 "Independent Problem Solving"	
In this practical phase, students work independently on relevant professional tasks, sub-areas and documentation sections with a focus on their future field of occupation, while taking into account their theoretical training. Students aim to integrate the solution into the overall business process, including the analysis of the associated information paths.	5th Semester	6 ECTS
Media Informatics		
3MI-MGUPR-10	Foundations of Media Design and Presentation Skills	
The module imparts the foundations of media design. This includes the relevant technical terms and their integration into the various fields. Furthermore, students are enabled to prepare and give a presentation.	1st Semester	6 ECTS
3MI-NATGL-20	Scientific Foundations	
The module provides the physical/technical basics necessary for the studies. This includes contents of mechanics, optics, electricity and electronics. This expertise is required, among other things, for the creation of physically realistic animation films and for the correct application of typical electrical and optical devices in the media industry.	2nd Semester	6 ECTS

3MI-GLWEB-20	Foundations of Web Programming	
<p>The module imparts knowledge and skills concerning the development of modern websites and aims to familiarize students with the problems, concepts and approaches to the development of websites. In practical exercises, students can test their skills in developing concrete websites thus deepening their knowledge. Focus is placed on elementary principles, architectural concepts and basic techniques as well as current W3C standards. Furthermore, students are enabled to analyze the requirements of a web application, evaluate existing solutions and put them into practice on the basis of a sufficient conceptual foundation. The module also includes laboratory tests and exercises on the computer.</p>	2nd Semester	6 ECTS
3MI-BIDRU-20	Image Processing and Prepress Printing	
<p>The module conveys the algorithms and procedures underlying image processing. Students are provided with knowledge and skills related to digital image processing. In practical exercises, students can test their skills on practical examples thus deepening their knowledge. Processes for the production of print products are explained. Data formats and the combination of different media types are of particular importance. The extensive digitalization of the production of printed products requires information technology knowledge and skills for processing the various file formats and the data volumes involved. The conversion of analogue data into digital data is of ongoing importance.</p>	2nd Semester	6 ECTS
3MI-CGUCA-30	Computer Graphics and Computer Animation	
<p>This module provides the basics of graphic data processing and computer animation. This involves understanding the internal modeling of graphical objects and their visualization. With respect to computer animation, the module addresses the various possibilities of animation thus enabling students to select the most appropriate method for a practical application.</p>	3rd Semester	5 ECTS
3MI-WEPDE-30	Web and Print Design	
<p>This module familiarizes students with the principles of web and print design. This includes the corresponding technical terms and their integration into the different areas.</p>	3rd Semester	4 ECTS

3MI-ENGMM-30	English for Media	
This English language module meets the needs of Bachelor students in a cooperative degree course, provides an introduction to general aspects of computer science and media. It systematically develops key language skills for efficient communication in this field. Great emphasis is placed on helping students boost their lexical range (terminology).	3rd Semester	5 ECTS
3MI-RAMT-40	Computer Architectures/Media Technology	
Students know and understand the classical computer model according to John von Neumann as well as the various current computer architectures and their components. Students gain an overview of the variety of media-typical hardware and their mode of operation. The spectrum includes input devices for computers, such as classical scanners, 3D scanners, digitizing tablets, data gloves and head mounted devices (HMD), and output devices for computers such as classical monitors, 3D monitors, classical printers, 3D printers and plotters. The module also covers external media devices and systems such as cameras, sound recording studios, TVs and cinema projection equipment. This also includes the corresponding data formats and their processing.	4th Semester	6 ECTS
3MI-AUUVI-40	Audio and Video Technology	
This module imparts theoretical foundations of audio and video technology. This includes hardware and software solutions. Special focus is placed on audio and video formats. The conversions from analog to digital and vice versa is of ongoing importance.	4th Semester	6 ECTS
3MI-STECH-40	Software Technology	
The students are able to plan and implement software projects from an engineering perspective. They know process models and their practical implementation. Students are able to select and implement a suitable procedure for specific project classes. They understand the importance of teamwork when dealing with complex tasks.	4th Semester	7 ECTS

3MI-INTME-50	Interactive Media	
The module imparts knowledge of interactive multimedia systems and their implementation. It builds on the modules "Computer Graphics/Computer Animation", "Media Technology" and the modules for software development. This module is a prerequisite for the module "Authoring and Learning Systems".	5th Semester	6 ECTS
3MI-PAPON-50	Publications/Print Online	
The module provides a theoretical introduction and deals with the practical implementation of publishing techniques from a print and online perspective, i.e. without considering AV media.	5th Semester	6 ECTS
3MI-PROMA-60	Project Management / Media Projects	
The module aims to impart knowledge of the use of project management methods. The project management methods are communicated by means of a practical, typical example from the media industry and practiced in group work. Students apply methods of analysis and project management to a concrete, practical task on the computer. Through their own experience, participants strengthen their ability to work in a team, their moderation and conflict management skills in the area of social competence.	6th Semester	6 ECTS
3MI-ABWLM-60	General Business Administration (ABWL) and Marketing	
The students acquire comprehensive basic knowledge of business administration. In this context, they learn to view business administration as an academic discipline and to differentiate between its sub-disciplines. The module presents the operational functions and the value creation process in the company. The importance and tasks of marketing in the context of business processes are outlined.	6th Semester	6 ECTS
3MI-ENGBM-50	Business English for Media & IT	
This English language module is geared towards Bachelor students in a cooperative degree course who consider self-employment in the IT sector. The course provides an introduction to the main aspects of founding and running a business. It systematically develops proficiency in commercial English within the framework of the (simulated) formation of a company offering digital products and/or services to an	5th Semester	6 ECTS

international target market. Great emphasis is placed on helping students boost their lexical range (terminology).		
3MI-WEBPR-50	Web Programming/App Programming	
This module imparts knowledge and skills concerning the development of modern web systems and aims to familiarize students with the problems, concepts and solutions for the development of web applications, websites and applications for e-commerce. In practical exercises, students can test their skills in developing concrete distributed Web/Web2 applications and services thus deepening their knowledge. Focus is laid on elementary principles, architectural concepts and basic techniques as well as current W3C standards. Furthermore, students are enabled to analyze the requirements of a web application (an e-commerce system), evaluate existing solutions and put them into practice on the basis of an adequate conceptual foundation. The module also includes laboratory tests and exercises on the computer.	5th Semester	6 ECTS
3MI-OEFFA-60	Public Relations	
The module covers the journalistic and creative spectrum of all activities in the field of public relations.	6th Semester	6 ECTS
3MI-UXUVS-60	UNIX and Distributed Systems	
This module conveys knowledge of the UNIX network operating system family and deals with special features of Linux derivatives. In addition, the module imparts knowledge and skills in the application of distributed systems in heterogeneous networks and aims to familiarize students with the problems, concepts and solution approaches of distributed software and operating systems. In practical exercises, students can test their skills in developing concrete distributed network applications thus deepening their knowledge. Students are enabled to analyze the requirements of a distributed (web) application, evaluate available solutions and put them into practice.	6th Semester	6 ECTS

3MI-PRAXI-10	Practical Module "Company Profile"	
In the first practical phase, the students get to know their practice company and elementary procedures and activities. They familiarize themselves with the communication relations and information systems used in the company. Students are directly involved in practical teams and thus receive essential impulses for the consolidation of their social skills. Moreover, students expand the specialist knowledge gained in the theoretical modules and apply it in a practical presentation.	1st Semester	6 ECTS
3MI-PRAXI-20	Practical Module "Internet Presence"	
In this practical module, students deal with the internet presence of their company or a customer of their company.	2nd Semester	6 ECTS
3MI-PRAXI-30	Practical Module "Print Media"	
The students get to know the printed materials that are important for their practice company. Drawing on previously attained knowledge and skills, they are able to classify, evaluate and possibly revise these materials.	3rd Semester	6 ECTS
3MI-PRAXI-40	Practical Module "Non-print Media"	
In this module, students deal with the non-print media of their practice company. They examine and, if necessary, implement possibilities of non-print media for their practice partner.	4th Semester	6 ECTS
3MI-PRAXI-50	Practical Module "Marketing"	
The module examines and explains the importance and the integration of marketing in the context of business processes of the practice partner.	5th Semester	6 ECTS