Module code	Module title	Module description	Semester	ECTS
Formal, Algorithmic and Mathematical Competences				
4TI-IMA-10	Engineering Mathematics	The module provides students with solid theoretical and practical fundamental knowledge and enables them to solve basic problems in the fields of engineering and IT. The fundamentals of arithmetic and algebra acquired in secondary education are expanded and the deeper meaning of analysis is developed pragmatically in accordance with the targeted learning objectives of Computer Engineering.	1	6
4TI-AMA-20	Applied Mathematics	In this module, students deepen and consolidate the knowledge and skills acquired in the module "Engineering Mathematics". To this end, the seminar provides an introduction to simple continuous-time deterministic models and the capture of random phenomena. The part on differential equations (DGl.) focuses on models with constant coefficients and the basic approximation methods. Probability theory is concerned with random events and random processes. Simple distribution models are used for this purpose. Their parameters, however, have to be estimated on the basis of observations, which highlights the importance of statistics for modeling. Students gain an understanding of the accuracy of estimation methods. Similar to the approximation methods for deterministic models, stochastic simulation is presented as a method for more complex tasks.	2	6
4TI-TGI-20	Theoretical Fundamentals of Informatics	Upon completion of the module, students are able to confidently apply fundamental knowledge of the concept of information. Focus is placed on the mathematical capture of the retrieval, encoding and transmission of information. Students apply this in the construction and evaluation of procedures or algorithms for data protection and compression. Further fundamentals from the field of relation and complexity theory as well as assertion and predicate logic facilitate the understanding of the functionality of compilers and special programming concepts (functional and logic-based languages).	2	5
4TI-ALDS-30	Algorithms and Data Structures	Upon completion of the module, students are able to understand and apply data structures and related algorithms as the fundamental elements of information-processing systems. Students are introduced to corresponding solutions for universal problem classes. Further focus is placed on the gradual formalization of informal tasks using appropriate descriptive tools in order to subsequently design and implement algorithms.	3	5
Analytical, Design, Realization, and Project Management Competences				

4TI-GPT-10	Fundamentals of Programming	Upon completion of the module, students are able to independently formulate simple problems in a procedural programming language and to translate and test the developed programs.	1	5
4TI-OOP-20	Object Oriented Programming	Upon completion of the module, students have acquired the knowledge and skills required to solve a problem in an object-oriented manner. Special emphasis is placed on developing an abstracting and object-oriented way of thinking. Practical exercises consolidate the theoretical knowledge and train both algorithmization and programming techniques.	2	5
4TI-SWE-30	Software Engineering	Upon completion of the module, students are able to technically plan and execute a complex software development process. Particular focus is placed on the modeling of requirements and applications. Computer exercises consolidate the understanding of the subject and strengthen practical skills and abilities.	3	5
4TI-INT-40	Internet Technologies	Upon completion of the module, students are able to evaluate the economic cycles influenced by the Internet, new business models and new strategies for acquiring knowledge. They are also enabled to use current web-based technologies and to develop their own solutions.	4	5
4TI-MA-50	Mobile Applications	The module provides students with practical and theoretical skills in the creation, deployment, and operation of mobile applications. Students are enabled to select the appropriate technology for a specific task from a variety of available technologies. They possess the skills to design graphical user interfaces for mobile devices and to read out sensor technology.	5	4
4TI-MMT-60	Multimedia Technologies	Upon completion of the module, students are able to evaluate and use multimedia technologies in a focused manner. Apart from an introduction to the necessary standards and procedures, the module consolidates knowledge through the practical use of multimedia software.	6	6
Technological Competences				
4TI-ITG-10	Engineering Fundamentals	In this module, students review their knowledge of physics and elementary electrical engineering as the physical-technical basis of technical computer science acquired in secondary education, and learn to grasp and understand it in a new way. To this end, previous mathematical knowledge that is required for admission is drawn upon in order to provide an abstract algebraic foundation for physical and electrical engineering models. In general, the module "Fundamentals of Engineering" aims to train the formal description of the environment with its manifold	1	7

		scientific phenomena made up of a few simple basic facts. The methods and procedures of the physical description of nature form the basis of engineering sciences. Their knowledge, especially in their basic features, is indispensable for the adequate description and conception of technical systems. Basic considerations of electric and magnetic fields facilitate the understanding of further information technology topics.		
4TI-ETDT-20	Electrical Engineering / Digital Technology	The module teaches the transition from DC electrical engineering to electrical engineering with time-varying signal quantities as the technical basis for information representation in computer engineering. Subsequently, students are familiar with all fundamental and advanced quantities of electrical engineering and relevant circuit symbols, as well as the mode of operation of elementary passive and active basic switching elements. Furthermore, the module covers the functional and descriptive modes of typical components of analog electronics and enables graduates to understand, analyze and calculate the mode of operation of semiconductor components in simple and complex electronic discrete and integrated circuits. Students understand the theory of digital representation, processing and storage of information on the basis of complete logical systems and the related technical realization of simple switching networks and switching circuits.	2	8
4TI-RN-30	Computer Networks	Upon completion of the module, students are able to plan and implement essential features of computer networks, from the physical structure to network security. Based on the OSI/ISO basic reference model, the module imparts knowledge of network topologies, transmission methods and architectures in LAN and WAN, from media access to basic services of the Internet. Focus is placed on the development of a basic understanding by referring to current standards of ITU T, IEEE and IETF. In tutorials, students examine practical examples that illustrate the planning, configuration and modification of local and wide-area networks, including changing requirements for the network structure.	3	5
4TI-BSVS-30	Operating Systems and Distributed Systems	Upon completion of the module, students have developed a thorough understanding of the theory of operating systems and distributed systems. The module provides knowledge of the tasks to be solved by modern operating systems and introduces solution procedures and algorithms for the typical problems of this branch of informatics. While the lecture focuses on a comparative analysis of commercially available PC and mainframe operating systems, tutorials deal with concepts of the Linux system.	3	5

Kommentiert [GL1]: Ich nehme an „Sicherung" bezieht sich auf die Netzwerksicherheit und nicht auf „backup"

		Students gain a thorough understanding of the structure and operating principles of distributed systems. They understand the problems that arise in a distributed processing of tasks.		
4TI-DB-34	Databases	Upon completion of the module, students are able to model, use and administer relational database systems. In practical tutorials in the computer lab, students can test their skills on a concrete database management system and deepen their knowledge.	3 and 4	8
4TI-DIS-40	Data and Information Security	Upon completion of the module, students are able to analyze the need for protection of information-processing systems in both the business and private domain and to implement appropriate measures. The course aims to sensitize students to this topic and to present the current state of the art in this area. Further emphasis is placed on the mathematical fundamentals of cryptographic methods. This are deepened to the extent necessary to understand how ciphering methods work.	4	5
4TI-RA-40	Computer Architecture	Upon completion of the module, students are able to evaluate current structures and methods of computer architecture and to design simple components of a computer system. The module covers general principles of each computer architecture, which is followed by instructions on how to program at the machine level using a specific architecture. Computer exercises strengthen practical skills and abilities.	4	5
4TI-SWSYS-50	Software Systems in the Practical Context	Upon completion of the module, students have gained an overview of currently used software systems and their architectures. Particular focus is placed on the connection of these systems via suitable interfaces. Furthermore, a connection is drawn between the contents of the courses on software development and databases in order to link independently developed software applications to database systems by means of SQL embedding. The lecture concludes with an overview of object-oriented and non-standard DBMS.	5	5
4TI-BWPM-50	Business Administration and Project Management	Upon completion of the module, students have gained sound knowledge of the fundamentals of business administration and project management. Students are thus enabled to understand business contexts and to incorporate them into their work as information scientists. They learn to plan projects independently and to structure and optimize project contents.	5	5

4TI-AKTI-60	Selected Chapters of Computer Engineering	Upon completion of the module, students are able to independently acquire specific aspects of computer engineering and to present them. This opens up the possibility to react to current trends or to needs of the partner company that arise at short notice.	6	4
Interdisciplinary, Social and Personal Skills				
4TI-WIA-10	Academic Work / Foreign Languages	Upon completion of the module, students are able to define the purpose of academic work and apply the fundamentals and essential methods of academic thinking and work. Students enhance their communicative competences in foreign languages in a professional context. They acquire interlinked subject, media and language competence and adopt language learning techniques for independent foreign language and knowledge acquisition (lifelong autonomous learning).	1	6
4TI-IKDKM	Intercultural Affairs, Diversity and Conflict Management	Upon completion of the module, students are able to deal with different groups of people in a legally secure manner, identify aspects of diversity in companies that are relevant to success, and understand the benefits of different individual competencies, characteristics, attitudes, and cultural backgrounds. Students are also enabled to resolve conflicts both in their personal lives and in the corporate environment.	4	5
4TI-VRR-60	Sales and Relevant Legal Bases	Upon completion of the module, students are able to use efficient sales methods and techniques, to respond to different types of customers and their needs, and to present the best possible value proposition. The legal part of the module provides an introduction to the systematics and application of German private law. Through the use of case studies, students become familiar with the legal forms and conceptions of private autonomy. In addition, students are familiarized with the fundamentals of liability in tort. IT law is an area of law with a cross-sectional character. Students gain a broad insight into a variety of legal areas through a practical example of an Internet-oriented project. They are able to identify problems and solve simple issues.	6	5
Elective modules				
4TI-IP-50	Industrial Processes	Upon completion of the module, students are able to understand and apply the fundamentals of operational work systems and processes. This knowledge provides the foundation for various remits involved in work planning and control within a process-oriented work organization.	5	5

		Students gain insight into the areas of process planning and control within a company. The module aims to provide generally applicable principles and methods for the planning and control of processes and sequences, primarily in industrial companies.		
4TI-ES-50	Embedded Systems	Upon completion of the module, students are familiar with the structure and mechanisms of embedded systems and are able to apply them in practice. Proceeding from basic hardware architectures and system software for time-critical applications such as real-time operating systems, the module covers the signal flow from sensors to electronic components for signal processing and digitization, the application software for control and regulation tasks and the output to the periphery to the actuator system.	5	5
4TI-KT-50	Communications Engineering	Upon completion of the module, students are familiar with communication technology systems and procedures and are able to compare and apply them in accordance with specific requirements. Specifically, students are able to evaluate and use systems of modern mobile communication, apply procedures of associated metrology and specify interfaces of transmission technology.	5	5
4TI-SPLS-60	Control and Process Control Systems	The module imparts fundamentals of industrial control systems and thus provides students with the basic knowledge required for the use of industrial control systems. In particular, students develop the ability to analyze control engineering tasks and use complex industrial control systems. Programming skills are trained by using selected examples. The module deals with application areas and possible uses of programmable logic controllers, in particular with regard to the use of closed-loop control and complex sequential control systems.	6	6
4TI-SPN-60	Special Networks and Network Engineering	Upon completion of the module, students are able to use current technologies to plan, deploy and manage special local networks. Students use X.509-based PKI structures and learn how to apply them to manage and use digital identities and to secure a wide range of security and communication processes. Students are familiarized with central aspects of systematic, engineering-based planning, design and operation of application-neutral networks. Case studies are used to examine typical scenarios and problems that occur in practice and to develop possible solutions.	6	6
Practical modules				

4TI-PRAX1-12	Company IT Processes	In this module, students actively apply the knowledge acquired during the theoretical phases in their partner company and extend this knowledge to include specific skills. Students acquire basic skills in evaluating technical documentations in terms of their information content for relevant assemblies and products. They are integrated into practical teams, which provides an important impetus for the development of new social skills and the consolidation of previously acquired ones.	1 and 2	12
4TI-PRAX2-34	Engineering Work	Upon completion of the module, students are able to recognize, evaluate and implement engineering contexts. They can capture and categorize necessary input information for internal documentation processing. Students are enabled to develop solutions from the customer's or contractor's perspective and to take the first steps towards their implementation. They have the ability to collaborate scientifically on complex tasks and to participate constructively in problem-solving processes.	3 and 4	12
4TI-PRAX3-50	Independent Problem Solving	In this practical phase, students work independently on relevant professional tasks, subareas, and documentations that relate to their future field of work, taking into account the theoretical background they have acquired. Main emphasis is placed on the integration of the solution into the company's process, including the analysis of the related information flows.	5	6
4TI-THESI-60	Bachelor's Thesis	With their bachelor's thesis, students demonstrate their ability to independently work on, critically evaluate, and further develop a practical problem within a specified period of time using the previously acquired practical and theoretical knowledge and academic methods. They are able to present the results in a presentation.	6	9