Module code	Module name	Short description	Semester	ECTS
5CS-CPWT-10	Computer Programming and Web Technologies	Students learn the fundamentals of programming. They are enabled to develop and interpret simple programs. The module imparts knowledge of development tools and the Java language as well as web technologies. Students learn to create and evaluate modern web presences. Appropriate tools and languages are used.	1	5
5CS-TI1AS-10	Automata and Formal Languages	Students become familiar with basic working methods and concepts of theoretical computer science. They are enabled to independently solve simple problems of automata theory and the theory of formal languages.	1	5
5CS-MA1LA-10	Linear Algebra	The module aims to provide fundamental knowledge of linear algebra. Furthermore, students learn the principles of linear optimization.	1	5
5CS-BWLPO-10	Business Administration 1 - Personnel and Organization	The module initially deals with the legal categorization of the company in terms of its legal form. On this basis, the fundamentals of the corporate organization are illustrated, which include the organizational and operational structure. The foundations of personnel management take into account staff as task managers within the framework of the corporate organization.	1	4
5CS-ETHLE-10	Foundations of Electrical Engineering and Semiconductor Electronics	The module imparts the foundations of electrical engineering and semiconductor electronics. This knowledge is applied in practical laboratory courses and forms the basis for understanding digital electronics and computer architecture.	1	5
5CS-PT1-10	Practice Module 1: IT Processes in the Company	Students get to know their workplace as well as the structure and organization of the company. They are imparted the activities and processes essential for everyday work and the application of the necessary information systems.	1	6

5CS-DPDL-20	Data Processing and Database Access Languages	Students are familiarized with various forms of computer-aided data processing. They are enabled to use containers and to process serialized data by using streams, e.g. in XML format. Furthermore, students become acquainted with basic database access languages and their use.	2	5
5CS-TI2BK-20	Computability and Complexity	Students are familiar with various concepts of computability and can classify them. They know classes of problems that cannot be solved algorithmically. They also know important complexity classes and prototypical examples.	2	5
5CS-MA2AN-20	Analysis	The module deals with differential and integral calculus for real-valued functions of one and several variables as well as ordinary differential equations.	2	5
5CS-ENG1W-20	Business English and Communication	The module provides an introduction to business English with special focus on communication about and within companies. Students acquire the necessary language skills in the IT sector. Furthermore, the course includes the foundations of communication.	2	4
5CS-DTCA-20	Digital Technology and Computer Architecture	Students get to know the fundamentals of digital technology and apply this knowledge to the field of computer architecture.	2	5
5CS-PT2-20	Practical Module 2: Operating Systems and Networks	Students deal with the operating systems and network structures that are used in their company for the various areas of work and tasks.	2	6
5CS-UIDB-30	User Interaction and Relational Databases	Students learn how to use frameworks to design user interaction between humans and computer applications. Event processing techniques are presented. Since the focus is laid on graphical user interfaces, different components for visual presentation as well as layout managers are	3	5

		discussed. Special data structures like tables or trees are addressed as well.		
5CS-TI3AD-30	Algorithms and Data Structures	Students get to know different algorithms and data structures of computer science and their applications.	3	5
5CS-MA3ST-30	Stochastics	The module imparts knowledge of stochastic and statistical methods for application in technology, economy and society.	3	5
5CS-ENG2F-30	Technical English and Communication Techniques	Students improve their language skills in English for computer science. Basic communication techniques are deepened.	3	4
5CS-OPSY-30	Operating Systems	Students know the commonly used computer architectures and understand the essential tasks and concepts of operating systems. They can assess the application areas of operating systems and evaluate the interaction of other program systems with the operating system. Furthermore, the course teaches the practical use of current operating systems.	3	5
5CS-PT3-30	Practical Module 3: Work Organization in a Team	Students get to know the organization and structuring of tasks in the working groups of their company.	3	6
5CS-SEPM-40	Software Engineering and Project Management	Students are introduced to UML notation for modeling software architectures and application domains. The module includes meta-models as well as CASE tools and software patterns as design techniques. Students learn to independently work on projects. They are enabled to work through the complete software lifecycle during the development process using a suitable process model.	4	5
5CS-CNWC-40	Computer Networks and Wireless Communication	The module aims to impart important foundations from the field of computer networks. Students get to know the technical principles and protocols of modern communication technology. They are	4	5

		introduced to the fundamentals of network security and wireless communication.		
5CS-MA4NU-40	Numerics	Students are aware of the problem of potential instabilities of numerical calculations. The module deals with basic numerical algorithms. Students learn to assess the condition of problems and the benignity of algorithms.	4	5
5CS-DSKRY-40	Data Protection and Cryptography	Data protection requirements are an important aspect of the work in practice. Students are enabled to understand data protection issues and to consider them when making appropriate decisions in business practice. The assessment of the security of an electronic data processing procedure requires knowledge of the quality of the cryptographic procedures and protocols used. This is often the only way to assess whether a procedure actually meets the legal requirements for data protection. Students are to be enabled to assess the security of cryptographic procedures. They are to be sensitized to recognize and avoid vulnerable points and points of attack of cryptographic protocols.	4	5
5CS-BWLRI-40	Business Administration 2 - Accounting and Investment	Students are taught the principles of internal and external accounting. The module also includes the basic instruments of accounting, cost/performance accounting and, based on this, investment accounting.	4	4
5CS-PT4-40	Practical Module 4: Software Engineering	Students deal with practical tasks in software development.	4	6
5CS-SOPR-50	Software Project	Students learn to independently work on projects. They are enabled to work through the complete software development process using a suitable process model. Special emphasis is placed on soft	5	5

		skills such as the ability to work in a team. Furthermore, the module imparts knowledge on version management and important aspects of Green IT.		
5CS-CGAN-50	Image Processing, Computer Graphics and Computer Animation	Students are introduced to the fundamental methods of computer graphics and computer animation. They are imparted theoretical and practical knowledge of image processing.	5	5
5CS-RECHT-50	Law	As one of the most important laws of the legal system of the Federal Republic of Germany, the Civil Code (BGB) regulates legal relationships between natural and legal persons. Students get to know the structure and attain normative knowledge and understanding of the structure of the BGB and its subsidiary laws. As a core element of intellectual property, copyright law guarantees effective legal protection. Students are familiarized with the content and scope of copyright law so that they are able to assess the extent to which they can invoke their intellectual property and the extent to which they must respect the intellectual property of others.	5	4
5CS-CPP-50	Programming in C/C++	Students become familiar with the system programming language C and its object-oriented extension C++. Qt is used as a framework for application development.	5	5
5CS-CYBOP-50	Cybernetics Oriented Programming	Students become acquainted with the XML-based language CYBOL, which can be used to model knowledge. Furthermore, the architecture of the CYBOI interpreter programmed in C, which is necessary for the execution of CYBOL applications, is addressed. Finally, the module discusses concepts of neighboring scientific disciplines that had an	5	5

		influence on the development of cybernetics-oriented programming.		
5CS-PRECH-50	Parallel Computing	Students acquire fundamental skills to install and configure cluster computers for various use cases. These can be applied for a wide range of purposes and are currently much discussed and widely used. Knowledge of installation, configuration and management of cluster computers is increasingly required.	5	5
5CS-FPGA-50	FPGA	For some tasks, fixed programmed logic is either too expensive or inflexible. Field Programmable Gate Arrays (FPGAs) are one way to solve this problem. The module deals with the structure, function and programming of FPGAs.	5	5
5CS-AI-50	Artificial Intelligence	The module deals with the fundamentals of systems with "artificial intelligence" from the historical development and theoretical foundations to practical applications.	5	5
5CS-EA-50	Evolutionary Algorithms	Evolutionary algorithms are used to find a solution to a problem that cannot be solved analytically. They are based on the model of biological evolution. Individuals are described through their characteristics (usually in numerical values), and they have to prove themselves as suitable as possible with regard to the selection conditions. "Proposed solutions" are modified and combined until one of these proposals meets the requirements.	5	5
5CS-PT5-50	Practical Module 5: Independent Project Work	Students work on a topic of their own choice that is related to their company in the form of a project work.	5	6

5CS-STDS-60	Server-Side Technologies and Distributed Systems	Students get to know technologies of distributed systems. They are enabled to develop client/server (C/S) applications.	6	4
5CS-V3DA-60	Video Technology, 3D Modelling and Animation	The module imparts knowledge in the field of audio and video technology with a focus on analog and digital video signals, image recording systems, image storage and image reproduction systems. Thus, students acquire practical skills and abilities for video film production and the use of software for non-linear video editing. Students are introduced to the methods and procedures of 3D modelling and animation. In addition, they learn how to design a virtual environment and integrate finished objects, characters and animations. Practical exercises in modelling and animation as well as the design of a virtual environment consolidate the imparted contents.	6	4
5CS-ERPS-60	Integrated Information Systems	Students acquire knowledge and skills in the structuring of business processes. They apply previously gained business knowledge to formulate requirements for business information systems. Students are familiarized with the structure, possibilities and typical applications of ERP systems.	6	5
5CS-ECAD-60	Circuit and Printed Circuit Board Design	The module deals with the development of the design of electronic circuits and printed circuit boards. Students acquire working techniques that lead to error-free and thus cost-saving circuit board design.	6	5
5CS-MICON-60	Microcontrollers	Students become familiar with the architecture of a microcontroller. Using the example of a current microcontroller, they learn how to program the controller and get to know different functional units.	6	5

5CS-FCAD-60	Foundations of Computer Aided Design	Students learn the foundations of computer-aided design, its integration into existing design processes and the possibilities of user-specific adaptation and design of such CAD systems. They are given an introduction to 2D design and modelling under a CAD system. The imparted theoretical foundations are practically applied in exercises on the computer.	6	5
5CS-BSC-60	Bachelor Thesis	With their bachelor thesis, students show that they are able to independently work on a practical problem within a specified period of time using scientific methods and practical knowledge. Furthermore, they are able to present and defend their results.	6	12