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Dresden University of Technology
Faculty of Computer Science

Module catalogue for the Master's programme in Computer Science from winter semester 2026/2027

Valid on the basis of the resolutions of the Faculty Council of the Faculty of Computer Science of
21.08.2025, 18.03.2026, 22.04.2026, 20.05.2026, 24.06.2026, 19.08.2026 and 30.09.2026

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Mandatory area

Module name	**Research project**
Module number	INF-25-Ma-FP
Responsible lecturer	Dean of Studies, Faculty of Computer Science studiendekan.inf@tu-dresden.de
Qualification objectives	Students are able to work on a complex research-related project based on competences from several areas of application and basic research in computer science and solve a larger task. Students know methods for developing applications, can use appropriate tools and are familiar with scientific working methods. They are able to structure and document the solution process. You can present the findings and explain them argumentatively. You have in-depth professional competence as well as extensive methodological competences with regard to project management.
contents	Contents of the module are the editing, application and communication of a working topic of the student's choice in the fields of application and basic research in computer science. In application research, the contents are the design, implementation and evaluation of application systems and in basic research the evaluation and, if necessary, correction of own theses or assumptions through suitable investigations and experiments.
Forms of teaching and learning	The module includes 100-hour projects and self-study. The teaching language of the projects can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma course, the competencies to be acquired in the module INF-25-Ba-WIA Scientific Work are required. In the Master's program Computer Science, basic competencies for scientific work at Bachelor's level are required.
usability	The module is a compulsory module in the computer science diploma program in the main course. The module is a compulsory module in the Master's programme in Computer Science. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 200 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	13 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every semester.

module	
workload	The total workload is 390 hours.
Duration of the module	The module covers one semester.

Compulsory elective area: General qualification

Module name	**Studium generale**
Module number	INF-25-Ma-AQUA
Responsible lecturer	Dean of Studies, Faculty of Computer Science studiendekan.inf@tu-dresden.de
Qualification objectives	The students have further media, environmental and social competence, general interdisciplinary knowledge or orientation knowledge from non-specialist areas. They are able to use and apply this knowledge in the discussion of complex and interdisciplinary questions. In addition, they are capable of social engagement and have advanced knowledge in a subject of general academic education. They also have knowledge or skills in one or more subject areas that affect life in a diverse and pluralistic society. Students possess special interdisciplinary knowledge and key qualifications that strengthen the competences for working in their field and promote and deepen interdisciplinarity.
contents	Contents of the module are, at the choice of the student, interdisciplinary topics, methodological knowledge of other disciplines and general interdisciplinary contents. Further contents are techniques of scientific work for the creation of a scientific work and its presentation as well as discussion, the deepening of intercultural competences and other offers of the studium generale.
Forms of teaching and learning	The module includes, at the choice of the student, lectures, exercises, seminars, projects, internships, tutorials and excursions in the amount of 4 SWS and self-study. The courses, including the language of instruction, must be selected to the specified extent from the catalogue of courses studium generale; This will be announced in the usual manner at the beginning of the semester, including the respective required examination achievements.
Prerequisites for participation	Media, environmental and social competence as well as general interdisciplinary knowledge at bachelor level are required.
usability	In the Computer Science Master's programme, the module is a compulsory elective module of the General Qualification, which must be selected in accordance with Annex 1 to the Examination Regulations. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of the prescribed examinations according to the catalogue studium generale.
Credits and grades	Through the module, 5 credit points can be earned. Taking into account

	the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every semester.
workload	The total workload is 150 hours.
Duration of the module	The module covers one semester.

Module name	**Methods of Computer Science**
Module number	INF-25-MINF
Responsible lecturer	Dean of Studies, Faculty of Computer Science studiendekan.inf@tu-dresden.de
Qualification objectives	Students have didactic skills in teaching computer science topics. They are able to lead discussions and critically evaluate third-party responses to questions in a computer science subject area.
contents	Contents of the module are methods of scientific work in computer science, selected topics of computer science as well as techniques of presentation of scientific content and non-technical competencies.
Forms of teaching and learning	The module includes 4 SWS projects and self-study.
Prerequisites for participation	Media competence and computer skills as well as general interdisciplinary knowledge at bachelor level are required
usability	The module is a compulsory elective module of the general qualification in the undergraduate computer science diploma course, which must be selected in accordance with Annex 1 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the general qualification, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme Applied Computer Science, the module is a compulsory elective module of the general qualification, which must be selected in accordance with the annex to the examination regulations. In the Computer Science Master's programme, the module is a compulsory elective module of the General Qualification, which must be selected in accordance with Annex 1 to the Examination Regulations. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a scientific-practical performance of 45 minutes duration.
Credits and grades	Through the module, 5 credit points can be earned. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 150 hours.
Duration of the module	The module covers one semester.

Area of Specialization Theoretical Computer Science and Symbolic Artificial Intelligence

Module name	**Algorithms and data structures 2**
Module number	INF-25-Ma-FTK-AD2
Responsible lecturer	Prof. Dr. László Kozma laszlo.kozma@tu-dresden.de
Qualification objectives	Students have advanced knowledge of scientific methods in the development and analysis of algorithms and data structures. They understand the properties of specific calculation models and their impact on the analysis of algorithms. They have a broad repertoire of advanced techniques and an overview of representative algorithmic problems and their complexity. You can use them for the formal presentation of algorithmic problems as well as the development and analysis of algorithms.
contents	Contents of the module are algorithms and data structures as well as topics of complexity theory, the techniques of dynamic programming, divide-and-conquer, fast-fourier transformation, amortized analysis of data structures and randomization. Other contents include flow problems and shortest path problems in graphs, arithmetic algorithms, advanced data structures and proof of lower barriers.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures and INF-25-Ba-Ma3 Algebra. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination

	regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 270 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Knowledge Models**
Module number	INF-25-Ma-FTK-KM
Responsible lecturer	Prof. Dr. Markus Krötzsch markus.kroetzsch@tu-dresden.de
Qualification objectives	The students have basic knowledge in dealing with formal knowledge models and master methods for their creation, processing and analysis. They are able to use knowledge models in applications and understand the theoretical background of the problems to be solved and the relevant algorithms in this context.
contents	Contents of the module are basics and methods of modeling large knowledge collections including their management and analysis, exchange formats and ontology languages, knowledge organization, constraints, ontologies, quality assurance, analysis of knowledge models, logical closing, inquiries, data mining, structural analysis as well as applications of knowledge models.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computability Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence are required to acquire the competencies required in the INF-25-Ba-AuD modules. In the Master's programme in Computer Science, competencies in the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level are required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics

	if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Foundations of Logic Programming**
Module number	INF-25-Ma-FTK-FLP
Responsible lecturer	Dr. Hannes Straß hannes.strass@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific foundations of logic programming. They know the central concepts of syntax and model-theoretical semantics of various fragments of logic programs, including definite and normal logic programs. The students know the corresponding proof theories of the logic program fragments. You can reproduce, formally justify and apply the central definitions and key statements mathematically correct. You know the difference between classic logic programming as in Prolog and response set programming. They are able to independently derive and prove statements based on the model-theoretical, algorithmic and complexity-theoretical aspects of logic and response set programming.
contents	Contents of the module are syntax of definite logic programs, model-theoretical semantics of definite and normal logic programs, SLD resolution, correctness and completeness of the SLD resolution, Turing completeness of definite logic programs, syntax of normal logic programs, SLDNF resolution, correctness and limited completeness of the SLDNF resolution, stratification of normal logic programs and the general semantics of stable models; the response quantity programming paradigm; Modelling of search and optimization problems by means of response quantity programming, calculation of stable models by means of backtracking search and propagation.
Forms of teaching and learning	The module includes lectures in the scope of 2 SWS as well as self-study. The teaching language of the lectures can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.

usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course of study with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 90 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Proof Theory and Sequent Systems**
Module number	INF-25-Ma-FTK-PT
Responsible lecturer	Dr. Timothy S. Lyon timothy.lyon@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of evidence theory, especially in the field of sequence systems. They know the central concepts of sequence calculus for classical statement logic, predicate logic and modal logic, including structural rules, cut elimination and evidence search. The students are familiar with the basic methods of proof theory, in particular invertibility and admissibility of inference rules, cut elimination as well as evidence search algorithms and can reproduce, formally justify and apply the central definitions and core statements mathematically correct. They are able to independently derive and prove statements based on the mathematical, algorithmic and complexity-theoretical aspects of evidence theory.
contents	Contents of the module are syntax and semantics of classical statement logic, first-level predicate logic and modal logic K; Sequence calculus LK, G3CPL, G3FOL and G3K; the structural rules of attenuation, contraction and exchange; invertibility and admissibility of inference rules; cut elimination according to the Gentzens main clause and the partial formula property; correctness and completeness with syntactic and semantic methods; Evidence search algorithms and decisiveness of the classical statement logic and the modal logic K; and Kripke semantics for modal logic.
Forms of teaching and learning	The module includes lectures in the scope of 2 SWS as well as self-study. The teaching language of the lectures can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the

	Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course of study with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 90 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Advanced data structures**
Module number	INF-25-Ma-FTK-AD
Responsible lecturer	Prof. Dr. László Kozma laszlo.kozma@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of scientific methods in the development and analysis of advanced data structures. They understand the characteristics of specific input and output models as well as their impact on the analysis of runtime and storage requirements. Students can understand current research results on data structures and apply the internalized methods to new design problems.
contents	Contents of the module are advanced data structures for storing dynamic quantities, complex geometric objects as well as strings, trees and graphs in dynamic applications. Further contents are the techniques of amortized analysis, competitive analysis and self-organizing data structures.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures and INF-25-Ba-Ma3 Algebra. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Advanced Algorithms Lab**
Module number	INF-25-Ma-FTK-AALAB
Responsible lecturer	Prof. Dr. László Kozma laszlo.kozma@tu-dresden.de
Qualification objectives	Students are able to implement advanced algorithms and develop new algorithms or heuristics based on general problem-solving techniques. They can evaluate to what extent they are suitable for solving difficult or underspecified problems, optimize them and evaluate experimental results. They are proficient in the theoretical and practical tools to analyse the duration of their implementation and to improve it with regard to the requirements of the application.
contents	Contents of the module are the implementation of advanced algorithms based on specifications as well as the design and refinement of specifications based on general objectives. This includes the design of algorithms, the targeted use of heuristic search strategies, the analysis and optimization of program code as well as the secure mastery of data structures, the complexity of their operations and their practical application.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Predictability Theory and INF-25-Ba-LuK Logic and Complexity are required. In the Master's programme in Computer Science, knowledge of the basics of programming, algorithm design, formal languages and theoretical computer science at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Model Checking**
Module number	INF-25-Ma-FTK-MC
Responsible lecturer	Prof. Dr. Christel Baier christel.baier@tu-dresden.de
Qualification objectives	Students know and master the basics of formal analysis of parallel systems with the help of model checking. They have internalized the central theoretical concepts such as transition system emantics, specification of properties by temporal logics and automata and associated model checking algorithms and abstraction techniques and can apply them in practice using current model checkers. They are aware of the fundamental challenges, both from a theoretical and practical point of view, and are able to independently develop creative solutions that, despite these challenges, enable a successful application of model checking in practice.
contents	Contents of the module are mathematical models and techniques for the specification, analysis and verification of software and hardware systems. These include basic concepts of modeling parallel systems and in particular transition systems as well as associated parallel operators, characterizations of safety and vitality properties, automata over infinite words and in particular Büchi machines, temporal logics such as LTL, CTL and its variants, model checking algorithms and complexity of the model checking problem for temporal specifications, formalisms for abstraction and refinement and in particular trace, bisimulation and simulation relations) as well as stochastic or real-time extensions of transition systems and associated temporal logics and model checking algorithms. Further content is the applicability of model checking tools in practice.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 4 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	Competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computability Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra and INF-25-Ba-Ma4 Probability Theory and Statistics are required in the diploma program Computer Science and the bachelor program Computer Science. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in

	accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	12 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 360 hours.
Duration of the module	The module covers one semester.
Accompanying literature	Principles of Model Checking, C. Baier, J.-P. Katoen. MIT Press, 2008.

Module name	**Advanced Logics**
Module number	INF-25-Ma-FTK-AL
Responsible lecturer	Christel Baier christel.baier@tu-dresden.de
Qualification objectives	Students will have in-depth knowledge of the scientific methods of the field of logic in computer science, in particular evidence and model theory. They are familiar with the central concepts of first- and second-level predicate logic, can reproduce, formally justify and apply its core statements mathematically correctly, and are able to independently derive and prove statements based on them on the algorithmic and complexity-theoretical aspects of mathematical logic.
contents	Contents of the module are various aspects of the first and second stage predicate logic and variants thereof. These include proof systems, Gödel's propositions, axiomatizability, the Löwenheim-Skolem theorems, (in)decidability of algorithmic questions such as fulfillability, validity, logical conclusions and equivalence, model theory, Ehrenfeucht-Fraisse games and the Büchi-Elgot-Trakhtenbrot theorem.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, and INF-25-Ba-Ma4 Probability Theory and Statistics. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's programme in Computer Science if this or a substantially identical

	module has already been completed from a course of study with which the admission requirements pursuant to § 3 of the Study Regulations have been met. The module creates the conditions for the modules it designates under conditions for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 270 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Building and Maintaining Ontologies in the Description Logic EL**
Module number	INF-25-Ma-FTK-BMOEL
Responsible lecturer	Dr Francesco Kriegel francesco.kriegel@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the description logic EL and some extensions. They know the central concepts and scientific methods, can reproduce their core statements mathematically correctly, formally justify and apply them and have the ability to independently derive and prove statements based on the algorithmic, semantic or logical foundations.
contents	Contents of the module are syntax and semantics of the various means of expression in the description logic EL, complexity of decision problems regarding logical conclusion and corresponding algorithms. Further contents of the module are extensions of EL in terms of limits of polynomial time and decision-making, logical-algebraic methods for building and maintaining EL knowledge bases, such as learning concept descriptions or knowledge bases from examples, explaining conclusions by means of evidence or counter-examples and repairing false conclusions.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-AuB Automata and Predictability Theory, INF-25-Ba-LuK Logic and Complexity as well as INF-25-Ba-Ma2 Discrete Structures are required. The Master's programme in Computer Science requires knowledge of the basics of formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level.

usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's degree program Computer Science if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been met has already been completed.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Introduction to Existential Rules**
Module number	INF-25-Ma-FTK-EXR
Responsible lecturer	Prof. Dr. Sebastian Rudolph sebastian.rudolph@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of the subfield of database theory and theoretical computer science. They know the central concepts of the subject area of existential rules, can reproduce their core statements mathematically correctly, formally justify and apply them. They can independently derive and prove statements based on the algorithmic, semantic, computational or logical foundations of the subfield.
contents	Contents of the module are formal foundations of ontology-based query response using existential rules, results on model theory, decision-making, algorithmics – in particular forward and backward chaining – and the complexity of associated computational problems, as well as relevant determinable subclasses of existential rule languages.
Forms of teaching and learning	The module includes lectures in the scope of 2 SWS as well as self-study. The teaching language of the lectures can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuB Automata and Predictability Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence. The Master's programme in Computer Science requires knowledge of the basics of formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 90 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Introduction to Formal Concept Analysis**
Module number	INF-25-Ma-FTK-FCA
Responsible lecturer	Prof. Dr. Sebastian Rudolph sebastian.rudolph@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of the subfield of Formal Conceptual Analysis. They know their central concepts, can reproduce their core statements mathematically correctly, formally justify and apply them, and have the ability to independently derive and prove statements based on them on the theoretical and algorithmic foundations of the subfield.
contents	Contents of the module are the theoretical foundations of formal concept analysis, association theory and feature logic, visualization aspects of concept association diagrams as well as algorithms for the efficient calculation of formal concepts, implication bases and interactive knowledge acquisition.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Algorithmic Game Theory**
Module number	INF-25-Ma-FTK-GaT
Responsible lecturer	Dr. habil. Hannes Straß hannes.strass@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of mathematical and algorithmic game theory. They know the central concepts, contexts and algorithms for non-cooperative normal-form and extensive-form games as well as cooperative games, can reproduce, formally justify and apply core statements mathematically correct and have the ability to independently derive and prove statements based on the mathematical or algorithmic foundations of the field.
contents	Contents of the module are normal form games, solution concepts for these as well as the calculation of such solution concepts, game trees with complete information with their solution concepts and search algorithms, extensive form games and solution concepts as well as search algorithms for these, the connection of extensive form and normal form games, cooperative games as well as their solution concepts and possible calculation methods of the solution concepts.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics as well as INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's pro-

	gramme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to §3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Algorithmic Graph Theory**
Module number	INF-25-Ma-FTK-GrT
Responsible lecturer	Prof. Dr. Daniel Neuen daniel.neuen@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of scientific methods in graph theory and the development of algorithms for graph problems. They are familiar with central concepts of graph theory, can reproduce its core statements mathematically correctly, formally justify them and apply them for the development of algorithms. In addition, they have the ability to independently derive and prove statements based on them and to independently develop and analyze algorithms for related problems.
contents	Contents of the module are different aspects of graph theory. These include correlation in graphs, tree width and other graph parameters, minors, and random graphs. Further contents of the modil are algorithms for typical graph problems, such as flow problems, assignment problems as well as various packing and coverage problems.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures and INF-25-Ba-Ma3 Algebra. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 270 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Randomized Algorithms**
Module number	INF-25-Ma-FTK-RA
Responsible lecturer	Prof. Dr. László Kozma laszlo.kozma@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of scientific methods in the development and analysis of algorithms using chance. They understand the properties of specific input and output models and their impact on the analysis of algorithms. They know a wide repertoire of advanced techniques and can apply them to the formal presentation of algorithmic problems as well as the development of algorithms. They are able to formally analyze the correctness and efficiency of randomized algorithms and have a solid knowledge of a variety of mathematical methods for this purpose.
contents	Contents of the module are algorithm and complexity theory as well as specific topics of randomized algorithms, such as sampling methods, random paths, derandomization, stochastic input models and related mathematical fields such as the theory of random graphs and the probabilistic method. Further contents of the module are algorithms for problems related to graphs, geometric objects or formal languages.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures and INF-25-Ba-Ma3 Algebra. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's pro-

	gramme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 270 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Seminar Theoretical Computer Science and Symbolic Artificial Intelligence**
Module number	INF-25-Ma-FTK-Sem
Responsible lecturer	Dr. Jakob Piribauer jakob.piribauer@tu-dresden.de
Qualification objectives	Students are able to comprehend the contents of scientific publications from a subject area in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, present them in an understandable way and critically analyze the acquired knowledge. They are able to critically assess and communicate the application of the methods of the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as to recognize cross-application approaches.
contents	Contents of the module are the analysis and discussion of scientific publications on a topic of the student's choice in the field of Theoretical Computer Science and Symbolic Artificial Intelligence.
Forms of teaching and learning	The module includes seminars of 2 SWS and self-study. The teaching language of the seminars can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra as well as INF-25-Ba-Ma4 Probability Theory and Statistics. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met.

	The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 40 hours. The language of the examination is, at the choice of the student, German or English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 90 hours.
Duration of the module	The module covers one semester.

Module name	**Advanced Problem Solving and Search**
Module number	INF-25-Ma-FTK-APSS
Responsible lecturer	Dr. Sarah Alice Gaggl sarah.gaggl@tu-dresden.de
Qualification objectives	Students are familiar with scientific methods for dealing with severe combinatorial and search problems relevant to applications in computer science. They understand their formal modeling and know how to solve it. They are able to formally investigate computational properties of these problems and associated algorithms.
contents	Contents of the module are uninformed and informed search, local search, Stochastic Hill Climbing, Simulated Annealing, taboo search, constraint satisfaction problems, evolutionary and genetic algorithms, response set programming as well as techniques of structural decomposition such as tree and hypertree decompositions.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination

points	language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Complexity Theory**
Module number	INF-25-Ma-FTK-CT
Responsible lecturer	Prof. Dr. Markus Krötzsch markus.kroetzsch@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of complexity theory. They are familiar with important complexity classes and their relationships with each other. They have detailed knowledge of various calculation models and can derive appropriate language classes from them. Furthermore, they have an in-depth understanding of relevant methods of proof and analysis.
contents	Contents of the module are Turing machines, oracles and predictability, basic complexity classes such as L, NL, P, NP, PSpace, Exp and NExp as well as their complements and relationships, the theorem of Savitch, the theorem of Immermann and Szelepcsényi, hierarchical sentences, the gap theorem, the the theorem of Ladner as well as the the theorem of Baker, Gill and Solovay, alternation and the polynomial hierarchy, circuit complexity with P/poly, NC and AC0, probabilistic complexity with PP and BPP, the the theorem of Adlemann as well as the the the theorem of Sipser, Gács and Lautemann, quantum complexity, interactive proof systems such as IP, AM and MA as parametrized complexity.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra as well as INF-25-Ba-Ma4 Probability Theory and Statistics. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module cre-

	ates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 270 hours.
Duration of the module	The module covers one semester.

Module name	**Foundations of Knowledge Representation**
Module number	INF-25-Ma-FTK-KR
Responsible lecturer	Sebastian Rudolph sebastian.rudolph @tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of logic-based knowledge representation in computer science. They know the central concepts of logical modeling in formalisms of different expressive strengths, including non-monotonic closing, dealing with contradictory and uncertain knowledge as well as formal reasoning and can reproduce, formally justify and apply the central definitions and core statements mathematically correct. They are able to independently derive and prove statements on the model-theoretical, algorithmic and complexity-theoretical aspects of knowledge representation.
contents	Contents of the module are knowledge modeling and automatic closing in statement logic and predicate logic as well as their horn fragments, description logics and ontology languages, nonmonotonic logic extensions, inconsistency treatment by paraconsistency or belief revision, probabilistic and fuzzy logics and approaches of abstract reasoning.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures, INF-25-Ba-Ma3 Algebra, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination

	regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course of study with which the admission requirements according to § 3 of the study regulations have been met. The module creates the conditions for the modules it designates under conditions for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Modal Logic**
Module number	INF-25-Ma-FTK-MoL
Responsible lecturer	Jakob Piribauer jakob.piribauer@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the scientific methods of modal logic in computer science. They know the central concepts of relational semantics of modal logic and of correctness and completeness results and can reproduce, formally justify and apply their core statements mathematically correct. They are able to independently derive and prove statements on the algorithmic and complexity-theoretical aspects of modal logic.
contents	Contents of the module are syntax and kripke semantics of modal logic, basic concepts such as bisimulations and filtrations, properties of modal logic such as the finite model property and the connections to predicate logic, modal definability, canonical models and completeness proofs as well as the decisionability and algorithmic complexity of fulfillability and validity problems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS and exercises in the amount of 2 SWS as well as self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-AuB Automata and Computational Theory, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma2 Discrete Structures and INF-25-Ba-Ma3 Algebra. In the Master's programme in Computer Science, knowledge of the basics of algorithm design, formal languages, theoretical computer science and the logic of statements and predicates as well as knowledge of mathematics at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Theoretical Computer Science and Symbolic Artificial Intelligence, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Theoretical Computer Science and Symbolic Artificial Intelligence as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course of study with which the

	admission requirements according to § 3 of the study regulations have been met. The module creates the conditions for the modules it designates under conditions for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Area of Specialization Software Technology and Programming Languages

Module name	**Compiler construction**
Module number	INF-25-Ma-FSP-CB
Responsible lecturer	Prof. Dr. Jerónimo Castrillon jeronimo.castrillon@tu-dresden.de
Qualification objectives	Students master the methodological basics of compiler construction as well as the corresponding compiler phases and algorithms. They have a basic understanding of the structure of programming languages consisting of lexic, syntax and semantics as well as the associated formalisms such as automata, parsers and context-free grammars. Students are familiar with analysis and optimization algorithms based on intermediate code and can apply them. Students understand the influence of processor architecture characteristics on the complexity of compiler backends and know the most important procedures for code generation.
contents	The contents of the module include the general compiler construction based on the process of how a high-level language is gradually translated into optimized machine code. In particular, the basics for the implementation of theoretical concepts of computer science in practice, the influence of the processor architecture on the software performance and basic and advanced optimization techniques are the subject of the module. The module includes in particular the phases of a compiler consisting of the frontend with lexical, syntactic and semantic analysis, the middleend with intermediate code representations, control and data flow analyses and compiler optimizations as well as the backend with target architectures, code selection, scheduling and register allocation.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-AuB Automata and Computational Theory as well as INF-25-Ba-AuD Algorithms and Data Structures are required. In the Bachelor's program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-EThI Introduction to Theoretical Computer Science as well as INF-25-Ba-AuD Algorithms and Data Structures are required. The Master's programme in Computer Science requires knowledge of formal languages as well as algorithms and data structures at bachelor's level.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance

	with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 120 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Self-Adaptive Software and Cobotics**
Module number	INF-25-Ma-FSP-SESAC
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with advanced principles of software modeling for self-adaptive and cobotic systems, especially for collaborative robotics. They know the concepts of autonomous control described by the MAPE-K loop, action grammar called motion grammar, hybrid petrinets, and context-oriented modeling. You can apply these formal concepts to collaborative robotics software, know platform concepts such as the Robot Operating System (ROS), and can use software techniques for the design of cobotic industrial cells.
contents	Contents of the module are the software development of self-adaptive and cobotic systems, context modeling, sensory and hybrid modeling, multi-target optimization as well as on the application level software techniques for industrial cobotics, swarm and telerobotics.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The computer science degree program requires the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Foundations of Certified Programming Language and Compiler Design**
Module number	INF-25-Ma-FSP-FCPL
Responsible lecturer	Dr. Sebastian Ertel sebastian.ertel@barkhauseninstitut.org
Qualification objectives	Students are able to develop programs with a strong guarantee of their characteristics in order to minimize the testing effort and avoid complex runtime errors already during the development process. For this purpose, the students know the basics of strongly-typed programming languages, so-called dependently-typed languages and their connection to logic. You can develop programs in programming languages such as Agda or Theorem Provern such as Coq and formally prove their properties. They are familiar with essential proof procedures to formally verify the properties of programming languages, compilers and hardware-related programs.
contents	Contents of the module are the theories of the untyped and cryptic lambda-calculus, type systems with Dependent Types and their connection to the logic of statements and predicates as a basis for the Curry-Howard isomorphism. Other content includes programming with highly-typed programming languages such as Agda and Theorem Provern such as Coq. Fundamentals of the properties of programming languages and compilers, their impact on the design process as well as to prove these formally are further central contents. This also includes important evidence techniques and formal concepts for defining operational and denotational semantics.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-LuK Logic and Complexity, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWT Software Technology and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of programming and logic at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites

	for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Software Engineering for Highly Configurable Software Systems**
Module number	INF-25-Ma-FSP-HICSOS
Responsible lecturer	Prof. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with advanced principles of software engineering, design, architecture, modeling, testing, and reuse of highly configurable systems. You can use the concepts of feature modeling, behavioral modeling, and feature-based software testing in the context of highly configurable systems.
contents	Contents of the module are the software development of highly configurable systems, their evolution and maintenance as well as the application of the above techniques in search-based software engineering, learning-based software engineering, cyber-physical systems and digital twins.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations are required. In the Bachelor's program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology and INF-25-Ba-PMZ-DBE Database Engineering are required. In the Master's programme in Computer Science, basic knowledge of software technology at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed

	from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Software as a Business**
Module number	INF-25-Ma-FSP-SAAB
Responsible lecturer	Prof. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with the basic principles of agile innovation management in the form of the agile start-up process 'Lean Startup', both in its methodology and in its phases and milestones (problem-solution fit, customer interviews, product-market fit, scale). They know Lean Startup tools like Business Model Canvas, Value Proposition Canvas and Jobs-to-be-done Canvas. You have knowledge of investor pitch formats and methods for developing the 'Minimal viable project (MVP)'. They know software business models for software product lines and ecosystems and how to work out with the help of models.
contents	Contents of the module are the basics of value-driven development, customer interviews, value analysis, questioning methods, cost and price models, feature models, business models of software products and product lines, software and transaction ecosystems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations are required. In the Bachelor's program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology and INF-25-Ba-PMZ-DBE Database Engineering are required. In the Master's programme in Computer Science, basic knowledge of software technology at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be

	selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the development and presentation of a business model in the amount of 30 hours. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Software Management and Quality Assurance**
Module number	INF-25-Ma-FSP-SMQS
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with the basic principles of project management of software systems in the planning, implementation, quality assurance, estimation, process modeling and business modeling of software systems. You can classify, evaluate and adapt important basic techniques of software project management and quality assurance for specific fields of application in the field of software applications.
contents	Contents of the module are basics of software projects, software quality assurance, project planning and task estimation, basics of different types of projects as well as agile and heavy-weight process models in project management.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science in the specialization Media Informatics, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence are required. In the Bachelor's program Applied Informatics in the specialization Medical Informatics, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-PMZ-DBE Database Engineering, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence are required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be

	chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of exercise tasks in the amount of 15 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Component-Based Software Engineering**
Module number	INF-25-Ma-FSP-CBSE
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	After completing the module, students will be familiar with the basic principles of software reuse, component design and software architecture. They can classify, evaluate and adapt important basic techniques of component models, compositional techniques and compositional languages for specific fields of application in the field of software applications, as well as distinguish different component models and assess their areas of application.
contents	Contents of the module are basics for software reuse with component models as well as the use of different composition techniques and languages. The module includes blackbox compositions in which components are connected via their interfaces and graybox compositions in which components are interwoven cross-cutting. The invasive software composition serves as the overarching framework of all methods. Other content includes software design, modeling, and metamodeling using component models, techniques, and compositional languages such as architectural languages and aspect orientation.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module exam-

points	ination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Automotive Software Engineering**
Module number	INF-25-Ma-FSP-AutoSOFT
Responsible lecturer	Prof. Mirko Conrad Mirko.conrad@tu-dresden.de
Qualification objectives	Students know and understand basic concepts, principles and methods of developing software-based systems in the automotive industry. They know and understand the domain-specific features and challenges of software development in the automotive sector as well as the need to embed software development in an overarching system development process. Students know and understand the basic activities of a reference process for the development of software-based systems for motor vehicles as well as selected technical aspects of this process.
contents	Contents of the module are the basics, special features and challenges of software development in the automotive sector, the core process for the development of vehicle software based on Automotive SPICE©, methods of system and software development for the software-defined vehicle. Other topics include the evolution of E/E architectures, the use of AUTOSAR and the use of machine learning methods to realize vehicle systems, as well as the concepts and methods of various software-based vehicle systems, including systems for automated driving.
Forms of teaching and learning	The module includes 2 SWS lectures and self-study. The language of instruction is English.
Prerequisites for participation	In the diploma program Computer Science, in the master program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-SWT Software Technology are required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme Applied Computer Science, the module is a compulsory elective module in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's pro-

	gramme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered in the summer semester.
workload	The total workload is 90 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Advanced Software Engineering**
Module number	INF-25-Ma-FSP-FSWT
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with the basic principles of software engineering, design, architecture, modeling, testing and reuse of software systems. You can classify, evaluate and adapt important basic techniques of software systems for specific fields of application in the field of software applications.
contents	The content of the module includes the basics of software design, modeling and metamodeling, software architecture, software quality, software reuse and modeling of software product lines. Further contents of the module are methods for mastering the complexity of models and code as well as examples from industrial software technology.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science in the specialization Media Informatics, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence are required. In the Bachelor's program Applied Informatics in the specialization Medical Informatics, the modules INF-25-Ba-PMZ-DBE Database Engineering and INF-25-Ba-KI Artificial Intelligence can be acquired.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations

	have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Requirements and Test Management**
Module number	INF-25-Ma-FSP-RETE
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students master the methods of requirements and quality management for software systems. They are able to apply advanced concepts of software engineering such as requirements and test specifications, continuous integration, modeling of software product lines in requirements analysis, quality assurance and management.
contents	Contents of the module are basic requirements specifications, requirements management, software analysis methods, software metrics, test types, test methods and tools, modeling and validation as well as information for embedding in project management.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science in the specialization Media Informatics, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence are required. In the Bachelor's program Applied Informatics in the specialization Medical Informatics, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-PMZ-DBE Database Engineering and INF-25-Ba-KI Artificial Intelligence are required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical

	module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Automotive Software Safety**
Module number	INF-25-Ma-FSP-AutoSAFE
Responsible lecturer	Prof. Mirko Conrad Mirko.conrad@tu-dresden.de
Qualification objectives	Students know and understand basic terms and principles to ensure the safety of software-based systems in automobiles. They know and understand key principles, methods and procedures of functional safety according to ISO 26262 and target functional safety (SOTIF) according to ISO 21448.
contents	The module contains basic concepts and concepts for the development of safer E/E systems used in road vehicles, as well as basic principles, methods and procedures for functional safety and target functional safety (SOTIF) and the associated standards ISO 26262 and ISO 21448.
Forms of teaching and learning	The module includes 2 SWS lectures and self-study. The language of instruction is English.
Prerequisites for participation	In the diploma program Computer Science, in the master program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology and INF-25-FSP-AutoSOFT Automotive Software Engineering are required.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme Applied Computer Science, the module is a compulsory elective module in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered in the winter semester.
workload	The total workload is 90 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Design Patterns and Frameworks**
Module number	INF-25-Ma-FSP-DPF
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with the basic principles of designing object-oriented software systems with design patterns and how these can be systematically derived or constructed from each other. You can understand design patterns as collaboration specifications and know the basics of role-oriented modeling and programming. You can apply the acquired knowledge to large software systems and know the principles of using design patterns in the context of software frameworks.
contents	Contents of the module are basics for the systematic derivation and derivation of design patterns in object-oriented languages. In particular, the module includes role-oriented modeling and programming as an extension of the object-oriented paradigm, its use to describe design patterns and the use of design patterns to realize variability and extensibility of frameworks.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory module in the Distributed Systems Engineering Track and a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Future-Proof Software Systems**
Module number	INF-25a-Ma-FSP-FPSS
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	After completing the module, students will be familiar with the basic principles of software architecture, both for variability (changeability) and reliability (dependability). The students know the concept of the architecture framework and can subordinate it with design patterns in the realization. They can distinguish different horizontal and vertical architectural aspects and assess their areas of application.
contents	Contents of the module are fundamentals of software architecture, both in software design, modeling and metamodeling, such as the basic principles of formal modeling of product lines, cyber-physical and embedded systems. Other content includes functional safety, architectural principles, stratification and development metrics.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.
Accompanying literature	Frank Furrer. Future-Proof Software Systems. Springer publishing house.

Module name	**Model-Driven Software Development in Technical Spaces**
Module number	INF-25-Ma-FSP-MOST
Responsible lecturer	Prof. Dr. Uwe Aßmann uwe.assmann@tu-dresden.de
Qualification objectives	Students are familiar with advanced principles of software modeling for heterogeneous systems, such as those required for software factories. In addition, students are familiar with the concept of technical space, metalanguage and can use it together with design patterns. Furthermore, they know the concept of the consistent multi-model and can assess its areas of application.
contents	Content of the module is advanced model-driven software development, both for information systems and for cyber-physical systems. Further contents are metamodeling and domain-specific languages, macro models and technology room bridges as well as various technology rooms, such as hierarchical or graph-based models, with request and transformation languages.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Software Technology and Programming Languages, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Software Technology and Programming Languages and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration. Bonus service for oral examination performance is the solving of computer-aided exercises in the amount of 15 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Area of Specialization Secure Computing

Module name	**Foundations of Concurrent and Distributed Systems**
Module number	INF-25-Ma-FSC-FCDS
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students are able to analyze applications that can run on parallel and distributed systems, as well as to use their computing capacities efficiently and fully. They understand how data inconsistencies can arise from concurrency and can apply appropriate principles that increase concurrency and associated performance while ensuring data consistency.
contents	The content of the module is the efficient use of computing power of modern CPUs through the simultaneous/parallel use of the cores. This includes in particular the basics of parallel and distributed systems, which are required for the development of parallel and distributed applications on such processors. In addition to theoretical foundations, basic aspects of the development of parallel high-performance programs are also included.
Forms of teaching and learning	The module includes lectures of 4 SWS and self-study. The language of instruction of the lectures is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ma-FSA-SE Systems Engineering module are required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Privacy-Enhancing Technologies**
Module number	INF-25-Ma-FSC-PET
Responsible lecturer	Prof. Dr. Florian Tschorsch florian.tschorsch@tu-dresden.de
Qualification objectives	The students are familiar with methods and techniques from the field of data protection-promoting technologies. They are aware of data protection risks and measures and are able to use, develop and evaluate data protection-promoting technologies.
contents	Contents of the module are data protection risks, privacy enhancing technologies to manage these risks, models and assessment metrics underlying the design of data protection technologies, in particular methods for anonymous and unobservable communication in computer networks, anonymity and pseudonymity on the network layer as well as the application layer. Further contents are methods for anonymization and pseudonymization of data as well as data protection-compliant processing based on security protocols in general and cryptographic methods in particular.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma course, the competencies to be acquired in the modules INF-25-Ba-Si Security are required. In the Master's programme in Computer Science, competencies in cryptography at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Software Fault Tolerance**
Module number	INF-25-Ma-FSC-SFT
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students are able to develop fault-tolerant software systems so that their probability of failure is minimized and their security increased. The students know the different error types and classes, can analyze and evaluate their probability of failure. Students can apply various principles of robustness to minimize the probability of failure of the systems.
contents	Contents of the module are theoretical foundations of various fault-tolerant mechanisms and analysis methods, which can be applied statically or dynamically. Furthermore, the module includes mechanisms that increase the robustness of distributed systems. In addition to fail-safety, aspects such as the attack security of such systems are the subject of the module.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules Programming and RoboLab, INF-25-Ba-BS Operating Systems, Computer Networks, INF-25-Ma-FSA-SE Systems Engineering and INF-25-Ba-SWT Software Technology. The Master's programme in Computer Science requires basic knowledge and skills in programming, a basic understanding of operating systems and network techniques as well as competencies in complex and distributed software systems and cloud computing at bachelor's level.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language is

	English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Confidential Computing**
Module number	INF-25-Ma-FSC-CONF
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students will master methods and techniques from the field of trustworthy processing of data in insecure environments such as public clouds, especially from the field of Confidential Computing.
contents	Contents of the module are methods for Confidential Computing such as Trusted Execution Environments, Local Attestation, Remote Attestation, Secret Provisioning, Attestation Policy, Confidential Service Meshes, Nested Confidential Computations, Confidential Fail-Stop Execution, Scaling of Confidential Workloads and Confidential Build Process.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree program, the competencies to be acquired in the modules INF-25-Ba-Si Security, Software Technology, Data Management Foundations, Software Technology Project and Artificial Intelligence are required. In the Master's programme in Computer Science, basic knowledge and competencies in cryptography at bachelor's level are required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every winter semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Concurrent and Distributed Systems Lab**
Module number	INF-25-Ma-FSC-FCDS.Lab
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students are able to develop and implement applications that can run on parallel and distributed multi-core architectures and to use their computing capacities efficiently and fully. They are able to identify and correct sources of concurrency errors and can evaluate and optimize the performance of parallel applications.
contents	Contents of the module are practical knowledge regarding the programming of multi-core CPUs/architectures, so that parallel/adjoining applications can efficiently use the computing power of the underlying processor. This includes practical foundations for the development and optimization of parallel, resource-efficient high-performance programs.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The language of instruction of the internships is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ma-FSA-SE Systems Engineering module are required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of an ungraded complex performance of 90 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module test is assessed as ‘passed’ or ‘failed’.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Network and Distributed Systems Security**
Module number	INF-25-Ma-FSC-NSec
Responsible lecturer	Prof. Dr. Florian Tschorsch florian.tschorsch@tu-dresden.de
Qualification objectives	Students are able to independently assess the security and robustness of networks and distributed systems.
contents	Contents of the module are the basics of secure networks and distributed systems, an overview of current threats and protection measures, methods of security analysis, consideration of attacks on networks as well as distributed applications and current countermeasures. The attack scenarios include attacks on the content as well as the resulting meta data and also attacks on the services themselves, such as Denial of Service. Countermeasures include both proactive and reactive mechanisms.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ba-Si Security module are required. The Master's programme in Computer Science requires basic knowledge and skills in IT security at Bachelor's level.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. The module is a compulsory module in the Master's program Computer Science in the Distributed Systems Engineering Track and in the Open Track a compulsory elective module in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and an ungraded complex performance of 30 hours. The examination language of the exam paper and the complex performance is English.
Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the	The module is offered every summer semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Systems Security Lab**
Module number	INF-25-Ma-FSC-SSL
Responsible lecturer	Prof. Dr. Florian Tschorsch florian.tschorsch@tu-dresden.de
Qualification objectives	Students know practical methods and techniques of IT security. You have knowledge of procedures and procedures in the field of penetration tests to evaluate the security of an IT system.
contents	Contents of the module are procedures and procedures in the field of penetration tests, legal and organizational backgrounds and framework conditions, a methodology for conducting penetration tests, the theoretical backgrounds of weak points as well as procedures for finding them using the example of different application areas or system areas, procedures in the field of computer forensics, for the analysis of successful attacks as well as practical penetration test attempts.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.

workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Software Fault Tolerance Lab**
Module number	INF-25-Ma-FSC-SFT.Lab
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students are able to minimize the susceptibility to errors of software systems. You can analyze existing systems and evaluate their susceptibility to errors and reduce them by using various mechanisms.
contents	The content of the module is the practical application of various fault-tolerant mechanisms and analysis methods, which can be applied statically or dynamically. This includes in particular the development and optimization of fault-tolerant, reliable software.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The language of instruction of the internships is English.
Prerequisites for participation	In the Computer Science degree program, the competencies to be acquired in the modules Programming and RoboLab, Operating Systems, Systems Engineering and Software Technology are required. The Master's programme in Computer Science requires basic knowledge and skills in programming, a basic understanding of operating systems as well as competencies in complex and distributed software systems and cloud computing at bachelor's level.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of an ungraded complex performance of 90 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module test is assessed as ‘passed’ or ‘failed’.
Frequency of the module	The module is offered every winter semester.

workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Security in Applications**
Module number	INF-25-Ma-FSC-ASec
Responsible lecturer	Dr. Stefan Köpsell stefan.koepsell@tu-dresden.de
Qualification objectives	Students are proficient in methods and techniques for the development of safe applications, with particular attention to practical aspects.
contents	Contents of the module are procedures, techniques and process models in the field of development and operation of secure and privacy-friendly applications with strong practical relevance, digital identities, including Self Sovereign Identities, Confidential Computing, certification, threat modeling, risk assessment, the development cycle for secure software development as well as DevSecOps and security in the field of operational technology (OT).
Forms of teaching and learning	The module includes 2 SWS lectures and self-study. The language of instruction of the lectures is German.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ba-Si Security module are required. In the Master's programme in Computer Science, competences in IT security at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Secure Computing in the computer science diploma course in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language is German.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 90 hours.
Duration of the module	The module covers one semester.

Module name	**IT Security in Cloud Computing**
Module number	INF-25-Ma-FSC-CSec
Responsible lecturer	Prof. Dr. Ivan Gudymenko ivan.gudymenko@tu-dresden.de
Qualification objectives	Students have basic skills to holistically assess the threats and risks associated with cloud applications. You can perform threat analysis, identify protection targets and attacker models, and analyze security risks in the context of cloud computing and associated protections. Students are able to understand the basics of important modern security technologies in the cloud security sector and to name their typical areas of application. They have fundamental knowledge in the field of data protection in cloud computing and can identify requirements and mechanisms of action.
contents	Contents of the module are the basics of IT security in cloud computing, in particular typical procedures and procedures from practice for assessing the general security situation (Security Posture) as well as specific risks and the introduction of appropriate countermeasures, threat analysis techniques as well as innovations and case studies from the IT security sector such as Confidential Computing, Zero Trust and Self-Sovereign Identity as well as data protection considerations regarding cloud and cloud applications.
Forms of teaching and learning	The module includes lectures in the amount of 1 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ba-Si Security module are required. In the Master's programme in Computer Science, competences in IT security at Bachelor's level are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of secure computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Secure Computing as well as the supplement to be selected in accordance with Annex 2 to the examination regulations. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language is English.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 90 hours.
Duration of the module	The module covers one semester.

Area of Specialization Systems Architecture

Module name	**Systems Engineering**
Module number	INF-25-Ma-FSA-SE
Responsible lecturer	Prof. Dr. Christof Fetzer christof.fetzer@tu-dresden.de
Qualification objectives	Students are able to design distributed software platforms using modern hardware and software components. They understand the challenges of distributed systems with regard to programming and correct execution, can evaluate them and apply appropriate mechanisms. They are able to design highly scalable and distributed systems that can be operated in cloud environments and know approaches, principles and concrete implementations regarding the correct operation of distributed applications.
contents	Contents of the module are the design, construction and operation of software platforms as well as current topics in the architecture of distributed systems. These include parallel computing on current hardware, ensuring the componability and security of complex modules, test methods for the fastest possible error detection, and the management of human resources to support collaboration. Further contents are concrete examples of some services with large distributed systems that enable cloud computing as well as the architecture, construction and operation of scalable systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The computer science degree program requires the competencies to be acquired in the modules INF-25-Ba-BS Operating Systems, INF-25-Ba-RA Computer Architecture and Hardware Laboratory, INF-25-Ba-Prg Programming and RoboLab as well as INF-25-Ba-RN Computer Networks. In the Master's program Computer Science, knowledge and skills about the basics of operating systems, computer architecture and computer networks as well as knowledge of programming and software technology at bachelor's level are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory module in the Distributed Systems Engineering Track and a compulsory elective module in the Open Track in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a

	substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Scalable Data Engineering**
Module number	INF-25a-Ma-FSA-SDE
Responsible lecturer	Prof. Dr.-Ing. Wolfgang Lehner wolfgang.lehner@tu-dresden.de
Qualification objectives	Students are familiar with advanced concepts of the analysis of large data sets in the field of data science. In addition, they know the entire process from the acquisition to the evaluation of data stocks using suitable concepts and tools. They have knowledge of the individual steps for data extraction, inspection (data profiling), data scrubbing, modelling necessary for analytical environments (data warehousing, data lakes) and finally the classes of analytical methods to achieve the qualification goals. Students are able to assess the complexity of data analysis and select appropriate methodological as well as technical solutions and evaluate their advantages and disadvantages. You know the practical handling of individual tools for the different process steps.
contents	The content of the module is the entire process of data analysis from the collection of extensive data sets to the discussion of individual analysis methods, such as data profiling, schema discovery, data quality assessment and modelling alternatives for analytical access patterns. Further contents are systematic analysis algorithms from different process classes with regard to the satisfaction of the information needs of the user and the system technical effects.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ba-DMF Data Management Foundations module are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled,

	has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.
Accompanying literature	http://www.sde.db-tu-dresden.de

Module name	**Scalable Data Management**
Module number	INF-25-Ma-FSA-SDM
Responsible lecturer	Prof. Dr. Dirk Habich dirk.habich@tu-dresden.de
Qualification objectives	Students are familiar with advanced concepts of scalable database technology. You have knowledge of concepts for linking several computer nodes to a large database management system and thus the implementation techniques of distributed data management, especially with regard to scale-out architectures. They are familiar with different concepts, from close coupling via shared disk and shared nothing to synchronization of independent database systems via data propagation and data replication. Students are able to evaluate different scale-in techniques in terms of the resulting effort and benefits in terms of different usage requirements. They understand the characteristics of the different architectural approaches and can select them from the specific application according to the requirements.
contents	Contents of the module are concepts and methods of scalable database systems as a basic technique of analytical and transactional processing of usually large data sets. These include the two essential aspects of performance and consistency, each of which is related to each other. The property of performance focuses on scalability issues in the case of scale-out architectures. Other consistency-related content includes different methods for synchronizing concurrent read and write activities on replicated datasets.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the INF-25-Ba-DMF Data Management Foundations module are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory module in the Distributed Systems Engineering Track and a compulsory elective module in the Open Track in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 25 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.
Accompanying literature	http://www.sdm.db-tu-dresden.de

Module name	**Distributed Systems**
Module number	INF-25-Ma-FSA-DS
Responsible lecturer	Dr. Thomas Springer thomas.springer@tu-dresden.de
Qualification objectives	After completing the module, students will be familiar with the requirements and basic principles regarding the structure, structure and requirements of distributed systems. They are able to analyse and evaluate distributed applications. They also have a basic understanding of how to break down large monolithic applications into their individual parts in order to be able to design scaled, distributed systems.
contents	Contents of the module are various architectures and communication mechanisms of distributed systems as well as basics of distributed transactions, security aspects, name and directory services as well as current trends, standards and research topics in the context of distributed systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory module in the Distributed Systems Engineering Track and a compulsory elective module in the Open Track in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every winter semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Service and Cloud Computing**
Module number	INF-25-Ma-FSA-SCC
Responsible lecturer	Dr. Iris Braun iris.braun@tu-dresden.de
Qualification objectives	Students are familiar with the basics and challenges of service-oriented applications in distributed systems. They are able to apply this knowledge independently and transfer it to unknown problems by being able to design and implement service-oriented applications or architectures for distributed systems as well as to analyze, evaluate and optimize existing systems.
contents	Contents of the module are the basics and challenges of service-oriented applications or architectures of distributed systems, including, for example, the distribution of services, composition of distributed service-oriented applications, load distribution, redundancy and selected security aspects. The module includes solution concepts and technologies for the development of service-oriented architectures and applications for distributed systems, especially in the context of cloud computing.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-BS Operating Systems and INF-25-Ba-DMF Data Management Foundations.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**IoT Communication**
Module number	INF-25-Ma-FSA-IoT
Responsible lecturer	Prof. Dr. Matthias Wählisch matthias.waehlisch@tu-dresden.de
Qualification objectives	Students have a qualified understanding of designing, implementing and evaluating communication solutions for networks with resource-poor end devices. Students can apply the theoretical basic concepts in practice and are able to build and configure an IoT network in principle and develop applications for it.
contents	Contents of the module are basics and novel approaches for the communication between resource-weak devices and the Internet as well as the devices with each other. This includes network architectures, protocols, services, and applications. The focus is on open solutions and standards that allow global communication of a wide variety of network participants.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks and INF-25-Ba-SWT Software Technology are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been

	met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam of 90 minutes duration and an ungraded portfolio of 30 hours. The examination language of the portfolio and the exam paper can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Advanced Computer Networks**
Module number	INF-25-Ma-FSA-RNA
Responsible lecturer	Prof. Dr. Matthias Wählisch matthias.waehlisch@tu-dresden.de
Qualification objectives	Students know practical aspects of computer networks as well as the technologies, concepts and protocols necessary for operation, can analyze, plan and design networks themselves and have advanced knowledge in the field of network and Internet security.
contents	Contents of the module are various computer network protocols of all layers of the TCP/IP protocol stack, the architecture of the Internet, routing protocols as well as basics of network management, security, virtualized networks and networks for data centers or cloud infrastructures, current standards, their further development and practical developments from research.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites

	for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Wireless Sensor Networks**
Module number	INF-25-Ma-FSA-WSN
Responsible lecturer	Dr. Waltenegus Dargie waltenegus.dargie@tu-dresden.de
Qualification objectives	Students have a qualified understanding of the wireless sensors, the networks built with them, their architecture, protocols and common applications. They are able to evaluate existing sensor systems and build new sensor networks.
contents	Contents of the module are solutions for the collection, processing and communication of data by means of sensor nodes. This includes local system aspects, self-organization algorithms, communication methods, routing algorithms, localization techniques, and data storage mechanisms for wireless sensor networks.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Internet and Web Applications**
Module number	INF-25-Ma-FSA-IWA
Responsible lecturer	Prof. Dr. Matthias Wählisch matthias.waehlisch@tu-dresden.de
Qualification objectives	Students are familiar with the current state of the art in the field of Internet services and web applications, including the technologies underlying these systems. They are able to analyze or reconstruct scalable Internet services and web applications with regard to their technological composition and can independently design rough concepts for such software systems.
contents	The contents of the module include principles and functions of widely used, current and future technologies of the application level on the Internet, in particular fundamental foundations of used architectures, protocols and interaction mechanisms in the World Wide Web and their popular fields of application. In addition, the module includes systems that build on the principles of the World Wide Web and make the World Wide Web scalable and secure, as well as other services that target a large user base, such as chat systems and file sharing applications.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules Programming and RoboLab, Computer Networks and Software Technology are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected

	in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Resilient Systems**
Module number	INF-25-Ma-FSA-Res
Responsible lecturer	Prof. Dr. Florian Tschorsch florian.tschorsch@tu-dresden.de
Qualification objectives	Students are able to understand resilience as a system property and evaluate the mechanisms of action and are familiar with the principles and protocols of resilient systems, especially computer networks.
contents	Contents of the module are the resilience of networks and associated design principles such as distribution, redundancy, self-organization and decentralization as well as the consequences of these principles with regard to other system characteristics such as fairness, robustness, scalability and security. In particular, the challenges and design of peer-to-peer architectures are included and serve to illustrate the general design principles of resilient systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures as well as INF-25-Ba-RN Computer Networks are required. The Master's programme in Computer Science requires basic knowledge and skills in algorithms and data structures as well as distributed systems and computer networks at bachelor's level.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration and an ungraded complex performance of 60 hours. The examination language of the oral examination

	performance and the complex performance can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Advanced Operating Systems**
Module number	INF-25-Ma-FSA-AOS
Responsible lecturer	Prof. Dr. Horst Schirmeier horst.schirmeier@tu-dresden.de
Qualification objectives	Students are able to design scalable and efficient system software on modern multiprocessor architectures and distributed systems and understand functional and non-functional properties of such systems.
contents	Contents of the module are basics from the operating system area, such as synchronization, security and virtualization as well as topics such as scalability, fault tolerance, trusted computing, real-time coding, mobile operating systems or cloud computing. Further contents include practical systems and their design principles as well as current research approaches and trends.
Forms of teaching and learning	The module includes lectures in the amount of 3 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems, INF-25-Ba-RA Computer Architecture and Hardware Laboratory, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-SWWTP Software Technology Project.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory module in the Distributed Systems Engineering Track and, in the Open Track, a compulsory elective module in the field of Systems Architecture as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every summer semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Operating system construction**
Module number	INF-25-Ma-FSA-OSC
Responsible lecturer	Prof. Dr. Horst Schirmeier horst.schirmeier@tu-dresden.de
Qualification objectives	Students are able to design, develop and debug system software directly on the hardware. They know the effect on non-functional, emergent properties, such as interrupt latencies, and can make design decisions that have a direct impact on the potential applications of the system.
contents	Contents of the module are conceptual basics and central techniques for the construction of an operating system and its practical application, through the development of a simple PC operating system. This includes the structure and functionality of the PC hardware contents of the module, for example the protection concept of the x86-64 architecture, current PC bus systems and modern multiprocessor interrupt systems as well as the basics of the operating system area such as interruptions, synchronization and scheduling.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 4 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-RN computer networks, INF-25-Ba-BS operating systems, INF-25-Ba-RA computer architecture and hardware laboratory, INF-25-Ba-SWT software technology, INF-25-Ba-DMF data management foundations and INF-25-Ba-SWWTP software technology project are required. In the Bachelor's program Applied Informatics in the specialization Medical Informatics, the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems, INF-25-Ba-SWT Software Technology, INF-25-Ba-PMZ-DBE Database Engineering and INF-25-Ba-SWWTP Software Technology Project are required. In the Bachelor's program Applied Computer Science in the specialization Media Informatics, the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-SWWTP Software Technology Project are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer

	Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Microkernel Construction**
Module number	INF-25-Ma-FSA-MKC
Responsible lecturer	Prof. Dr. Horst Schirmeier horst.schirmeier@tu-dresden.de
Qualification objectives	Students are able to design, implement and evaluate micronuclei in terms of functional and non-functional properties.
contents	Contents of the module are various aspects and concepts in the design and implementation of micronuclei. Further contents include a general introduction to micronucleus-based operating systems, the basic design principles for micronuclei, the micronuclei developed at TU Dresden, several case studies of other micronuclei and their different design decisions.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems, INF-25-Ba-RA Computer Architecture and Hardware Laboratory, INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every summer semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Scheduling theory**
Module number	INF-25-Ma-FSA-STH
Responsible lecturer	Prof. Dr. Horst Schirmeier horst.schirmeier@tu-dresden.de
Qualification objectives	Students are familiar with the mathematical modeling of real-time systems with periodic and non-periodic tasks. You can model these with tools such as queue theory, job networks and resource servers to prove the schedulability of task sets and the optimality of algorithms with regard to schedulability, as well as to make statements on the suitability for concrete application scenarios.
contents	Contents of the module are mathematical foundations of real-time systems, techniques for their analysis and evidence of central properties. These include classical scheduling theory with deterministic and probabilistic models as well as real-time systems with a focus on periodic task sets.
Forms of teaching and learning	The module includes 2 SWS lectures and self-study. The language of instruction of the lectures is German.
Prerequisites for participation	The competencies to be acquired in the module INF-25-Ba-BS Operating Systems are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language is German.
Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 90 hours.

Duration of the module	The module covers one semester.

Module name	**Real-Time Systems**
Module number	INF-25-Ma-FSA-RTS
Responsible lecturer	Dr. Michael Roitzsch michael.roitzsch@tu-dresden.de
Qualification objectives	Students are able to analyze requirements of real-time systems. You can model and design time- and event-driven real-time systems using domain-specific modeling concepts, scheduling algorithms and operating systems. They can understand functional and non-functional properties of such systems.
contents	Contents of the module are conceptual foundations of real-time systems, central techniques for their implementation, basic modeling techniques for real-time systems, the differentiation between time- and event-controlled real-time systems and associated scheduling algorithms, real-time communication, real-time hardware, real-time operating systems, synchronization methods and the consideration of multiprocessor systems.
Forms of teaching and learning	The module includes lectures in the amount of 1 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems and INF-25-Ba-RA Computer Architecture are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	3 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 90 hours.
Duration of the module	The module covers one semester.

Module name	**Microkernel-Based Operating Systems**
Module number	INF-25-Ma-FSA-MOS
Responsible lecturer	Prof. Dr. Horst Schirmeier horst.schirmeier@tu-dresden.de
Qualification objectives	Students are able to design, implement and evaluate micronucleus-based operating systems in terms of functional and non-functional characteristics.
contents	Contents of the module are various aspects and concepts in the design and implementation of micronucleus-based operating systems. This includes both basic design principles and real systems, in particular the micronucleus work at TU Dresden. Further contents are the examination of research papers from the micronucleus area and the implementation of components of a micronucleus-based operating system and application software based on them.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 4 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-BS Operating Systems, INF-25-Ba-RA Computer Architecture and Hardware Laboratory, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-SWWTP Software Technology Project.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	9 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 270 hours.
Duration of the module	The module covers one semester.

Module name	**Engineering Adaptive Mobile Applications**
Module number	INF-25-Ma-FSA-EAMA
Responsible lecturer	Dr. Thomas Springer thomas.springer@tu-dresden.de
Qualification objectives	After completing the module, students will be familiar with the challenges of context-sensitive applications for mobile ubiquitous systems as well as adaptation mechanisms for such applications. In addition, they are able to apply and transfer this knowledge independently by being able to design and implement adaptive applications for mobile and ubiquitous systems, as well as to evaluate and improve existing systems.
contents	Contents of the module are the basic challenges of mobile, ubiquitous applications, including, for example, the problems of context sensitivity or platform independence. Furthermore, the module includes solution concepts and technologies for the development of applications for mobile and ubiquitous infrastructures.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Internet Measurements**
Module number	INF-25-Ma-FSA-IM
Responsible lecturer	Prof. Dr. Matthias Wählisch matthias.waehlisch@tu-dresden.de
Qualification objectives	Students are familiar with practice-relevant methods for measuring and evaluating globally distributed communication infrastructures, services and applications offered and used by different parties. They know the technologies, concepts and protocols necessary for operation, can design measurements and experiments and analyze networks. They are able to identify the associated challenges, have basic knowledge in the field of network and Internet security and are able to efficiently evaluate large data sets.
contents	The content of the module is the construction of the Internet inside and the dissemination of the services and applications based on it. The focus is on measurement methods based on current research results in order to better understand the typical implementation of current communication standards and their further development on the global Internet. Furthermore, there are concrete examples of the dissemination of traditional and novel network protocols, for example BGP, IPv6, DNSSEC and QUIC, whose quantification and limits include.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-Si Security, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence are required.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen

	in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of an ungraded complex performance of 45 hours and a exam work of 90 minutes duration. Bonus service for exam work is the solving of internship tasks in the amount of 15 hours. The examination language of the complex performance and the exam paper can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Prediction and Estimation Techniques**
Module number	INF-25-Ma-FSA-PET
Responsible lecturer	Dr. Waltenegus Dargie waltenegus.dargie@tu-dresden.de
Qualification objectives	Students are familiar with probabilistic prediction and estimation techniques. They are able to apply and evaluate these in the context of distributed dynamic adaptive systems.
contents	Contents of the module are the basics of probabilistic prediction and estimation techniques, including the introduction and combination of random variables, the minimization of uncertainty, as well as the concept of minimum mean square estimation.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Decentralized Systems**
Module number	INF-25a-Ma-FSA-Dec
Responsible lecturer	Prof. Dr. Florian Tschorsch florian.tschorsch@tu-dresden.de
Qualification objectives	Students are able to evaluate the functioning and use of decentralized approaches in various application areas.
contents	The content of the module is a comprehensive overview of decentralized systems and their design space. The focus is on the basic concepts, principles and applications of decentralized systems as well as the associated challenges and innovations. This includes protocols, algorithms and incentive systems for the fault-tolerant and secure functioning of distributed systems, in particular the design principles of blockchain technologies, as well as system features such as decentralization, openness and distributed trust.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the Lectures and exercises are in English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures as well as INF-25-Ba-RN Computer Networks are required. The Master's programme in Computer Science requires basic knowledge of algorithms and data structures, distributed systems and computer networks at bachelor's level.
usability	In the computer science diploma course in the main course, the module is a compulsory elective module in the field of systems architecture, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Systems Architecture and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and an ungraded complex performance of 60 hours. The examination language of the exam paper and the Complex performance is English.

Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Area of Specialization Cyber Physical Systems

Module name	**Foundations of Cyber Physical Systems**
Module number	INF-25-Ma-FCP-CPS
Responsible lecturer	Prof. Dr. Christoph Sommer christoph.sommer@tu-dresden.de
Qualification objectives	Students will be familiar with the basics of designing specification, implementation, and simulative performance evaluation of networked cyber physical systems. They are able to model, design and implement simple cyber physical systems and to design, carry out and evaluate studies on their use.
contents	Contents of the module are Cyber Physical Systems and methods for their specification, implementation and simulative performance evaluation as well as requirements and solutions for applications of Cyber Physical Systems in different domains.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The computer science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of object-oriented programming at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning

	of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Industrial Communications**
Module number	INF-25-Ma-FCP-IC
Responsible lecturer	Prof. Dr. Martin Wollschlaeger martin.wollschlaeger@tu-dresden.de
Qualification objectives	Students are familiar with the basic architectures and operating principles of communication systems for use in industrial automation. They are able to derive typical requirements for the use of such systems in complex networked production systems, evaluate specific industrial solutions and select suitable solutions. Students can transfer the characteristics of industrial communication to novel application systems, apply them in an integrated manner and develop components of such systems independently.
contents	Contents of the module are networked systems in industrial real-time applications as well as the basics of communication, requirements for real-time, robustness and availability of such systems. Further contents are concrete industrial solutions based on fieldbuses and Industrial Ethernet and the evaluation of their properties as well as developments and trends for novel systems and the practical investigation of selected solutions.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ma-FCP-CPS Foundations of Cyber Physical Systems, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language

	can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Cooperative Mobile Systems**
Module number	INF-25-Ma-FCP-CMS
Responsible lecturer	Prof. Dr. Christoph Sommer christoph.sommer@tu-dresden.de
Qualification objectives	The students are familiar with concepts and concrete designs of cooperative highly mobile systems. They are able to design such systems and evaluate their performance.
contents	Contents of the module are concepts, concrete designs and methods for the evaluation of cooperative highly mobile systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, skills in object-oriented programming at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Cyber Physical Systems and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Cyber Physical Systems Modeling Lab**
Module number	INF-25-Ma-FCP-CPSM.Lab1
Responsible lecturer	Prof. Dr. Christoph Sommer christoph.sommer@tu-dresden.de
Qualification objectives	Students are able to work on simple research-related issues in the field of cyber physical systems in a structured and scientific manner under guidance.
contents	The content of the module is the practical development of results of simple, coherent, research-oriented projects in the field of cyber physical systems and their preparation.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, skills in object-oriented programming at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.

workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Vehicular Networking**
Module number	INF-25-Ma-FCP-C2X
Responsible lecturer	Prof. Dr. Christoph Sommer christoph.sommer@tu-dresden.de
Qualification objectives	The students are familiar with concepts and concrete designs of vehicle networks. They are able to design vehicle networks and evaluate their performance and characteristics.
contents	Contents of the module are concepts, concrete designs and methods for the evaluation of networks in and out of vehicles.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, modules INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, skills in object-oriented programming at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Cyber Physical Systems and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Model-Driven Automation**
Module number	INF-25-Ma-FCP-MA
Responsible lecturer	Prof. Dr. Martin Wollschlaeger martin.wollschlaeger@tu-dresden.de
Qualification objectives	Students are familiar with the basic structure and information models of Cyber Physical Systems (CPS) in industrial applications. They are able to apply and link these models to describe complex CPS-based production systems and to independently develop components of such systems. Students can transfer the models and their elements to similar fields of application.
contents	Contents of the module are methods for modeling cyber physical systems in industrial automation. These concern process, functional, component and information models of industrial practice for modelling CPS. Further contents are multi-model concepts and the generation of applications as well as tool chains and domain-specific description languages.
Forms of teaching and learning	The module includes lectures in the amount of 3 SWS, exercises in the amount of 1 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ma-FCP-CPS Foundations of Cyber Physical Systems, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module exam-

points	ination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Cyber Physical Systems Modeling Lab Advanced**
Module number	INF-25-Ma-FCP-CPSM.Lab2
Responsible lecturer	Prof. Dr. Christoph Sommer christoph.sommer@tu-dresden.de
Qualification objectives	Students are able to work on research-related issues in the field of cyber physical systems in a structured and scientific manner under guidance.
contents	The content of the module is the practical development of results of advanced, coherent, research-oriented projects in the field of cyber physical systems and their preparation.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the module INF-25-Ma-FCP-CPSM.Lab1 Cyber Physical Systems Modeling Lab are required. In the Master's programme in Computer Science, competences in the processing of simple research-related projects at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 180 hours.
Duration of the	The module covers one semester.

module	

Module name	**Industrial Internet of Things**
Module number	INF-25-Ma-FCP-IIoT
Responsible lecturer	Prof. Dr. Martin Wollschlaeger martin.wollschlaeger@tu-dresden.de
Qualification objectives	Students will be familiar with the fundamental architectures, technologies and principles of the Internet of Things for industrial automation applications. They are able to derive typical requirements for the use of such systems in complex networked production systems, select suitable technologies and design application-specific solutions. Students can transfer the characteristics of the Industrial Internet of Things to new application systems, apply them in an integrated way and develop components of such systems independently.
contents	Contents of the module are architectural concepts and technologies of the Internet of Things with a focus on industrial applications. This includes requirements from the application domain and the evaluation of technologies and solutions for networking and application. Further contents are the design of suitable software components for industrial use as well as developments and trends for novel systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, internships in the amount of 2 SWS and self-study. The teaching language of the lectures and the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science, the bachelor program Computer Science and the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence are required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The

	module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Engineering and Management of Industrial Networks**
Module number	INF-25-Ma-FCP-EMIN
Responsible lecturer	Prof. Dr. Martin Wollschlaeger martin.wollschlaeger@tu-dresden.de
Qualification objectives	Students are familiar with the basic functions, processes, architectures and principles of action for designing, monitoring and influencing industrial communication systems. You can describe and classify the functions. They are able to model the relevant elements of the systems and components appropriately. Students can transfer the functions and processes to new application systems and apply them in an integrated manner.
contents	Contents of the module are networked systems in industrial real-time applications, methods for their design and management, requirements of the field of application and mirroring of existing solutions from both the IT domain and automation. Further contents are description tools and tools as well as developments and trends for new systems.
Forms of teaching and learning	The module includes lectures in the amount of 3 SWS, exercises in the amount of 1 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language

	can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Industrial Cyber Physical Systems Lab**
Module number	INF-25-Ma-FCP-ICPS.Lab
Responsible lecturer	Prof. Dr. Martin Wollschlaeger martin.wollschlaeger@tu-dresden.de
Qualification objectives	Students are familiar with the requirements and application aspects of cyber physical systems in industrial applications and are able to work on simple research-related questions from this area in a structured and scientific manner under guidance.
contents	The content of the module is the practical development of results of simple, coherent, research-oriented projects from the context of use of Cyber Physical Systems in industrial applications and their preparation.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-RN Computer Networks, INF-25-Ba-SWT Software Technology, INF-25-Ba-DMF Data Management Foundations, INF-25-Ba-SWWTP Software Technology Project and INF-25-Ba-KI Artificial Intelligence. In the Master's programme in Computer Science, knowledge of object-oriented programming at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Cyber Physical Systems, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Cyber Physical Systems as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme Media Informatics, the module is a compulsory elective module in the field of supplementary modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Area of Specialization Visual Computing and Machine Learning

Module name	**Foundations of Computer Graphics**
Module number	INF-25-Ma-FVC-FCG
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students know the components of a graphical application and can design new graphical applications based on requirements. You can apply and analyze the basics of computer graphics in solving graphical problems. You have an overview of the sub-areas modeling, rendering and animation and can establish links between the areas and work on cross-area problems. In addition, they can propose suitable geometric representations for a problem and reproduce, implement and analyze basic algorithms of geometric modeling. They know the stages of the rendering pipeline and can describe the underlying techniques. You can play back the idea of raytracing and have a detailed idea of how to implement a raytracer. They know basic animation techniques, can reproduce the mathematical backgrounds and describe how to enrich a graphical application with animations.
contents	Contents of the module are the handling of vectors and transformations, color perception and color spaces as well as the construction of graphics systems, modeling such as parametric curves and surfaces, basic modeling techniques and polygonal networks as well as the representation with the rendering pipeline, the basic lighting calculation, texturing and the ray tracing process. Further contents in connection with animation are approaches based on keyframes, particle systems and morphing as well as the basics for the use of acceleration data structures.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Prg Programming and RoboLab as well as INF-25-Ba-SWT Software Technology are required. In the Master's programme in Computer Science, competences in vector spaces and matrices as well as in imperative programming at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the

	annex to the examination regulations. In the Bachelor's programme Applied Computer Science, the module is a compulsory module in the specialisation in Media Informatics. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. Bonus service for exam work is the solving of exercise tasks in the amount of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.
Accompanying literature	Fundamentals of computer graphics, P. Shirley, M. Ashikhmin, S. Marschner. AK Peters/CRC Press, 2009.

Module name	**Foundations of Data Visualisation**
Module number	INF-25-Ma-FVC-FDV
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students master the basics and practices of scientific visualization of measurement and experiment data as well as simulation results. They know the basics of visual perception and its influence on the design of visualizations. Students can safely specify data by dimension, feature types, and structure, and select visual attributes suitable for a given specification. They know the most important forms of visualization for two-, three- and multidimensional observation spaces as well as for scalar, vectorial, tensor-valued and multidimensional characteristics. You are able to select suitable techniques for the respective visualization task. Students are familiar with basic presentation and interaction techniques and can fundamentally implement them in an interactive visual analysis system. They know the most important visualization frameworks, have practical experience and are able to select visualization frameworks appropriately.
contents	Contents of the module are the basics of data visualization, with regard to the mapping of data of different types to visual attributes and the insights about the visual perception of humans.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-AuD Algorithms and Data Structures as well as INF-25-Ba-Ma1 Linear Algebra and Analysis are required. The Master's programme in Computer Science requires knowledge of sequential computer programming, algorithms and data structures, analysis of functions of one and several variables, basic techniques of data analysis as well as linear algebra, in particular vector and matrices calculation at bachelor's level.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement,

	which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Machine Learning**
Module number	INF-25-Ma-FVC-ML
Responsible lecturer	Prof. Dr. Bjoern Andres bjoern.andres@tu-dresden.de
Qualification objectives	Students know the problems of supervised, semi-supervised, unsupervised and structural machine learning in their formulation as mathematical optimization problems. They understand the complexity of these problems and are able to prove the complexity themselves by means of theoretical computer science. They know efficient local search algorithms for learning decision trees, for logistic regression, for correlation clustering, for linear ordering as well as for inference and learning in graphical models with factor graphs and are able to implement and apply these algorithms themselves. They know the structure of simple artificial neural networks as well as the forward and backward propagation algorithm and are able to implement and apply these algorithms themselves. You can present technical results in English.
contents	Contents of the module are supervised machine learning as optimization problem, regularized risk minimization, learning of decision trees, logistic regression, neural networks and basics of supervised deep learning, forward propagation and backward propagation algorithm, semi-supervised and unsupervised machine learning as optimization problem, classification with more than two classes, correlation clustering, linear ordering, structural machine learning as optimization problem, graphical models, factor graphs, gibbs distribution and message-passing algorithms.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS, projects in the amount of 20 hours and self-study. The language of instruction for lectures, exercises and projects is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-Ma1 Linear Algebra and Analysis as well as INF-25-Ba-Ma4 Probability Theory and Statistics. The Master's programme in Computer Science requires knowledge of algorithms and data structures, fundamentals of theoretical computer science, analysis of univariate functions and multivariate functions, linear algebra, probability calculation and statistics at bachelor's level. The following literature is suitable for preparation: 1. Algorithms and Data Structures, Kurt Mehlhorn, Peter Sanders. Springer Berlin Heidelberg, 2008. ISBN: 978-3-540-77977-3. DOI: 10.1007/978-3-540-77978-0, 2. Analysis 1, Konrad Königsberger. Springer Berlin Heidelberg, 2004. ISBN: 978-3-540-40371-5. DOI: 10.1007/978-3-642-18490-1, 3. Analysis 2, Konrad Königsberger. Springer Berlin Heidelberg, 2013. ISBN: 978-3-662-05699-8. DOI: 10.1007/978-3-662-05699-8, 4. Linear algebra, Gerd Fischer. Springer Spektrum Wiesbaden, 2014. ISBN: 978-3-658-03945-5. DOI 10.1007/978-3-658-03945-5,

	5. Introduction to Probability Theory and Statistics, Ulrich Krengel. Vieweg+Teubner Wiesbaden, 2013. ISBN: 978-3-322-93581-6. DOI: 10.1007/978-3-322-93581-6, 6. Theoretical computer science, Lutz Priese, Katrin Erk. Springer Vieweg Berlin Heidelberg, 2018. ISBN: 978-3-662-57408-9. DOI: 10.1007/978-3-662-57409-6.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Computer Vision**
Module number	INF-25-Ma-FVC-CV
Responsible lecturer	Prof. Dr. Bjoern Andres bjoern.andres@tu-dresden.de
Qualification objectives	Students are familiar with elementary linear and nonlinear operators of image analysis and are able to implement and apply them. They understand the problems of image classification, image segmentation, object recognition and object tracking in their mathematical formulation. They know local search algorithms for these problems and are able to implement them and apply them to image data. Students know and understand the mathematical concept of the artificial neural network as well as the folding network. They know and understand the forward and backward propagation algorithm for machine learning of deep artificial neural networks and are able to apply these algorithms to the problem of image classification. You can present technical results in English.
contents	Contents of the module are color spaces, elementary linear and non-linear operators of image analysis, the problem of image classification, artificial neural networks, folding networks, the forward and backward propagation algorithm, image segmentation as optimization problem, local search algorithms for image segmentation, object recognition as optimization problem, local search algorithms for object recognition, object tracking as optimization problem as well as local search algorithms for object tracking.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS, projects in the amount of 20 hours and self-study. The language of instruction for lectures, exercises and projects is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-Ma1 Linear Algebra and Analysis as well as INF-25-Ba-Ma4 Probability Theory and Statistics. The Master's programme in Computer Science requires knowledge of algorithms and data structures, analysis of univariate functions and multivariate functions, linear algebra, probability calculation and statistics at bachelor's level. The following literature is suitable for preparation: 1. Algorithms and Data Structures, Kurt Mehlhorn, Peter Sanders. Springer Berlin Heidelberg, 2008. ISBN: 978-3-540-77977-3. DOI: 10.1007/978-3-540-77978-0, 2. Analysis 1, Konrad Königsberger. Springer Berlin Heidelberg, 2004. ISBN: 978-3-540-40371-5. DOI: 10.1007/978-3-642-18490-1, 3. Analysis 2, Konrad Königsberger. Springer Berlin Heidelberg, 2013. ISBN: 978-3-662-05699-8. DOI: 10.1007/978-3-662-05699-8, Linear algebra, Gerd Fischer. Springer Spektrum Wiesbaden, 2014. ISBN: 978-3-658-03945-5. DOI 10.1007/978-3-658-03945-5, 4. Introduction to Probability Theory and Statistics, Ulrich Krengel. Vieweg+Teubner Wiesbaden, 2013. ISBN: 978-3-322-93581-6. DOI: 10.1007/978-3-322-93581-6.

usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Large Language Models**
Module number	INF-25a-Ma-FTK-LLM
Responsible lecturer	Prof. Dr. Simon Razniewski simon.razniewski@tu-dresden.de
Qualification objectives	Students have basic knowledge of building, training and applying large language models. They master methods for the development, analysis and evaluation of such models and understand the theoretical, empirical and ethical foundations. They are able to use and critically reflect on large language models in various application contexts.
contents	Contents of the module are architecture, training methods and applications of large language models, including transformer models, pretraining and finetuning, prompting techniques, evaluation methods, security and ethical issues, as well as the use and analysis of large language models in various fields of application of natural language processing.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The degree program in Computer Science requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Ma4 Probability Theory and Statistics, INF-25-Ba-DMF Data Management Foundations, and INF-25-Ba-KI Artificial Intelligence.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning and the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. Bonus service for the exam work is a project work of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every winter semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Robot Learning**
Module number	INF-25-Ma-FVC-RL
Responsible lecturer	Prof. Dr. Roberto Calandra roberto.calandra@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of machine learning methods in the field of robotics and are able to independently apply machine learning methods in the field of robotics. They can describe problems of machine learning in the field of robotics mathematically, implement algorithms to solve these problems themselves and empirically quantitatively investigate the application of these algorithms in the context of concrete applications.
contents	Contents of the module are the basics of classical control theory, methods of machine learning in the field of robotics, such as optimization, supervised learning for robotics and reinforcement learning, as well as problems and applications of methods of machine learning in the field of robotics, such as navigation, manipulation, locomotion and multi-agent systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Touch Sensing and Processing**
Module number	INF-25-Ma-FVC-TSP
Responsible lecturer	Prof. Dr. Roberto Calandra roberto.calandra@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of touch sensing and touch processing techniques. You can implement these techniques algorithmically on your own. They can apply these algorithms in practice, on concrete touch-sensing hardware as well as on concrete problems and are able to empirically quantitatively examine the algorithms in relation to the application.
contents	Contents of the module are basics of the psychology of the sense of touch, touch sensing hardware, simulation of the key, touch sensing, touch processing, touch-based control, applications of touch sensing, touch processing and touch-based control.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a portfolio of 10 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every winter semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Geometric Modelling and Animation**
Module number	INF-25-Ma-FVC-GMA
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students know what hardware and algorithms are needed to create an animated digital image of a human character. They know surface representations and know the basic algorithms to evaluate and represent these surface representations. You can assess which 3D scanning technology is best suited for which application. They know the algorithms needed to create surface models from 3D scans. They know the mathematical representations for rigid body transformations and can use them for the articulation of 3D models. They know character animation techniques and how to turn a simulated surface into a character animation.
contents	Contents of the module are the surface representations with point-based, implicit and subdivision-based representations, 3D scans with the discussion of scanning methods and scanning processing algorithms, skeleton-based object representations with mathematical representations for rigid body transformations, representations for articulated objects, basics of inverse kinematics as well as algorithms for the extraction of skeletal representations. Other content includes character animation of various techniques for the representation and animation of virtual people.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma programme and the computer science master's programme, the competencies to be acquired in the Foundations of Computer Graphics module are required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. Bonus service for

points	exam work is the solving of exercise tasks in the amount of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Interactive Information Visualisation**
Module number	INF-25-Ma-FVC-IIV
Responsible lecturer	Prof. Dr. Raimund Dachselt raimund.dachselt@tu-dresden.de
Qualification objectives	Students possess ready-to-use knowledge in the field of interactive information and data visualization and master techniques and basic principles related to modern computer environments. They can evaluate existing information visualization solutions and are able to select or develop appropriate visualization and interaction techniques depending on tasks and users. Students can apply modern information visualization techniques and implement various concrete interactive visualization techniques based on the current state of research.
contents	Contents of the module are advanced techniques of information visualization and essential concepts of interactive visualization of multivariate data as well as networks and hierarchies. The focus is on concepts for the exploration and analysis of large data and information spaces, coordinated visualization views, zoomable user interfaces, focus-and-context techniques and magical lenses. Other content includes modern visualization environments with very large and very small displays as well as their combination, mobile devices, immersive mixed reality solutions and physical data representations.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ma-FVC-FDV Foundations of Data Visualisation, INF-25-Ba-MCI Fundamentals of Human-Computer Interaction and INF-25-Ba-DMF Data Management Foundations are required. The Master's programme in Computer Science requires the competencies to be acquired in the module INF-25-Ma-FVC-FDV Foundations of Data Visualisation.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according

	to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Scientific Visualisation**
Module number	INF-25-Ma-FVC-SciVis
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students are familiar with the basics of stereo-based visualization, particle, terrain and volume visualization. They understand how different features are mapped to visual attributes. They know the necessary hardware and the required data structures and algorithms. In particular, you know the rendering approaches that enable interactive visualization of large data sets. You know how to implement hierarchical and batch-based structuring.
contents	Contents of the module are the application areas stereoscopy, particle visualization, terrain and volume visualization. In the field of application of stereoscopy are perception, display technology and rendering and in the field of application of particle visualization data sets, glyph-based visualization and efficient display algorithms are included. Further contents in the field of terrain visualization are the terrain models, data structures and efficient display algorithms and in the field of volume visualization the volume rendering integral, lighting models, advanced transfer functions design as well as display algorithms for different volumes representations.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ma-FVC-FCG Foundations of Computer Graphics, INF-25-Ma-FVC-FDV Foundations of Data Visualisation, INF-25-Ba-Prg Programming and RoboLab. In the Master's programme in Computer Science, competences in the field of programming at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. Bonus service for exam work is the solving of exercise tasks in the amount of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Creative Computing**
Module number	INF-25-Ma-FVC-CC
Responsible lecturer	Jun Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to put software into practice in creative or artistic contexts. They know methods of software development and processes of creative exploration, iteration, reflection and exploration and can apply them.
contents	Contents of the module are computer-aided creations, creative workflows and design processes, artistic artifacts as well as the use of visual, acoustic, interactive and immersive technologies.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The INF-25-Ba-MCI Fundamentals of Human-Computer Interaction, INF-25-Ba-SWT Software Technology and INF-25-Ma-FVC-FCG Foundations of Computer Graphics are required for the diploma programme in Computer Science, the bachelor programme in Computer Science and the bachelor programme in Applied Computer Science.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Physics-based graphics**
Module number	INF-25-Ma-FVC-PBG
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students have an overview of the use of physics in computer graphics. They know Newton's axioms and the most important laws of force. They can derive equations of motion and explain the rendering equation in various forms, including its components and contexts. You have mastered Monte Carlo and cache-based solution procedures, can implement them and analyze them in terms of runtime, errors and bias. In addition, they have knowledge of reflection and emission models as well as their suitability for approximating materials and light sources. They are familiar with the basics of physically based animation, as well as the numerical solution of ordinary differential equations and the simulation of particle-based phenomena in computer graphics. In addition, they are familiar with rigid body modeling and the treatment of collisions. In fluid simulation, they know the Navier-Stokes equation as well as efficient solutions for incompressible fluids, which are suitable for fast simulation.
contents	Contents of the module are physical fundamentals, such as the numerical solving of differential equations, global illumination and physically based simulation. Global lighting includes the rendering equation and models for surface representation and light sources, as well as stochastic and cache-based solutions for the rendering equation. In the physically based simulation, simulation techniques for rigid bodies including collision treatment as well as selected topics from the knowledge areas fluid simulation, clothing simulation and soft body simulation are included in the module.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree programme, the competencies to be acquired in the module INF-25-Ma-FVC-FCG Foundations of Computer Graphics are required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module

	from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. Bonus service for oral examination performance is the solving of exercise tasks in the amount of 15 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Foundations of Virtual Reality**
Module number	INF-25-Ma-FVC-FVR
Responsible lecturer	Jun Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students know the basics of virtual reality and immersive media technologies. This includes knowledge of the perceptual and psychological foundations of immersive media and a basic understanding of the technical challenges involved in developing immersive systems and experiences.
contents	Contents of the module are definitions and the history of immersive media and related concepts, basics of visual, acoustic, haptic and multisensory perception, head tracking and head-mounted displays, 3D tracking, spatial audio and haptic interfaces, embodiment, social presence, software architectures and world models for immersive simulations.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, the bachelor program Computer Science and the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-MCI Fundamentals of Human-Computer Interaction and INF-25-Ba-SWT Software Technology are required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 120 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Computer- and Robot-Assisted Surgery Lab**
Module number	INF-25-Ma-FVC-CRC.Lab
Responsible lecturer	Prof. Dr. Stefanie Speidel stefanie.speidel@nct-dresden.de
Qualification objectives	Students are able to describe fundamental problems of robot-assisted surgery. You can develop the basic theoretical concepts and apply the acquired knowledge in a team. You have competences in communication, organisation and management.
contents	Contents of the module are current interdisciplinary research topics of robot-assisted surgery, in particular medical image analysis, segmentation, navigation and visualization with augmented reality in the context of computer-assisted assistance systems in robot-assisted surgery.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Computer Science degree program, the competencies to be acquired in the modules INF-25-Ba-Ma1 Linear Algebra and Analysis as well as INF-25-Ba-KI Artificial Intelligence are required.
usability	In the main course, the module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be used in the Master's program Computer Science are selected if this or a substantially identical module from a course of study with which the admission requirements according to § 3 the study regulations have been met, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Computer- and Robot-Assisted Surgery**
Module number	INF-25-Ma-FVC-CRC
Responsible lecturer	Prof. Dr. Stefanie Speidel stefanie.speidel@nct-dresden.de
Qualification objectives	Students master the methodological and practical basics of computer and robot-assisted surgery. They are able to apply the methods and work on new, interdisciplinary tasks, select suitable solution methods and develop new solution methods.
contents	Content of the module is computer- and robot-assisted surgery. It includes the basics of image acquisition, medical image processing and segmentation, registration, basics of robot and navigation systems, intraoperative support and augmented reality as well as insights into current research, clinical issues and application examples.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, the bachelor program Computer Science and the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-Ma1 Linear Algebra and Analysis are required. In the Master's programme in Computer Science, knowledge of mathematics at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Spatial Computing**
Module number	INF-25a-Ma-FVC-SC
Responsible lecturer	Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to design and implement spatial computer interfaces and applications. They know the algorithms, tools, and platforms needed to create spatial computer interfaces and applications.
contents	Contents of the module are the design and development of spatial interactive, immersive applications, interface design, visual and acoustic design, performance analysis, localization, tracking and mapping.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The INF-25-Ba-MCI Basics of Human-Computer Interaction, INF-25-Ba-SWT Software Technology, INF-25-Ba-KI Artificial Intelligence as well as INF-25-Ba-RN Computer Networks are required for the diploma program in Computer Science, the bachelor program in Computer Science and the bachelor program in Applied Computer Science.
usability	The module is a compulsory elective module in the field of Visual Computing and Machine Learning, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Deep Learning for Vision - Foundations and Applications**
Module number	INF-25-Ma-FVC-DLVFA
Responsible lecturer	Prof. Dr. Martin Weigert martin.weigert@tu-dresden.de
Qualification objectives	Students are familiar with modern deep learning architectures for vision such as CNN and Vision Transformer and understand their methodological foundations, in particular folding, attention and the optimization of deep networks. They are familiar with scientific applications such as object recognition, segmentation and generative image modeling and are able to implement deep learning models, train and adapt pre-trained models to apply modern methods specifically to their own image processing problems.
contents	Contents of the module are basic concepts of deep learning for image data, including fundamental architectures such as CNN and Vision Transformer, basic problem classes such as segmentation, object recognition, image restoration and generative modeling, as well as training paradigms such as supervised and self-supervised learning. In addition, there are practical methods for training and evaluation, such as optimization procedures, regularization, data augmentation, transfer learning and evaluation metrics. Further contents are multimodal models, applications in various scientific disciplines and their practical implementation.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	Basic knowledge of Linear Algebra, Analysis, Probability, Computer Programming, preferably Python and Machine Learning at Bachelor's level is required.
usability	The module is part of the diploma program Computer Science in the main course of study Compulsory elective module in the field of Visual Computing and Machine Learning, which is to be selected in accordance with Annex 2 to the Examination Regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The

	module creates the prerequisites for the modules that it designates under prerequisites for participation
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Area of Specialization Human-Computer Interaction and Interactive Media

Module name	**User Interface Engineering**
Module number	INF-25-Ma-FHI-UIE
Responsible lecturer	Prof. Dr. Raimund Dachselt raimund.dachselt@tu-dresden.de
Qualification objectives	Students are familiar with the requirements and techniques for the development of novel, natural user interfaces. In particular, they master the techniques of scenario-based and user experience design. Students are able to apply the concepts and techniques for the development of novel user interfaces in practice.
contents	Contents of the module are the development of novel, more natural user interfaces based on gesture or gaze control, for example, and the associated requirements, development processes and HCI techniques, with a focus on scenario-based design and user experience design. Further content includes engineering-centered approaches as well as creative design phases. These phases include the creation of sketches and early prototypes.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-MCI Fundamentals of Human-Computer Interaction are required.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have

	been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and a portfolio of 60 hours. Both examinations are pass-relevant. The examination language of the exam paper and the portfolio can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade results from the weighted average of the grades of the individual examination achievements. The exam work is weighted threefold and the portfolio twofold.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Advanced User Interfaces**
Module number	INF-25-Ma-FHI-AUI
Responsible lecturer	Prof. Dr. Raimund Dachselt raimund.dachselt@tu-dresden.de
Qualification objectives	Students have knowledge of basic hardware technologies, tracking methods, interaction principles, implementation possibilities and application examples for natural user interfaces. They are able to work scientifically in a promising field of human-computer interaction. Students can critically engage with the latest and most influential articles in the subject areas covered.
contents	Contents of the module are the development of so-called post-WIMP or natural user interfaces, which are based on experiences in dealing with the real world. The focus is on gestural and comprehensible application control, interactive interfaces and mixed reality environments. Other contents include technologies and interaction principles of various operating modalities, including multi-touch, free-hand gestures, pen interaction and eye control, each with reference to international research work.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, seminars in the amount of 2 SWS and self-study. The language of instruction of the lectures and seminars is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-MCI Fundamentals of Human-Computer Interaction are required.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and a portfolio of 60 hours. Both examinations are pass-relevant. The examination language of the exam paper and the portfolio can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade results from the weighted average of the grades of the individual examination achievements. The exam work is weighted threefold and the portfolio twofold.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**OUTPUT.DD Live**
Module number	INF-25-Ma-FHI-OUT.Lab
Responsible lecturer	Jun Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to hold a trade fair. You are proficient in the practical organization of a trade fair and can implement visual information control systems in practice.
contents	Contents of the module are extended event planning and execution, event management, short-term advertising of the event through actions and on social media, information systems and information control systems.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The language of instruction of the internships is German.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-MCI Fundamentals of Human-Computer Interaction are required.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Interactive Multimedia Information Retrieval**
Module number	INF-25-Ma-FHI-IMIR
Responsible lecturer	Dr Annett Mitschick annett.mitschick@tu-dresden.de
Qualification objectives	Students have ready-to-use knowledge in the field of interactive retrieval and content-based exploration of multimedia data and documents. They know the essential methods and techniques of realizing demand-oriented and user-oriented search interfaces and are able to evaluate concrete interactive information retrieval systems and develop their own concepts.
contents	Contents of the module are the basics of information retrieval, methods and techniques for content-based search in multimedia, especially audiovisual data, as well as principles of feature extraction and metadata acquisition. Further contents are the basics of the design of needs-based and user-friendly search interfaces, taking into account findings from the Department of Information Seeking Behaviour.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The Computer Science degree program requires the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures, INF-25-Ba-Prg Programming and RoboLab, INF-25-Ba-SWT Software Technology and INF-25-Ba-DMF Data Management Foundations.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. In the Master's programme in Media Informatics, the module is a compulsory elective module in the field of advanced modules, which must be selected in accordance with § 27(3) of the Examination Regulations. The module cannot be selected in the Master's degree program Computer Science and in the Master's degree program Media Informatics if this or a substantially identical module from a degree program with which the admission requirements according to § 3 of the study regulations have been fulfilled, has already been completed. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the

	beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**OUTPUT.DD Workshop**
Module number	INF-25a-Ma-FHI-OUT.W
Responsible lecturer	Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to plan and prepare a trade fair. You have an overview of all the necessary trades and can implement interactive information systems in practice.
contents	Contents of the module are event planning and management, exhibition design, long-term advertising of the event through print media, conception and design of a social media campaign, planning, conception and implementation of an information control system.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The INF-25-Ba-MCI Fundamentals of Human-Computer Interaction as well as the INF-25-Ba-DMF Data Management Foundations are required for the diploma programme in Computer Science and the bachelor programme in Applied Computer Science.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. The module is a compulsory elective module in the Bachelor's programme Applied Computer Science in the specialisation in Media Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Philosophy and Computing**
Module number	INF-25a-Ma-FHI-PC
Responsible lecturer	Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are familiar with historical and contemporary philosophical topics of computer science from phenomenology to the philosophy of the mind to artificial intelligence and ethics. They understand the nature of philosophical discourse and its reasoning.
contents	Contents of the module are a philosophical discourse as well as historical and current questions of the philosophy of computing, simulation, perception, cognition and artificial intelligence.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, seminars in the amount of 2 SWS and self-study. The language of instruction of the lectures and seminars is English.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Art and Code**
Module number	INF-25-Ma-FHI-ART
Responsible lecturer	Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are familiar with the use of computer technologies in historical and contemporary art. They understand the different roles that computers can play in artistic and creative contexts and are familiar with key contemporary technologies, algorithms and platforms. You have practical experience with creative computing.
contents	Contents of the module are the history and current landscape of computer science and art, an analysis of the different roles and manifestations of computer science in art, an overview of known and new techniques, algorithms and methods, software platforms and interface technologies as well as approaches to software development in the creative process.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Bachelor's program Computer Science and in the Bachelor's program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-MCI Fundamentals of Human-Computer Interaction, INF-25-Ba-SWT Software Technology and INF-25-Ma-FVC-FCG Foundations of Computer Graphics are required. In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-MCI Basics of Human-Computer Interaction and INF-25-Ba-SWT Software Technology are required. The Master's programme in Computer Science requires competences in the design and implementation of user interfaces as well as knowledge of their evaluation with regard to usability and accessibility, knowledge in object-oriented software development, in the application of object-oriented modeling and programming languages as well as knowledge of computer graphics at Bachelor's level.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination

	regulations. In the Bachelor's programme in Applied Computer Science, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Geoinformatics, which must be selected in accordance with Annex 2 to the Specific Examination Regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 90 hours. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Digital Design**
Module number	INF-25-Ma-FHI-DD
Responsible lecturer	Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to analyze a real problem and design and develop a practical solution using interactive, intelligent and immersive technologies.
contents	Contents of the module are the design and development of an interactive or immersive application in a practical context, the analysis of a real problem or a challenge posed by professionals from fields such as archaeology, architecture, physiotherapy or psychotherapy, museums and galleries, journalism or education, the design and development of a solution using interactive and immersive technologies, as well as the design analysis processes the development of immersive media software.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the Bachelor's program Computer Science and in the Bachelor's program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-MCI Fundamentals of Human-Computer Interaction, INF-25-Ba-SWT Software Technology and INF-25-Ma-FVC-FCG Foundations of Computer Graphics are required. In the Computer Science degree programme, the competencies to be acquired in the modules INF-25-Ba-MCI Basics of Human-Computer Interaction and INF-25-Ba-SWT Software Technology are required. The Master's programme in Computer Science requires competences in the design and implementation of user interfaces as well as knowledge of their evaluation with regard to usability and accessibility, knowledge in object-oriented software development, in the application of object-oriented modeling and programming languages as well as knowledge of computer graphics at Bachelor's level.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination

	regulations. In the Bachelor's programme in Applied Computer Science, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Geoinformatics, which must be selected in accordance with Annex 2 to the Specific Examination Regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Experiments in Immersive Media**
Module number	INF-25-Ma-FHI-XIM
Responsible lecturer	Jun Prof. Dr. Matthew McGinity matthew.mcginity@tu-dresden.de
Qualification objectives	Students are able to analyze experimental computer interfaces and technologies and understand the conceptual design of these. You can implement experimental demonstrators in practice.
contents	Contents of the module are experimental demonstrators using new interaction, sensor and display technologies, exploratory design and development processes as well as modern software platforms suitable for rapid prototyping of interactive systems.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The teaching language of the internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The INF-25-Ba-MCI Fundamentals of Human-Computer Interaction, INF-25-Ba-SWT Software Technology, INF-25-Ma-FVC-FCG Foundations of Computer Graphics as well as INF-25-Ba-KI Artificial Intelligence are required for the diploma programme in Computer Science, the bachelor programme in Computer Science and the bachelor programme in Applied Computer Science.
usability	The module is a compulsory elective module in the field of Human-Computer Interaction and Interactive Media, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Human-Computer Interaction and Interactive Media as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language can be German or English and is specified by the lecturer at the

	beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Area of Specialization Computer Engineering and High Performance Computing

Module name	**High Performance Computing**
Module number	INF-25-Ma-FTI-HPC
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students can describe strategies and methods of parallel processing in parallel computer architectures, as well as assess parallel architectures and network concepts and their suitability for various parallel algorithms. They are able to develop simple parallel programs that make use of different types of parallelism.
contents	Contents of the module are the basics of high-performance computers and their programming, strategies and methods of parallel processing including the programming models widely used in supercomputing. Further contents are architecture and network concepts and the necessary algorithmic building blocks in close connection with practical experience from the interdisciplinary field of work of the CIDS Department Center for Information Services and High Performance Computing (ZIH).
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-RA computer architecture and hardware laboratory as well as INF-25-Ba-BS operating systems are required. In the Master's program Computer Science, knowledge of the construction of computer systems and the use of a Unix command line environment as well as the programming language C at Bachelor's level is required. The following literature is suitable for preparation: 1. Introduction to high performance computing for scientists and engineers, G. Hager, G. Wellein. CRC Press, 2010, 2. Computer Architecture, Fifth Edition: A Quantitative Approach, John L. Hennessy, David A. Patterson. Morgan Kaufmann Publishers Inc., 2011, 3. Programming: principles and practice using C++, Bjarne Stroustrup. Pearson International, 2014, 4. The Linux Command Line, 2nd Ed., W.E. Shotts. No Starch Press, 2019.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective

	module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Performance Analysis of Computing Systems**
Module number	INF-25-Ma-FTI-PACS
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students know the terminology of performance evaluation and can use it safely in the expert discussion and are able to develop and evaluate performance experiments. You can safely use queue or simulation models.
contents	Contents of the module are basic techniques from the fields of application of statistics, probability calculation, experimental planning, simulation and queue theory on the basis of practical problems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Prg Programming and RoboLab as well as INF-25-Ba-BS Operating Systems are required. In the Computer Science master's program, programming skills in an imperative programming language such as C, C++, Java, Fortran or Python are required, as well as knowledge of using a Unix command line environment at bachelor's level. The following literature is suitable for preparation: 1. TU Dresden, ZIH HPC Compendium, 2. Systems Benchmarking: For Scientists and Engineers, S. Kounev, K. Lange, J. Kistowski, Springer, 2020. (ISBN: 3-030-41704-8), 3. Measuring Computer Performance. A Practitioner's Guide, David J. Lilja. Cambridge University Press, 2000. (ISBN: 0-521-64105-5), 4. The Art of Computer Systems Performance Analysis, Raj Jain. Wiley, 1991 (ISBN: 0-471-50336-3), 5. Programming: principles and practice using C++, Bjarne Stroustrup. Addison-Wesley, 2014, 6. The Linux Command Line, 2nd Ed., W.E. Shotts. No Starch Press, 2019.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex

	2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Efficient Parallel Algorithms**
Module number	INF-25-Ma-FTI-EPA
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students are familiar with common algorithms, can describe them and implement them efficiently. They are able to evaluate algorithms according to their asymptotic time complexity and justify their statements.
contents	Contents of the module are concepts of parallel programming for the parallelization of algorithms and data structures. Further contents are search algorithms, sorting algorithms, graph algorithms as well as algorithms from linear algebra and their efficient implementation, parallelization as well as the design principles and assessment criteria for parallel algorithms.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	In the diploma program Computer Science, the bachelor program Computer Science and the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-AuD Algorithms and Data Structures as well as INF-25-Ba-Prg Programming and RoboLab are required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language is

	German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Highly Parallel Programming of GPUs**
Module number	INF-25-Ma-FTI-HPGPU
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students are able to analyze and evaluate manycore architectures using the example of graphics processors (GPUs). They are capable of developing and optimising algorithms for these architectures.
contents	Contents of the module are highly parallel algorithms for manycore architectures with a focus on modern graphics cards, which are used in both consumer and high-performance computing. Other content includes programming models as well as programming techniques for massively parallel environments and various GPU APIs for parallelization, computer graphics and deep learning and working with remote GPU instances.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, internships in the amount of 1 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the degree program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the module INF-25-Ba-RA Computer Architecture and Hardware Laboratory are required. In the Master's programme in Computer Science, knowledge of building computer systems at Bachelor's level as well as programming skills in C/C++ are required. The following literature is suitable for preparation: 1. Computer architecture: a quantitative approach, J.L. Hennessy, D.A. Patterson, Elsevier, 2011. Chapter 4, 2. Programming: principles and practice using C++, Bjarne Stroustrup. Addison-Wesley, 2014.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially

	identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. Bonus service for exam work is a programming of 8 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Adaptive Dynamic Systems Lab**
Module number	INF-25-Ma-FTI-ADS.Lab
Responsible lecturer	Prof. Dr. Diana Göhringer diana.goehringer@tu-dresden.de
Qualification objectives	The students have practical experience in the field of reconfigurable computing systems and their applications, for example image processing and machine learning. You can independently and profoundly familiarize yourself with a predetermined task in the field of reconfigurable computing systems and practically process them using scientific methods.
contents	Contents of the module are the design, simulation, evaluation and verification of reconfigurable computing systems and their realization with FPGA platforms or simulators.
Forms of teaching and learning	The module includes internships of 4 SWS and self-study. The language of instruction of the internships is English.
Prerequisites for participation	In the computer science diploma course, the competencies to be acquired in the modules INF-25-Ba-GTI Basics of Computer Engineering as well as INF-25-Ba-Prg Programming and RoboLab are required. In the Master's program Computer Science, programming skills in C/C++ as well as knowledge of technical computer science at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Structure and Operation Principle of Processors**
Module number	INF-25-Ma-FTI-SOP
Responsible lecturer	Dr. Robert Schöne robert.schoene@tu-dresden.de
Qualification objectives	Students are able to evaluate different processors and computer systems, analyze their functioning and determine characteristics through system-related programming. They know interfaces for determining and configuring processor properties, are able to use them and evaluate the resulting implications.
contents	Contents of the module are programming interfaces as well as the micro-architectures of selected processors including the possibilities for the optimization of sequential and parallel programs as well as development trends in the processor architecture.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, internships in the amount of 1 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	The computer science degree program requires the competencies to be acquired in the modules INF-25-Ba-RA computer architecture and hardware laboratory as well as INF-25-Ba-BS operating systems. In the Master's program Computer Science, knowledge about the structure of processors and computer systems and the functioning of important components of processors as well as in system-related programming and operating systems at bachelor's level is required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Digitization and Data Analytics**
Module number	INF-25-Ma-FTI-DDA
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students understand different concepts for data storage and metadata collection and can develop data management concepts for existing data sets. They know and understand different methods of data preprocessing, exploratory data analysis and machine learning, can assess their strengths and weaknesses in relation to given data and apply the methods with the help of current software frameworks both locally and on an HPC infrastructure.
contents	The contents of the module are current approaches to the analysis of large amounts of data (big data) for specific computer architectures as well as processing in the environment of high-performance computing (HPC), various data analytics approaches and their use in the HPC environment. Other content includes data analytics frameworks, basics of statistical analysis and machine learning techniques, and selected applications.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the Computer Science degree program, the competencies to be acquired in the modules INF-25-Ba-Ma1 Linear Algebra and Analysis as well as INF-25-Ba-Ma4 Probability Theory and Statistics are required. In the master's program Computer Science, knowledge in statistics and linear algebra as well as knowledge in the use of Python at bachelor's level are required. The following literature is suitable for preparation: 1. Mathematics for Engineers II: Calculus and Linear Algebra, G. Baumann. Oldenbourg Verlag, 2010. http://dx.doi.org/10.1524/9783486598476, 2. All of Statistics, L. Wasserman. Springer. 2004. https://link.springer.com/book/10.1007/978-0-387-21736-9, 3. Python for Data Analysis 3rd Ed., W. McKinney. O'Reilly Media, 2022. https://learning.oreilly.com/library/view/-/9781098104023/?ar.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer

	Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Design and Programming of Embedded Multicore Architectures**
Module number	INF-25-Ma-FTI-EMA
Responsible lecturer	Prof. Dr. Diana Göhringer diana.goehringer@tu-dresden.de
Qualification objectives	Students have qualified knowledge in the fields of design and programming of modern embedded systems and in the field of simulation of embedded multicore architectures. They also have practical skills for using embedded operating systems, such as Embedded Linux or FreeRTOS, on a modern embedded system, such as a Xilinx Zynq system-on-chip.
contents	Contents of the module are overview and specialist knowledge in the fields of design, simulation and programming of modern embedded systems, consisting of several processors and special accelerators. Other content includes the storage and communication infrastructures of embedded multicore architectures, such as network-on-chip and the use of embedded operating systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the degree program Computer Science, in the bachelor program Computer Science, the competencies to be acquired in the modules INF-25-Ba-RA Computer Architecture and Hardware Laboratory, INF-25-Ba-SWT Software Technology and INF-25-Ba-SWWTP Software Technology Project are required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations, and in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Linux Cluster in Theory and Practice**
Module number	INF-25-Ma-FTI-LCTP
Responsible lecturer	Dr. Robert Schöne robert.schoene@tu-dresden.de
Qualification objectives	Students are able to understand the basics and concepts of Linux clusters including construction, administration, maintenance, and usage. You can analyze hardware and software architectures of clusters and evaluate their applications, as well as describe network and storage solutions for clusters. They understand batch systems and parallel programming in the High Performance Computing (HPC) environment and can apply this knowledge. You can evaluate and use monitoring and benchmarking methods for the performance evaluation and optimization of clusters. They are able to apply the mediated content in practical scenarios and develop solutions for typical challenges in cluster operation. You can classify typical topics from the field of high performance computing and are able to analyze the performance of Linux-based clusters.
contents	Contents of the module are the structure, administration, maintenance and use as well as the challenges and requirements of Linux clusters in theory and practice, the analysis and evaluation of the architecture and functioning of Linux clusters, the construction of cluster nodes and the use of network topologies and storage solutions. Further contents of the module are the basics of parallel programming, software provision and management as well as monitoring and benchmarking methods, the optimization of the performance and efficiency of clusters and the sustainable design of their operation.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The teaching language of the lectures and the exercises can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-RA computer architecture and hardware laboratory as well as INF-25-Ba-BS operating systems are required. In the Master's program Computer Science, basic knowledge of the construction of computer systems as well as basic knowledge in the use of Linux and command lines at Bachelor's level are required. The following literature is suitable for preparation: John L. Hennessy, David A. Patterson (2011), Computer Architecture, Fifth Edition: A Quantitative Approach, https://dl.acm.org/doi/book/10.5555/1999263

	Shotts, W.E. (2019). The Linux Command Line, 2nd Ed., No Starch Press, https://learning.oreilly.com/library/view/-/9781492071235/?ar
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module consists of 1 semester.

Module name	**Introduction to Computer Engineering**
Module number	INF-25-Ma-FTI-ETI
Responsible lecturer	Prof. Dr. Wolfgang Nagel wolfgang.nagel@tu-dresden.de
Qualification objectives	Students can explain and assess implementation concepts for both embedded systems and parallel computers. They understand the interdependence of hardware and software in computer systems, can derive design decisions for embedded systems and implement them using high-level synthesis tools. They can classify and evaluate reliability and low-performance challenges in the design of embedded systems, as well as describe and discuss modern design techniques such as approximate computing and new transistor technologies. They are able to use different approaches to formulate parallel programs and can assess how they are mapped to different architectures. You can estimate and evaluate the impact of program alternatives and architectural decisions. In addition to manual parallelization, students can explain challenges of automatic code parallelization, apply formal parallel calculation models, and reproduce the fundamentals of domain-specific languages.
contents	Contents of the module are design, modeling, programming, simulation and realization of technical systems in the field of embedded systems and parallel processing.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 2 SWS, internships in the amount of 2 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma course, the competencies to be acquired in the module INF-25-Ba-RA computer architecture and hardware laboratory are required. In the Master's programme in Computer Science, knowledge of building computer systems at Bachelor's level is required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 30 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	12 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 360 hours.
Duration of the module	The module covers one semester.

Module name	**Hardware Modeling and Simulation**
Module number	INF-25-Ma-FTI-HMS
Responsible lecturer	Prof. Dr. Diana Göhringer diana.goehringer@tu-dresden.de
Qualification objectives	Students have qualified knowledge in the fields of simulation, evaluation and verification of digital systems, such as field programmable gate arrays (FPGAs), and in the field of modelling of digital systems using SystemC. In addition, they have practical skills for programming digital systems using the hardware description language VHDL and experience from sample projects.
contents	Contents of the module are the design, simulation, evaluation and verification of digital systems as well as programming using hardware description languages, for example VHDL and the modeling language SystemC.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the diploma program Computer Science, in the bachelor program Computer Science and in the bachelor program Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-GTI Basics of Computer Engineering as well as INF-25-Ba-Prg Programming and RoboLab are required. In the Master's program Computer Science, programming skills in C/C++ as well as knowledge of technical computer science at Bachelor's level are required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Bachelor's programme in Applied Informatics, the module is a compulsory elective module in the specialisation in Media Informatics and in the specialisation in Medical Informatics, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Computer Engineering and High Performance Computing and the supplement, which must be selected in accordance with Annex 2 to the examination regulations, as well as in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Adaptive Computing Systems for Robotics**
Module number	INF-25-Ma-FTI-ACSR
Responsible lecturer	Prof. Dr. Diana Göhringer diana.goehringer@tu-dresden.de
Qualification objectives	Students have qualified knowledge in the fields of design and programming of modern embedded systems for robot applications and in the field of robotics in the areas of perception, localization, planning and multi-robot collaboration tasks. In addition, they are able to use modern embedded systems such as the Xilinx Zynq System-on-Chip and software environments for robotics applications such as Robotics Operating System (ROS) and Embedded Linux.
contents	Contents of the module are state-of-the-art FPGA-based robotics computing accelerator designs and their optimized techniques. The module includes the use of FPGAs in robotic perception, localization and planning, how they can be combined into robotic products, such as autonomous vehicles and mobile robots, as well as practical experience with robotic and reconfigurable platforms.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	In the computer science diploma program and the bachelor's program in computer science, the competencies to be acquired in the modules INF-25-Ba-RA computer architecture and hardware laboratory, INF-25-Ba-SWT software technology and INF-25-Ba-SWWTP software technology project are required.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's programme in Computer Science, the module is a compulsory elective module of the specialist specialisation, which must be selected in accordance with the annex to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the Open Track in the field of Computer Engineering and High Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations, and in the Distributed Systems Engineering Track, which must be selected in accordance with Annex 3 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.

Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 60 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Virtualization Techniques**
Module number	INF-25-Ma-FTI-VirTe
Responsible lecturer	Prof. Dr. Josef Weidendorfer josef.weidendorfer@tu-dresden.de
Qualification objectives	Students are able to classify and evaluate different implementations of virtual machines, both in terms of concepts used and products used today. You can analyze their usefulness in different scenarios and understand technical design compromises, implementation challenges and typical solutions for the best possible performance and usability.
contents	The content of the module is the description and classification of various virtual machines often used today, their advantages and disadvantages and areas of application as well as concepts and techniques often used in the implementation, which allow the use with acceptable performance, with a particular focus on VMs at the process and system level as well as high-level language VMs. Other content includes techniques such as ISA virtualization, from interpretation to translation at the binary level, as well as the functionality of modern hardware that allows better system virtualization.
Forms of teaching and learning	The module includes lectures in the amount of 3 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is English.
Prerequisites for participation	The computer science degree program requires the competencies to be acquired in the modules INF-25-Ba-RA computer architecture and hardware laboratory, INF-25-Ba-BS operating systems, INF-25-Ba-RN computer networks and INF-25-Ma-FSP-CB compiler construction. In the Master's programme in Computer Science, knowledge of the construction of computer systems, a basic understanding of operating systems and compiler construction as well as programming skills in C/C++ at Bachelor's level are required. The following literature is suitable for preparation: Virtual Machines, Versatile Platforms for Systems and Processes, James E. Smith, Ravi Nair. Elsevier/Morgan Kaufmann, 2005. Hardware and Software Support for Virtualization, Edouard Bugnion, Jason Nieh and Dan Tsafrir. Synthesis Lectures on Comp.Arch, M&C, 2017.
usability	The module is a compulsory elective module in the field of Computer Engineering and High Performance Computing, which must be selected in accordance with Annex 2 to the examination regulations. In the Computer Science master's programme, the module is a compulsory elective module in the open track in the field of Computer Engineering and High

	Performance Computing as well as the supplement, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected once in the Master's programme in Computer Science. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Compulsory elective area: Supplement Modules

Module name	**Exploration of a Research Subject**
Module number	INF-25-Ma-ERS
Responsible lecturer	Dean of Studies, Faculty of Computer Science studiendekan.inf@tu-dresden.de
Qualification objectives	Students are able to independently conduct literature research on a limited research topic and prepare it for specific questions. They can name the connections and identify and apply the need for further applications and research results.
contents	Contents of the module are the techniques of scientific work in a research area of computer science, the evaluation of the state of research in this research area, research on publications as well as the identification of additional investigations or applications for the preparation of a scientific work.
Forms of teaching and learning	The module includes 40-hour projects and self-study. The teaching language of the projects can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	Basic competencies for scientific work at bachelor level are required.
usability	In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 80 hours. The language of the examination is, at the choice of the student, German or English.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Acoustics basics**
Module number	INF-25-Ma-NGR-AKU
Responsible lecturer	Prof. Dr. Ercan Altinsoy ercan.altinsoy@tu-dresden.de
Qualification objectives	Students know the basics, basic principles and technical language of the field of application of acoustics and can plan the use of typical computer science methods, assess the corresponding challenges and successfully implement them. They are able to comprehend problems of the field of application and understand how to develop solutions with the inclusion of approaches of computer science. You can work in interdisciplinary projects and teams.
contents	Contents of the module are physical acoustics, in particular sound pressure levels and wave propagation, hearing and speech acoustics, in particular spatial hearing and loudness perception, electroacoustics for microphones, loudspeakers, sound technology and virtual reality as well as room acoustics.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, internships in the amount of 1 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement acoustics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-AKU Acoustics - Specialization Virtual Reality. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Acoustics Deepening – Virtual Reality**
Module number	INF-25-Ma-NVE-AKU
Responsible lecturer	Prof. Dr. Ercan Altinsoy ercan.altinsoy@tu-dresden.de
Qualification objectives	Students have in-depth knowledge of the fundamentals of acoustics and can plan applications using typical computer science methods, assess the corresponding challenges and successfully implement them. They are able to comprehend acoustic problems in virtual environments and understand how to develop solutions involving approaches to computer science. They are also particularly qualified to work in interdisciplinary projects and teams.
contents	Contents of the module are techniques, methods and current technologies that are used in virtual realities. Further contents are audio recordings and reproduction technologies, in particular binaural technology, stereophony, ambisonics, wave field synthesis and the implementation of room acoustic models as well as methods of sound synthesis.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, projects in the amount of 30 hours and self-study. The teaching language of the lectures and the projects can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the diploma program Computer Science and in the master program Computer Science, the competencies to be acquired in the module INF-25-Ma-NGR-AKU Acoustics Basics are required.
usability	The module is a compulsory module of the non-informatic supplement acoustics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-AKU Acoustics Fundamentals. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 30 hours. The examination language can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Computational Laser Metrology basics**
Module number	INF-25-Ma-NGR-CLM
Responsible lecturer	Prof. Dr. Jürgen Czarske juergen.czarske@tu-dresden.de
Qualification objectives	The students know the basics, the basic principles and the technical language and master the methodological basics of measurement uncertainty analysis. They are familiar with analogous methods for detecting electrical and non-electrical quantities and can calculate and interpret systematic and random measurement deviations. You can work on classic image processing tasks with neural networks and apply metrological analysis tools. They are able to comprehend problems of the field of application and understand how to develop solutions with the inclusion of approaches of computer science. They are particularly qualified to work in interdisciplinary projects and teams.
contents	Contents of the module are the basics of measuring as well as the basics of image processing using neural networks.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, internships in the amount of 1 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement Computational Laser Metrology in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-CLM Computational Laser Metrology Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 20 minutes duration and a portfolio of 20 hours. Both examinations are pass-relevant. The examination language of the oral examination performance and the portfolio can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.

Credits and grades	6 credit points can be earned through the module. The module grade results from the weighted average of the grades of the individual examination achievements. The oral examination performance is weighted quadruple and the portfolio simply.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Computational Laser Metrology deepening**
Module number	INF-25-Ma-NVE-CLM
Responsible lecturer	Prof. Dr. Jürgen Czarske juergen.czarske@tu-dresden.de
Qualification objectives	Students are able to present and assess the physical and system-theoretical principles and technical design of computer-aided laser sensors. They master approaches and methods of system design and the application of modern laser sensors.
contents	Contents of the module are the physical and system-theoretical basics of computer-aided laser measurement technology as well as the experimental investigation and application of laser sensors.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, internships in the amount of 1 SWS and self-study. The language of instruction of the lectures, exercises and internships can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Prerequisites for participation	In the computer science diploma program and the master's program in computer science, the basics to be acquired in the module INF-25-Ma-NGR-CLM Computational Laser Metrology are required.
usability	The module is a compulsory module of the non-informatic supplement Computational Laser Metrology in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in combination with the module INF-25-Ma-NGR-CLM Computational Laser Metrology Basics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a non-public oral examination performance as an individual examination of 15 minutes duration and a portfolio of 20 hours. Both examinations are pass-relevant. The examination language of the oral examination performance and the portfolio can be German or English and is specified by the lecturer at the beginning of each semester and announced in the usual manner.
Credits and grades	6 credit points can be earned through the module. The module grade results from the weighted average of the grades of the individual examination achievements. The oral examination performance is weighted quadruple and the portfolio simply.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Geoinformatics basics**
Module number	INF-25-Ma-NGR-GEO
Responsible lecturer	Prof. Dr. Lars Bernard lars.bernard@tu-dresden.de
Qualification objectives	Students master basic application strategies of geoinformatics. They fundamentally master the essential instruments of geoinformatics, in particular the application of geoinformation systems.
contents	Contents of the module are mathematical and informatics basics of geoinformatics, basics of geodata modeling and geodata analysis, basics of geodatabase and geoinformation systems, outlook on current research fields of geoinformatics as well as practical specializations on the basis of simple geoinformatics application examples.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement Geoinformatics in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-GEO Geoinformatics Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam of 90 minutes duration and an ungraded portfolio of 30 hours. The examination language of the exam paper and the portfolio is German.
Credits and grades	6 credit points can be earned through the module. Taking into account the sixth sentence of Section 15(1) of the Examination Regulations, the module grade is derived from the weighted average of the grades of the individual examination achievements. The exam work is weighted twice and the portfolio simply.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Geoinformatics in-depth**
Module number	INF-25-Ma-NVE-GEO
Responsible lecturer	Prof. Dr. Lars Bernard lars.bernard@tu-dresden.de
Qualification objectives	The students have in-depth knowledge of the basics, the basic principles and the technical language and are able to survey the application areas of geoinformation systems and geodatabases in practice and to master these instruments independently. You have methodological expertise in the development of applications for geoinformation systems and geodatabases as well as in project-based teamwork.
contents	Content of the module is the development of applications based on geoinformation systems and geodatabases for the collection, management and analysis of geodata.
Forms of teaching and learning	The module includes lectures in the amount of 0.5 SWS, exercises in the amount of 1.5 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	The INF-25-Ma-NGR-GEO Geoinformatics module requires the competences to be acquired in the computer science diploma programme and the master's programme in computer science.
usability	The module is a compulsory module of the non-informatic supplement Geoinformatics in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-GEO Geoinformatics Fundamentals. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module test consists of a complex performance of 60 hours. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the	The module covers one semester.

module	

Module name	**Mathematics basics**
Module number	INF-25-Ma-NGR-MAT
Responsible lecturer	Prof. Dr. Manuel Bodirsky manuel.bodirsky@tu-dresden.de
Qualification objectives	Students know the basics, basic principles and technical language of the field of application of mathematics. They have knowledge in the field of linear algebra, can safely apply elementary proof techniques as well as appropriately use the mathematical terminology and have the basic skills for mathematical abstraction.
contents	Contents of the module are the naive set theory, in particular sets, relations and illustrations, the basics of logic, the basic algebraic structures, in particular groups, bodies, vector spaces, rings and structure-preserving illustrations and linear algebra, in particular linear illustrations, systems of equations, matrices, determinants and eigenvalues.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	In the Computer Science degree program, the competencies to be acquired in the module INF-25-Ba-Ma1 Linear Algebra and Analysis are required. In the Master's programme in Computer Science, competencies in linear algebra at bachelor's level are required.
usability	The module is a compulsory module of the non-informatic supplement Mathematics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-MAT Mathematics Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Mathematics in-depth**
Module number	INF-25-Ma-NVE-MAT
Responsible lecturer	Prof. Dr. Manuel Bodirsky manuel.bodirsky@tu-dresden.de
Qualification objectives	Students possess in-depth knowledge in the field of linear algebra, can safely apply proof techniques, use mathematical terminology appropriately, and possess well-developed skills in mathematical abstraction.
contents	Contents of the module are duality, unitary spaces, normal forms of matrices and classification problems of linear algebra as well as aspects of analytical geometry.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	In the computer science diploma program and in the master's program computer science, the basics to be acquired in the module INF-25-Ma-NGR-MAT mathematics are required.
usability	The module is a compulsory module of the non-informatic supplement Mathematics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-MAT Mathematics Basics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Photogrammetry basics**
Module number	INF-25-Ma-NGR-PGB
Responsible lecturer	Prof. Dr. Hans-Gerd Maas hans-gerd.maas@tu-dresden.de
Qualification objectives	Students are able to plan the use of typical computer science methods, assess the corresponding challenges and successfully implement them. They are able to comprehend problems of the field of application and understand how to develop solutions with the inclusion of approaches of computer science. They are qualified to work in interdisciplinary projects and teams.
contents	Contents of the module are geometric fundamentals of photogrammetry, imaging sensors, image processing and image analysis, evaluation methods and systems, project planning and implementation, georeferencing, mapping, DTM generation, orthophotos, aerotriangulation, near-range photogrammetry, generation of VR models as well as the automation of photogrammetric standard processes by means of image analysis methods.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement photogrammetry in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-PGB Photogrammetry Deepening. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.

workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Photogrammetry deepening**
Module number	INF-25-Ma-NVE-PGB
Responsible lecturer	Prof. Dr. Hans-Gerd Maas hans-gerd.maas@tu-dresden.de
Qualification objectives	Students are able to plan the use of typical computer science methods, assess the corresponding challenges and successfully implement them. They are able to comprehend problems of the field of application and understand how to develop solutions with the inclusion of approaches of computer science. They are qualified to work in interdisciplinary projects and teams. Students have in-depth knowledge of laser scanner systems as well as competencies in the acquisition, visualization, handling and automatic processing of 3D point clouds.
contents	Contents of the module are laser scanning and point cloud processing, the technological foundations of aircraft laser scanning and terrestrial laser scanning, in particular procedures of registration and calibration, filtering procedures, procedures for the automatic extraction of geoinformation from 3D point clouds as well as applications for DTM generation, 3D city models, forestry sciences, architecture and engineering.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 2 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	In the diploma program Computer Science and in the master program Computer Science, the basics to be acquired in the module INF-25-Ma-NGR-PGB Photogrammetry are required.
usability	The module is a compulsory module of the non-informatic supplement photogrammetry in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-PGB Photogrammetry Basics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.

Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Production Technology Basics − Manufacturing Technology and Production Planning**
Module number	INF-25-Ma-NGR-PROD
Responsible lecturer	Prof. Dr. Hans Christian Schmale hans_christian.schmale@tu-dresden.de
Qualification objectives	Students have basic knowledge of manufacturing and production of mechanical, automotive and plant engineering products. They are able to provide an overview of existing manufacturing processes and have basic knowledge of the operating principles, the technical equipment and the technological parameters to be defined for these processes. They are capable of planning and designing production and manufacturing processes. Basics of work preparation and production planning from the definition of a machining task to implementation on production facilities are understood as part of the engineering work and can be carried out responsibly.
contents	The contents of the module are the most important manufacturing processes of the primary forming, forming, machining, ablation, joining and surface technology and their operating principles. Furthermore, the module focuses on work preparation and production planning for parts production and assembly processes with the work steps from the analysis of the machining task, process preparation on the basis of process graphs, process detailing including process time determination and the development of technological documents.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement production technology in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-PROD Production Technology Deepening − Production Technology and Automated Parts Production. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and a portfolio of

points	25 hours. Both examinations are pass-relevant. The examination language of the exam paper and the portfolio is German.
Credits and grades	6 credit points can be earned through the module. The module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Production Technology Deepening Production Technology and Automated Parts Production**
Module number	INF-25-Ma-NVE-PROD
Responsible lecturer	Prof. Dr. Hans Christian Schmale hans_christian.schmale@tu-dresden.de
Qualification objectives	The students have basic practical knowledge of the production of products in mechanical, vehicle and plant engineering. They have advanced basic knowledge of the principles of action of selected methods and the technological parameters of these methods to be defined. The students know the procedures and methods for the selection of the process steps, the determination of the operating resources and the process parameterization in the context of work preparation for the processes of part production. They are able to apply methods and systems for NC planning and NC simulation in conjunction with automated technology planning and to evaluate CAD/NC process chains.
contents	The contents of the module are the practical application of selected manufacturing processes of primary forming, forming, machining, ablation and joining technology. The module includes planning steps and methodological procedures for NC planning of technological operations on automated production facilities, structure and content of NC programming systems, techniques and functionalities for NC planning, simulation and organization as well as automated technology planning, feature technology and production data organization.
Forms of teaching and learning	The module includes lectures in the amount of 1 SWS, exercises in the amount of 1 SWS, internships in the amount of 3 SWS and self-study. The language of instruction for lectures, exercises and internships is German.
Prerequisites for participation	INF-25-Ma-NGR-PROD Production Engineering Basics − Production Engineering and Production Planning are required for the computer science diploma program and the master's program in computer science.
usability	The module is a compulsory module of the non-informatic supplement production technology in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be selected in combination with the module INF-25-Ma-NGR-PROD Production Engineering Basics − Production Engineering and Production Planning. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration and a portfolio of

points	55 hours. Both examinations are pass-relevant. The examination language of the exam paper and the portfolio is German.
Credits and grades	6 credit points can be earned through the module. The module grade results from the unweighted average of the grades of the individual examination achievements.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Psychology basics**
Module number	INF-25-Ma-NGR-PSY
Responsible lecturer	Prof. Dr. Sebastian Pannasch sebastian.pannasch@tu-dresden.de
Qualification objectives	Students understand the natural and humanities roots of psychology and fundamental statistical relationships. They can describe basic socio-psychological theories, research methods and central empirical findings from social psychology, the peculiarities of the object of investigation human as well as fundamental methodological and ethical requirements of psychological research and are able to present important survey methods of empirical research work.
contents	Contents of the module are scientific-theoretical foundations and the history of psychological human images and the resulting methods, the foundations of empirical methods of psychology as well as fundamental correlations of descriptive and inference statistics. The module includes central topics of social psychology such as social perception, attitudes and attitude change, prosocial and aggressive behavior, social influence and norms as well as group processes and intergroup relationships.
Forms of teaching and learning	The module includes lectures of 4 SWS and self-study. The language of instruction of the lectures is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement Psychology in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-PSY Psychology Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a portfolio of 40 hours. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.

workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Psychology deepening**
Module number	INF-25-Ma-NVE-PSY
Responsible lecturer	Prof. Dr. Sebastian Pannasch sebastian.pannasch@tu-dresden.de
Qualification objectives	Students are familiar with the basic concepts and techniques of experimental planning and can outline the quality criteria for research work. They have the ability to independently select methods and can carry out independent investigation planning and present their results in an argumentative manner for answering typical research papers. They can describe the most important research and application areas of engineering psychology as well as basic theories, research methods and practical intervention or solution strategies. Students are able to analyze, compare and evaluate the research subjects using appropriate scientific methods and have the ability to methodically reflect.
contents	Contents of the module are the experimental planning and sample planning as well as basic theories and methods of engineering psychology, such as scientific theory foundation of the experiment, methods of hypothesis formation, principles of experimental planning, types of experiments and associated experimental plans, selection and compilation of samples, interpretation and communication of experimental results, ethical duties and implications, perception and attention in the application, situational awareness as well as central questions of human-technological interaction such as automation, human errors, display design and social aspects.
Forms of teaching and learning	The module includes lectures of 4 SWS and self-study. The language of instruction of the lectures is German.
Prerequisites for participation	In the diploma program Computer Science and in the master program Computer Science, the basics to be acquired in the module INF-25-Ma-NGR-PSY Psychology are required.
usability	The module is a compulsory module of the non-informatic supplement Psychology in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-PSY Psychology Basics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a portfolio of 40 hours. The examination language is German.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Fundamentals of Economics**
Module number	INF-25-Ma-NGR-VWL
Responsible lecturer	Dean of Studies Economics studiendekan.ww@mailbox.tu-dresden.de
Qualification objectives	Students have basic knowledge of economic concepts and procedures. They recognise economic problems and are able to present them appropriately.
contents	Contents of the module are central economic terms as well as basic micro- and macroeconomic problems and methods.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS and self-study. The language of instruction of the lectures and exercises is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement to economics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's programme Computer Science in combination with the module INF-25-Ma-NVE-VWL Economics Deepening – Microeconomics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Economics Deepening - Microeconomics**
Module number	INF-25-Ma-NVE-VWL
Responsible lecturer	Dean of Studies Economics studiendekan.ww@mailbox.tu-dresden.de
Qualification objectives	Students are familiar with the basic concepts of microeconomics. They are able to understand, analyse and transfer the individual economic decisions of households and companies to other contexts.
contents	Contents of the module are the basics of household and production theory as well as welfare economics.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, exercises in the amount of 1 SWS, tutorials in the amount of 1 SWS and self-study. The language of instruction for lectures, exercises and tutorials is German.
Prerequisites for participation	In the diploma program Computer Science and in the master program Computer Science, the basics to be acquired in the module INF-25-Ma-NGR-VWL Economics are required.
usability	The module is a compulsory module of the non-informatic supplement to economics in the computer science diploma program in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-VWL Economics Fundamentals. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Business administration Basics**
Module number	INF-25-Ma-NGR-BWL
Responsible lecturer	Dean of Studies Economics studiendekan.ww@mailbox.tu-dresden.de
Qualification objectives	Students have a basic knowledge of business administration and know the basics of organizational management. They are proficient in methodological instruments and systematic orientation. Students are able to successfully deal with business management issues, identify problems of organizational management and assess the effectiveness of organizational design measures.
contents	Contents of the module are the basics of business administration, in particular legal forms, marketing, innovations and property rights, technology management, production and procurement, service management, investment and financing, project management, controlling, theories of organizational design, models of organizational differentiation, models of organizational integration, formal and informal organization, motivating organizational design, organizational culture, organizational change and ethical behavior in organizations.
Forms of teaching and learning	The module includes lectures in the amount of 3 SWS, exercises in the amount of 1 SWS, tutorials in the amount of 1 SWS and self-study. The language of instruction for lectures, exercises and tutorials is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement Business Administration in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NVE-BWL Business Administration Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 120 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the	The module is offered every winter semester.

module	
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.

Module name	**Business Administration Deepening**
Module number	INF-25-Ma-NVE-BWL
Responsible lecturer	Dean of Studies Economics studiendekan.ww@mailbox.tu-dresden.de
Qualification objectives	The students know the most important basics and principles of sustainable corporate management and marketing. They can define concepts in marketing and sustainable corporate management and are able to apply selected theories and approaches to practical issues and real companies.
contents	Contents of the module are fundamental theories, approaches, concepts of marketing and marketing strategies as well as informational basics, in particular of consumer behavior and market research, basics of sustainable corporate management in relation to the three dimensions economy, ecology and social / society, concepts for the implementation of sustainable development in the company and methods of sustainability assessment.
Forms of teaching and learning	The module includes lectures of 3 SWS and self-study. The language of instruction of the lectures is German.
Prerequisites for participation	In the diploma program Computer Science and in the master program Computer Science, the basics to be acquired in the module INF-25-Ma-NGR-BWL Business Administration are required.
usability	The module is a compulsory module of the non-informatic supplement Business Administration in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-BWL Business Administration Fundamentals. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a complex performance of 16.5 hours. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Biomedical technology Basics**
Module number	INF-25-Ma-NGR-BMT
Responsible lecturer	Prof. Dr. Hagen Malberg hagen.malberg@tu-dresden.de
Qualification objectives	Upon completion of the module, students possess knowledge, skills and abilities to design systems for measuring physiological quantities. In addition, they can design automated systems for diagnostic and organ support and are familiar with the most important therapeutic medical technology procedures. They can transfer basic biological-physiological principles to technical areas, in particular computer science.
contents	Contents of the module are the basics of biomedical technology for diagnosis and therapy, in particular relevant physical, physiological and biochemical laws, basic principles and structure of medical devices, diagnostic measurement data acquisition, automated processing of diagnostic signals and information, organ support systems as well as structure and function of life-sustaining systems.
Forms of teaching and learning	The module includes lectures in the amount of 2 SWS, seminars in the amount of 1 SWS and self-study. The language of instruction of the lectures and seminars is German.
Prerequisites for participation	No knowledge is required.
usability	The module is a compulsory module of the non-informatic supplement Biomedical Engineering in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in combination with the module INF-25-Ma-NVE-BMT Biomedical Engineering − Clinical Specialization. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.
Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every winter semester.
workload	The total workload is 180 hours.

Duration of the module	The module covers one semester.

Module name	**Biomedical Engineering – Clinical Deepening**
Module number	INF-25-Ma-NVE-BMT
Responsible lecturer	Prof. Dr. Hagen Malberg hagen.malberg@tu-dresden.de
Qualification objectives	Students are familiar with basic life processes and their pathological changes, which are diagnosed and treated through the use of biomedical technology. In addition, they are aware of the essential characteristics of the various measurement methods for obtaining physiological information. You have in-depth knowledge of medical terminology and thus have the prerequisites for good interdisciplinary cooperation as engineers in the medical environment.
contents	Contents of the module are the basics of anatomy, physiology and disease theory for engineers, in particular structure and function of cells, organs and organ systems, electrophysiological and neurophysiological basics, cardiovascular system, autoregulation of the organism, pathophysiological phenomenon and clinical functional sequences. These are the operating principles and technical realizations of devices and procedures in the medical diagnostic process, for example X-ray diagnostics, CT, PET, SPECT, multi-modal data fusion, visualization and the quality assessment of diagnostic statements as a basis for the medical decision-making process, which includes therapy measures and procedures in the clinics.
Forms of teaching and learning	The module includes lectures in the amount of 4 SWS, internships in the amount of 1 SWS and self-study. The language of instruction for lectures and internships is German.
Prerequisites for participation	The INF-25-Ma-NGR-BMT Biomedical Engineering basics to be acquired in the INF-25-Ma-NGR-BMT Biomedical Engineering module are required in the computer science diploma program and the master's program in computer science.
usability	The module is a compulsory module of the non-informatic supplement Biomedical Engineering in the diploma program Computer Science in the main course. In the Computer Science Master's programme, the module is a compulsory elective module of the supplement in the Open Track, which must be selected in accordance with Annex 2 to the examination regulations. The module can only be chosen in the Master's program Computer Science in combination with the module INF-25-Ma-NGR-BMT Biomedical Engineering Basics. The module cannot be chosen in the Master's program Computer Science if this or a substantially identical module has already been completed from a course with which the admission requirements according to § 3 of the study regulations have been met. The module creates the prerequisites for the modules that it designates under prerequisites for participation.
Requirements for the award of credit points	Credits are earned when the module exam is passed. The module examination consists of a exam work of 90 minutes duration. The examination language is German.

Credits and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination performance.
Frequency of the module	The module is offered every summer semester.
workload	The total workload is 180 hours.
Duration of the module	The module covers one semester.