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Technische Universität Dresden
Faculty of Physics

Study Regulations for the Bachelor's degree program Physics

as of July 22, 2020
(translated version)

On the basis of § 36 para.1 of the Act on the Autonomy of Institutions of Higher Education in the Free State of Saxony (*Sächsisches Hochschulfreiheitsgesetz*) in the version published on January 15, 2013 (SächsGVBl. p. 3), Technische Universität Dresden issues the following Study Regulations as statutes.

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§ 1
Scope of application

On the basis of the Act on the Autonomy of Institutions of Higher Education in the Free State of Saxony and the examination regulations, these Study Regulations stipulate the objectives, content, structure and organization of the Bachelor's degree program in Physics at Technische Universität Dresden.

§ 2
Objectives of the degree program

(1) Students will have a broad general education in physics as a fundamental natural science. They will be familiar with the various sub-fields of physics from an experimental and theoretical point of view and will master physical ways of thinking and working. They will have practical experience in experimentation and will be able to plan and successfully carry out experiments alone or in a team. The students will have insight into current research fields in physics, possess essential mathematical knowledge, have experience in programming and the application of numerical algorithms as well as basic knowledge in a non-physics discipline. They will be able to present physical relationships in an engaging way and will be able to convey them in a technically correct and interesting manner. They will be capable of discussing information, ideas, problems and solutions with both (international) experts and laypersons. In addition, they will be able to systematically explore more in-depth and new areas of knowledge, classify specific issues and have the ability to apply and critically review scientific methods and findings. They will be aware of their ethical responsibility as a researcher. Students will also possess key qualifications relevant to professional life, such as communication and teamwork skills, presentation skills, critical self-reflection, work organization and time management. Moreover, they will have the ability to use English as a language of science and will be able to critically address issues relevant to society.

(2) As a result of their broad fundamental education and the introduction to independent scientific work, graduates will possess a wide range of specialist knowledge and skills, which they will usually deepen in a consecutive Master's degree program in Physics. They will possess key qualifications for activities in a wide variety of occupational fields that require physical, analytical or problem-solving skills. The occupational fields range from fundamental and industrial research to application-related development, including in the medical field, technical sales, technical and administrative planning, management, consulting, supervision and testing, and university teaching.

§ 3
Admission requirements

To be admitted to the degree program, applicants must have a general university entrance qualification, a subject-specific university entrance qualification in the relevant discipline, or a university entrance qualification that the university has recognized as equivalent.

§ 4
Start and duration of the degree program

(1) The program can be started each winter semester.

(2) The standard period of study is six semesters and includes on-site attendance, self-study, supervised practice periods, and the Bachelor's examination.

§ 5
Teaching and learning methods

(1) The curriculum is structured in modules. In the individual modules, the course content is taught, consolidated and deepened through lectures, exercises, practical training, seminars, practical further education and self-study.

(2) Lectures introduce the subject matter of the modules. Exercises allow applying the subject matter in exemplary sub-areas. Practical training serves to apply the subject matter taught and to acquire practical skills in potential areas of employment. Seminars enable students to familiarize themselves under supervision in a selected subject area on the basis of specialist literature or other material, to report on the results of their work, to discuss them within the group and to present them in writing. Practical further education serves to set individual priorities in the area of social, personal and intercultural skills. Self-study allows students to acquire, consolidate and deepen their knowledge and skills on their own.

§ 6
Structure and organization of the degree program

(1) The program is organized in modules. The curriculum is divided into six semesters. The sixth semester is particularly suitable for a temporary stay at another university (mobility window). Part-time study is possible in accordance with the regulations on part-time study.

(2) The degree program comprises 23 compulsory modules and one elective compulsory module, which allows students to choose their non-physics specialization. The modules available include the Non-Physics Elective Module Chemistry, Non-Physics Elective Module Electronics, the Non-Physics Elective Module Computer Science and the Non-Physics Elective Module Philosophy. The selection is binding. Modules can be re-selected; the student must submit a written request to the Examination Office stating the module to be replaced and the newly selected module.

(3) Qualification objectives, content, teaching and learning methods included, requirements, applicability, frequency, workload, and duration of the individual modules are all listed in the module descriptions (Annex 1).

(4) The courses are held in German or, if indicated by the module descriptions, in English.

(5) The appropriate allocation of the modules to the individual semester, the observance of which makes it possible to complete the program within the standard period of study, as well as the type and scope of the respective courses included, and the number and standard time of the required study achievements and examined assessments are defined in the study schedule attached (Annex 2), or in an individual study schedule for part-time studies approved by the Faculty.

(6) Upon proposal of the Academic Affairs Committee, the Faculty Board may change the range of elective compulsory modules as well as the study schedule. The current selection of elective compulsory modules available must be announced at the beginning of the semester by the Faculty in the usual manner. The amended study schedule will apply to all students who have been informed about this by the Faculty at the beginning of their studies. The Examination Committee shall decide, upon application by the student, on any exceptions to sentence 3.

(7) For the practical training in the Non-Physics Elective Module Electronics, the students must prove that they have the prior knowledge required for proper completion by taking an entrance

test in the form of a written examination, unless the written examination for this module has already been graded with at least "pass" (4.0).

§ 7
Content of the degree program

(1) The compulsory field comprises Experimental Physics with the presentation of mechanical, thermal, electromagnetic, atomic, molecular and solid-state physical phenomena as well as particle and nuclear physics. In the compulsory field of Theoretical Physics, the emphasis is on the systematic way of thinking and the formal description of classical and quantum physics. Moreover, the degree program includes Physical Lab Courses for independent experimentation, evaluation and presentation of measurement results, as well as Computational Physics for computer-based solution of physics problems using numerical methods and visualizations. Furthermore, the program includes basic mathematical training in Linear Algebra and Analysis, as well as in-depth physical and general education components that optionally include key personal, social, or intercultural skills or knowledge pertaining to life in a diverse and pluralistic society.

(2) In the elective compulsory field, students hone in and concentrate on a different non-physical discipline. The Non-Physics Elective Module Chemistry covers fundamentals of the chemistry of main group and transition elements as well as the major inorganic compounds with their chemical and physical properties. The Non-Physics Elective Module Electronics includes fundamentals of electronics especially in the areas of electronic networks, and circuits. The Non-Physics Elective Module Computer Science covers fundamentals of imperative programming, algorithms for handling classical problems, various classes of algorithms, and complexity analysis. The Non-Physics Elective Module Philosophy includes either the Principles of Logic or an Introduction to Theoretical Philosophy, depending on the student's choice.

§ 8
Credit points

(1) ECTS credits document the average workload of the students and their individual study progress. One credit point corresponds to a 30-hour workload. Normally, 60 credit points are awarded per academic year, i.e. 30 credit points per semester. The total workload for the program corresponds to 180 credit points and comprises the teaching and learning methods according to type and scope stipulated in the module descriptions, the study achievements and examined assessments, the Bachelor’s thesis and the colloquium.

(2) The module descriptions indicate the number of credits that can be earned by each module. Credits are awarded upon passing the module examination. § 29 of the examination regulations shall remain unaffected.

§ 9
Academic advisory and counseling service

(1) General advice will be provided by the Central Student Information and Counseling Service at TU Dresden. It covers questions regarding study options, enrollment modalities and general student affairs. Subject-specific advice during studies will be provided by the Academic Advisory Service of the Faculty of Physics. This subject-specific advisory service assists students with regard to the planning and structuring of their studies.

(2) At the beginning of the third semester, each student who has not yet provided proof of academic performance shall make use of the subject-specific advisory services.

§ 10
Changes to module descriptions

(1) In order to amend to changed conditions, module descriptions may be changed in a simplified procedure in order to optimize study organization, with the exemption of the fields “Module name”, “Qualification objectives”, “Content”, “Teaching and learning methods”, “Requirements for earning credit points”, “Credit points and grades” and “Module duration”.

(2) In a simplified procedure, the Faculty Board will adopt the amendments to the module descriptions upon proposal of the Academic Affairs Committee. The amendments must be published by the Faculty in the usual manner.

§ 11
Entry into force, publication and interim arrangements

(1) These Study Regulations shall enter into force on the day following their publication in the Official Announcements of TU Dresden.

(2) They apply to all students newly enrolled in the Bachelor’s degree program in Physics in the 2020/2021 winter semester or later.

(3) For students who enrolled earlier than the 2020/2021 winter semester, the version of the Study Regulations for the Bachelor’s degree program in Physics that has been valid for them up until the amendment continues to apply unless they declare their acceptance of the amendment in writing. The form and deadline of this declaration are specified by the Examination Committee and announced by the Faculty in the usual manner. Switching to the new regulations is possible at the earliest on October 1, 2020.

(4) From the 2023/2024 winter semester, these Study Regulations apply to all students enrolled in the Bachelor’s degree program in Physics.

Issued based on the resolution of the Faculty Board of the Faculty of Physics as of November 27, 2019, and the approval of the University Executive Board as of February 18, 2020.

Dresden, July 22, 2020

The Rector
of Technische Universität Dresden

Signed in representation

Prof. Dr.-Ing. Antonio M. Hurtado
Vice-Rector for University Development

Annex 1:
Module descriptions

Module number	**Module name**	**Responsible lecturer**
Phy-Ba-EP1	Experimental Physics I – Mechanics, Heat	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students will be able to independently understand, analytically and quantitatively describe and clearly present basic physical processes and relationships in mechanics and thermodynamics for idealized case studies. Students will be able to apply this knowledge to a wide range of mechanical and thermodynamic phenomena.	
Content	Contents of the module are mechanics (kinematics and dynamics of the point mass and the rigid body, special theory of relativity, mechanical properties of solids, liquids and gases, mechanical vibrations and waves) and thermodynamics (laws of thermodynamics, cyclic processes, thermal properties of solids, liquids and gases, changes of state and phase diagrams, heat conduction).	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Experimental Physics II – Electromagnetism, Optics, Experimental Physics III – Waves and Quanta, Atomic and Molecular Physics, Solid-State Physics as well as Particle and Nuclear Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 180 hours.	
Module duration	The module comprises one semester.	

Module number	**Module name**	**Responsible lecturer**
Phy-Ba-EP2	Experimental Physics II – Electromagnetism, Optics	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students will be able to independently understand, analytically and quantitatively describe and clearly present basic physical processes and relationships in electrodynamics and optics for idealized case studies. Students will be able to apply this knowledge to a wide range of electromagnetic and optical phenomena.	
Content	Contents of the module are electrodynamics (electrostatics and magnetostatics, currents and fields in matter, time-varying fields, electromagnetic oscillations and waves, Maxwell's equations, relativistic description) and optics (geometric optics, reflection, refraction, lenses, optical instruments, photometry).	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	Participants require skills acquired in the module Experimental Physics I – Mechanics, Heat.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Experimental Physics III – Waves and Quanta, Atomic and Molecular Physics, Solid-State Physics as well as Particle and Nuclear Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 180 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-EP3	Experimental Physics III – Waves and Quanta	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students will be able to independently grasp, analytically and quantitatively describe and clearly present basic physical processes and relationships in the description and treatment of waves and quanta for idealized case studies. Students will be able to apply this knowledge to a wide range of wave and quantum phenomena.	
Content	The module covers wave optics (coherence, interference and diffraction, applications such as the resolving power of optical instruments, interferometers) and light quanta (photo effect and Compton effect, applications such as photodiodes, solar energy and X-ray tubes, interaction of photons with matter). It also includes the mathematical description of waves and wave packets (Fourier series and integrals including Heisenberg's uncertainty principle), matter waves (de Broglie's hypothesis, first proofs by Thomson and Davisson/Germer) and wave mechanics according to Schrödinger with simple applications (potential steps and potential well, tunneling effect, bound states, zero-point energy and molecular vibrations).	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Experimental Physics I – Mechanics, Heat as well as Experimental Physics II – Electromagnetism, Optics.	
Applicability	This module is a compulsory module in the Bachelor’s degree program in Physics. It fulfills the requirements for the modules Atomic and Molecular Physics as well as Solid-State Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 180 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-EP4	Atomic and Molecular Physics	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students will know the most important general properties of atoms and molecules and be able to calculate these for simple cases. Students will be able to apply this knowledge to a wide range of atomic and molecular physics phenomena.	
Content	The module includes topics on the structure and properties of atoms, coarse structure, fine structure, hyperfine structure, interaction with magnetic and electric fields and many-electron atoms. The module also covers the quantum mechanical treatment of H_2^+ and H_2, the valence-bond and molecular-orbital model, rotation and vibration of molecules, and spectroscopy.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Experimental Physics I – Mechanics, Heat, Experimental Physics II – Electromagnetism, Optics as well as Experimental Physics III – Waves and Quanta.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 180 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-EP5	Solid-State Physics	Director of the Institute of Solid State and Materials Physics (ifmp@mailbox.tu-dresden.de)
Qualification objectives	Students will master basic terms, models, experimental methods and theoretical concepts for the description of condensed matter. They will know the essential phenomena that characterize the behavior of condensed matter and understand technological applications. Students will be able to apply their knowledge to a wide range of phenomena.	
Content	Contents of the module are the structure of crystalline and amorphous solids (bond types, structure, structure determination, defects), lattice dynamics (lattice vibrations, dispersion curves, density of states, anharmonic properties), conduction electrons (Fermi gas, band model, transport properties, behavior in magnetic fields) as well as semiconductors (intrinsic and doped semiconductors, simple devices and heterostructures). The module also covers magnetism (dia-, para- and ferromagnetism), dielectric and optical properties (local field, dielectric function, collective excitations) and superconductivity (basic properties, Cooper pairs, macroscopic wave function).	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Experimental Physics I – Mechanics, Heat, Experimental Physics II – Electromagnetism, Optics, Experimental Physics III – Waves and Quantum as well as Quantum Theory I – Basic Concepts.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the module Advanced Specialization Course Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 180 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-EP6	Particle and Nuclear Physics	Director of the Institute of Nuclear and Particle Physics (iktp@physik.tu-dresden.de)
Qualification objectives	Students will have the ability to trace the questions about the origin and structure of the matter surrounding us back to the question of the fundamental building blocks and their interactions. They will be familiar with the methods and detection devices used in experimental research in particle and nuclear physics. They will understand the great similarities in the description of all interactions and be able to trace them back to a common basic principle, and will be able to analyze their significance for cosmological questions.	
Content	The module covers the construction and interpretation of the essential experiments for testing or discovering the characteristic properties of interactions and elementary particles as well as the discussion of the phenomenology of the Standard Model using Feynman diagrams. The module also covers the basics of symmetry principles and Lagrange densities for understanding the fundamental vertices of all interactions relevant to elementary particles, properties of nuclei (based on the physics of their constituents), models for describing the binding of nucleons in nuclei and the resulting consequences for the stability and decay of nuclei, as well as other areas of application in particle and nuclear physics, such as how energy generation from nuclear transformations works.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the week exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Experimental Physics I – Mechanics, Heat, Experimental Physics II – Electromagnetism, Optics, Mathematical Methods in Physics, Theoretical Mechanics, Theoretical Electrodynamics as well as Quantum Theory I – Basic Concepts.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the module Advanced Specialization Course Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn six credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 180 hours.	

Module duration	The module comprises one semester.

Module number	Module name	Responsible lecturer
Phy-Ba-TP1	Mathematical Methods in Physics	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will have an insight into the systematizing way of thinking and formal description of physical theories. They will master basic calculation methods in physics. Students will be able to apply this knowledge to a wide range of problems using mathematical methods.	
Content	The module covers vector algebra, differentiation, integration, functions of several variables, Taylor expansion, complex numbers, vector analysis (coordinate transformations, Nabla operator, integral theorems) as well as ordinary differential equations, distributions and Fourier transformation.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Theoretical Mechanics, Theoretical Electrodynamics, Particle and Nuclear Physics as well as Quantum Theory I – Basic Concepts.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-TP2	Theoretical Mechanics	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will know and understand the systematizing way of thinking and formal description of mechanics. They will understand the models of theoretical physics of individual mass points and can work on the problems of mechanics analytically. Students will be able to apply this knowledge and mathematical methods to a wide range of problems in mechanics.	
Content	The module covers the kinematics of the mass point, Newton's equation of motion, conservation laws, central force problem, two-body and multi-body problem, non-linear dynamics, Galilei transformation and Lorentz transformation, special theory of relativity (also covariant formulation) and equivalent formulations of theoretical mechanics (Lagrange I+II, Hamilton, Poisson bracket), symmetries, rigid bodies, gyroscopes.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	Participants require skills acquired in the module Mathematical Methods in Physics.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Theoretical Electrodynamics, Particle and Nuclear Physics as well as Quantum Theory I – Basic Concepts.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-TP3	Theoretical Electrodynamics	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will know and understand the systematizing way of thinking and formal description of electrodynamics. They will be able to understand physical processes and relationships with the help of Maxwell's equations, and to describe them analytically and quantitatively. Students will be able to apply the knowledge they have acquired to a broad spectrum of electromagnetic phenomena. They will have general problem-solving skills and analytical thinking skills.	
Content	Contents of the module are the basic equations of electrodynamics, electrostatics, magnetostatics, electromagnetic waves, fields of time-dependent charge and current distributions, covariant formulation and electromagnetic fields in media.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Mathematical Methods in Physics as well as Theoretical Mechanics.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Quantum Theory I – Basic Concepts as well as Particle and Nuclear Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-TP4	Quantum Theory I – Basic Concepts	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will know and understand the systematizing way of thinking and formal description of quantum mechanics. They will be able to derive fundamental quantum effects from the postulates of quantum theory and to describe them analytically and quantitatively. Students will be able to apply the knowledge they have acquired to a broad spectrum of quantum physical phenomena. They will have general problem-solving skills and enhanced analytical thinking skills.	
Content	Contents of the module are the quantum mechanical state, quantum mechanical operators, measured values of observables, Hilbert space, the Schrödinger equation, time evolution, stationary solutions, one-dimensional problems, harmonic oscillator as well as the angular momentum operators, hydrogen atom and spin. The module also covers the measurement process in quantum theory and approximation methods (time-independent and time-dependent perturbation calculation, variational methods, WKB).	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the modules Mathematical Methods in Physics, Theoretical Mechanics as well as Theoretical Electrodynamics.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Solid-State Physics, Particle and Nuclear Physics, Thermodynamics and Statistical Physics as well as Quantum Theory II – Advanced Concepts.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-TP5	Thermodynamics and Statistical Physics	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will be able to quantitatively describe the thermodynamic properties of classical and quantum mechanical many-body systems using basic concepts of statistical physics. They will be able to apply their knowledge to a wide range of complex systems. They will have general problem-solving skills and enhanced analytical thinking skills.	
Content	The module covers the fundamentals of statistical physics, the microscopic description of many-body systems, the laws of thermodynamics, thermodynamic potentials and ideal quantum gases, Bose and Fermi statistics.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the module Quantum Theory I – Basic Concepts.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the module Advanced Specialization Course Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-TP6	Quantum Theory II – Advanced Concepts	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	Students will be able to apply advanced concepts of quantum theory to complex issues and to solve complex problems of quantum theory independently. They will have general problem-solving skills and enhanced analytical thinking skills.	
Content	The module comprises identical particles (Second quantization), relativistic quantum theory and scattering theory.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the module Quantum Theory I – Basic Concepts.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	**Module name**	**Responsible lecturer**
Phy-Ba-MA1	Linear Algebra	Director of the Institute of Algebra (i.algebra@tu-dresden.de)
Qualification objectives	Students will be able to deepen and expand their mathematical skills by independently applying mathematical concepts and methods of linear algebra to physics. They will be able to solve problems independently and think analytically and critically.	
Content	The module covers the basics of linear algebra such as complex numbers, matrices, linear systems of equations, linear mappings in finite-dimensional vector spaces, eigenvalue theory and principal axis transformation.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Analysis – Advanced Concepts as well as Advanced Analysis for Physicists.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes. Preliminary academic work comprises a collection of module-related tasks.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-MA2	Analysis – Basic Concepts	Director of the Institute of Analysis (i.analysis@tu-dresden.de)
Qualification objectives	Students will know and understand the systematic and structured organization of the basic mathematical definitions and statements of analysis based on mathematical definitions and proofs. They will master important proof strategies and have basic skills and abilities to investigate mathematical facts and solve simple mathematical problems using analysis.	
Content	Contents of the module are real numbers, complete induction, real and complex sequences and series, elementary functions, limits of functions, continuity and advanced properties of functions.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Analysis – Advanced Concepts as well as Advanced Analysis for Physicists.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes. Preliminary academic work comprises a collection of module-related tasks.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	**Module name**	**Responsible lecturer**
Phy-Ba-MA3	Analysis – Advanced Concepts	Director of the Institute of Analysis (i.analysis@tu-dresden.de)
Qualification objectives	Students will know and understand the systematic and structured organization of the advanced statements of analysis based on mathematical definitions and proofs. They will be able to use their advanced knowledge of analysis to solve abstract mathematical problems. They will be proficient in advanced proof and solution strategies and have general problem-solving skills and analytical thinking skills.	
Content	The module covers differential calculus with Taylor's theorem, implicit function theorem, extremum problems with and without constraints as well as integral calculus with Riemann integral, Fubini's theorem and the substitution rule.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises and self-study.	
Prerequisites	Participants require skills acquired in the modules Linear Algebra as well as Analysis – Basic Concepts.	
Applicability	This module is a compulsory module in the Bachelor’s degree program in Physics. It fulfills the requirements for the module Advanced Analysis for Physicists.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes. Preliminary academic work comprises a collection of module-related tasks.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-MA4	Advanced Analysis for Physicists	Director of the Institute of Analysis (i.analysis@tu-dresden.de)
Qualification objectives	Students will master the mathematical fundamentals of theoretical physics, in particular electrodynamics and quantum physics. They will have the skills to deal with more complex mathematical structures and apply them to solve problems in physics. They will have the basic skills to work independently on well-defined problems in the areas covered and have in-depth analytical skills, a developed understanding of mathematical relationships and analytical-critical thinking skills.	
Content	The module covers ordinary differential equations, partial differential equations including weak solutions and variational methods. In addition, the module includes the basics of the theory of distributions with reference to partial differential equations, functional analysis including operators in Hilbert space and spectral theory. Complex analysis (theory of functions of a complex variable) and integration on manifolds and vector analysis are also part of the module.	
Teaching and learning methods	The module comprises 8 hours per week lectures, 4 hours per week exercises and self-study.	
Prerequisites	Participants require skills acquired in the modules Linear Algebra, Analysis – Basic Concepts as well as Analysis – Advanced Concepts.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 120 minutes.	
Credit points and grades	Participants can earn 14 credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each year, starting in the winter semester.	
Workload	The workload comprises a total of 420 hours.	
Module duration	The module comprises two semesters.	

Module number	Module name	Responsible lecturer
Phy-Ba-Pr1	Introductory Lab Course and Basic Lab Course I – Mechanics and Heat	Lab management of the Faculty of Physics (physikpraktikum@tu-dresden.de)
Qualification objectives	Students will be able to apply their theoretical and experimental knowledge in practice. They will master basic experimental skills in the fields of mechanics and thermodynamics, know important measuring instruments and measuring techniques and have knowledge of how to scientifically deal with measurement uncertainties. They will be able to work in a team, develop solutions together and critically analyze measurement results. They will also have the ability to express themselves orally and in writing. They will be able to use computer and programming techniques for the statistical evaluation and presentation of measurement results.	
Content	Contents of the module are basic concepts of statistical data analysis, computer and programming techniques with an emphasis on the evaluation and presentation of physical measurement results. The module also includes basic experiments in the fields of mechanics (e.g. mechanical vibrations, hydrodynamics, elastic properties) and thermodynamics (e.g. heat capacities, changes of state, conversion energy, gases).	
Teaching and learning methods	The module comprises 3 hours per week lectures, 2 hours per week exercises, 6 hours per week practical training and self-study.	
Prerequisites	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the modules Basic Lab Course II – Electromagnetism, Optics as well as Basic Lab Course III – Structure of Matter.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 30 hours.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each year, starting in the winter semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises two semesters.	

Module number	Module name	Responsible lecturer
Phy-Ba-Pr2	Basic Lab Course II – Electromagnetism, Optics	Lab management of the Faculty of Physics (physikpraktikum@tu-dresden.de)
Qualification objectives	Students will be able to apply their theoretical and experimental knowledge in practice. They will master basic experimental skills in the fields of electrodynamics and optics. They will also have initial experience in independent laboratory work. They will be able to statistically evaluate the recorded measurement data and can scientifically document their experiments and results. They will be able to work scientifically in a team, work on tasks independently and together and generate solutions. In addition, they will be able to critically analyze measurement results and have strengthened oral and written expression skills.	
Content	The module includes basic experiments in the fields of electrodynamics (e.g. electric or magnetic fields, induction, electric circuits) and optics (e.g. optical imaging, interferometry, polarization, diffraction).	
Teaching and learning methods	The module comprises 5 hours per week practical training and self-study. The practical training will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the module Introductory Lab Course and Basic Lab Course I – Mechanics and Heat.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics. It fulfills the requirements for the module Advanced Lab Course.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 25 hours.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-Pr3	Basic Lab Course III – Structure of Matter	Lab management of the Faculty of Physics (physikpraktikum@tu-dresden.de)
Qualification objectives	Students will be able to practically apply their theoretical and experimental knowledge in the field of the structure of matter. They will have experimental skills for investigating the structure of matter and have in-depth experience in independent laboratory work. They will be familiar with sophisticated statistical evaluation methods and be able to document, describe and explain experimental procedures, measurement results and evaluations of measurement data. They will also be able to think critically and analytically. They will have personal skills such as the ability to express themselves orally and in writing, including in English, teamwork, presentation skills, time management and work organization.	
Content	The module covers basic experiments to investigate the structure of matter (e.g. atomic and nuclear physics experiments, structural analysis, spectra, basic experiments on quantum mechanics (Franck-Hertz experiment, Millikan experiment, Zeeman effect, superconductivity)).	
Teaching and learning methods	The module comprises 6 hours per week practical training and self-study. The practical training will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the module Introductory Lab Course and Basic Lab Course I – Mechanics and Heat as well as English language skills at basic course baccalaureate (*Abitur*) level.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 40 hours.	
Credit points and grades	Participants can earn seven credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 210 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-Pr4	Advanced Lab Course	Lab management of the Faculty of Physics (physikpraktikum@tu-dresden.de)
Qualification objectives	Students will be able to apply their advanced theoretical and experimental knowledge in practice. They will be able to independently carry out experiments in applied physics, solid state and material physics or nuclear and particle physics using complex measuring systems and apply modern evaluation methods. They will also be able to prepare, present and discuss their results scientifically at an advanced level. They will have personal skills such as the ability to express themselves orally and in writing, including in English, teamwork, presentation skills, time management and work organization.	
Content	The contents of the module are experiments in modern physics from the research areas of applied physics, solid state and material physics or nuclear and particle physics.	
Teaching and learning methods	The module comprises 8 hours per week practical training and self-study. The practical training will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require skills acquired in the module Basic Lab Course II – Electromagnetism, Optics as well as English language skills at basic course baccalaureate (*Abitur*) level.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessment equating to 50 hours.	
Credit points and grades	Participants can earn ten credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 300 hours.	
Module duration	The module comprises one semester.	

Module number	**Module name**	**Responsible lecturer**
Phy-Ba-CP	Computational Physics	Prof. Roland Ketzmerick (roland.ketzmerick@tu-dresden.de)
Qualification objectives	Students will be able to solve and visualize physical problems from the fields of mechanics, electrodynamics, quantum mechanics and statistical physics using numerical methods. Students will have the ability to use suitable numerical methods and to critically evaluate the results.	
Content	The module includes the numerical solution of ordinary differential equations, the setting up and numerical solution of eigenvalue problems as well as the numerical determination of the dynamics of wave packets. The module also covers numerical methods such as Fourier transformation, random numbers, stochastic processes and Monte Carlo methods.	
Teaching and learning methods	The module comprises 2 hours per week lectures, 2 hours per week exercises and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty.	
Prerequisites	Participants require English language skills at basic course baccalaureate (*Abitur*) level.	
Applicability	This module is a compulsory module in the Bachelor's degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 60 hours.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-AQ	General Qualifications	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students will have personal, social and intercultural skills as well as key qualifications in the areas of communication skills, interdisciplinarity, project and time management, cooperation and teamwork skills, foreign language – in particular the use of English as a technical and academic language. They are also capable of social commitment and have extended knowledge in a subject of general academic education. They also have knowledge or skills in one or more subject areas relating to life in a diverse and pluralistic society.	
Content	The module covers topics of current physics such as theoretical physics, nuclear and particle physics, solid state and material physics or applied physics. In addition, depending on the student's choice, the module includes subject areas that deal with living together in a diverse and pluralistic society, including areas of social engagement or general academic education. Possible topics include sustainability, democracy, globalization, digitalization, science communication, diversity and internationalization.	
Teaching and learning methods	The module comprises 2 hours per week seminar, 6 hours per week practical further education and self-study. The seminar will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty. The courses are be chosen from the catalog General Qualifications. The catalog including the required examinations will be announced at the beginning of each semester in the usual manner by the Faculty.	
Prerequisites	Participants require English language skills at basic course baccalaureate (*Abitur*) level.	
Applicability	This module is a compulsory module in the Bachelor’s degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of an ungraded examination specified in the General Qualifications catalog.	
Credit points and grades	Participants can earn eight credit points for this module. The module examination will only be graded as either “pass” or “fail”.	
Module frequency	The module is offered each semester.	
Workload	The workload comprises a total of 240 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-PV	Advanced Specialization Course Physics	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students deal scientifically and critically with a special field of physics (specialization) such as applied physics, solid state and material physics, biophysics, particle and nuclear physics, theoretical physics or comparable topics. They will be able to acquire new knowledge independently through research. They can prepare their findings in a scientifically correct manner and present results in writing in a problem-oriented way. They are also able to grasp, process and understand current physics topics independently. Students will be able to use English as a scientific language.	
Content	The module comprises one of the following five specializations of the student's choice: - Applied solid state physics and photonics, - Solid state and material physics, - Soft condensed matter and biological physics, - Particle and nuclear physics, - Theoretical physics.	
Teaching and learning methods	The module comprises lectures and exercises with a total of 4 hours per week and self-study. The lecture and the exercises will be held in either German or English. This will be specified by the lecturer at the beginning of each semester and announced in the usual manner by the Faculty. The courses are be chosen from the catalog Advanced Specialization Course Physics. This will be announced at the beginning of each semester in the usual manner by the Faculty.	
Prerequisites	Depending on the chosen specialization, participants are required to have skills in theoretical or experimental physics, such as those acquired in the Thermodynamics and Statistical Physics module for Theoretical Physics, in the Particle and Nuclear Physics module for Particle and Nuclear Physics, and in the Solid-State Physics module for all other specializations. Participants require English language skills at basic course baccalaureate (*Abitur*) level.	
Applicability	This module is a compulsory module in the Bachelor’s degree program in Physics.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessment equating to 60 hours.	
Credit points and grades	Participants can earn five credit points for this module. The module examination will only be graded as either “pass” or “fail”.	
Module frequency	The module is offered each semester.	

Workload	The workload comprises a total of 150 hours.
Module duration	The module comprises one semester.

Module number	Module name	Responsible lecturer
Phy-Ba-NP1	Non-Physics Elective Module Chemistry	Dean of Studies of the Faculty of Chemistry and Food Chemistry (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	Students will understand basic chemical facts and relationships and will be able to link these to corresponding experiments. They will be able to think in an interdisciplinary way by combining chemical and physical ways of thinking. They will have teamwork and problem-solving skills and be aware of chemical-related environmental protection issues.	
Content	The module covers the fundamentals of the chemistry of main group and transition elements as well as the major inorganic compounds with their chemical and physical properties. The module also covers the importance of occupational safety in chemical laboratories and the proper handling and disposal of chemicals.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 1 hour per week exercises, 3 hours per week practical training and self-study.	
Prerequisites	None.	
Applicability	This module is one of four elective compulsory modules in the Bachelor's degree program in Physics, one of which must be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes and a portfolio equating to 30 hours.	
Credit points and grades	Participants can earn eight credit points for this module. The module grade is calculated from the weighted average grade of the examined assessments. The grade of the written test is weighted two times, the grade of the portfolio one times.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 240 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-NP2	Non-Physics Elective Module Electronics	Dr.-Ing. Jörg Herricht (joerg.herricht@tu-dresden.de)
Qualification objectives	Students will have knowledge of the basics of electronics. They will be able to understand, symbolically and numerically analyze electronic circuits and devices according to their function as a basis for the independent development of device specifications and new developments. They will be able to examine typical properties of analog and digital circuits and to measure them. They will be able to set up and investigate amplifier circuits and circuits for data acquisition and signal transmission using operational amplifiers and simple and complex digital circuits with reference to applications in physical measurement technology.	
Content	The module covers linear networks, basic circuit and resistive networks, capacitive, inductive and non-linear two-poles, electrical networks with harmonic excitation, semiconductor components, analog and digital circuits, circuit realization and interfaces/measurement data acquisition.	
Teaching and learning methods	The module comprises 4 hours per week lectures, 2 hours per week exercises, 1 hour per week practical training and self-study.	
Prerequisites	In accordance with § 6 para. 7 of the study regulations, a prior entrance test is required for participation in the lab, if the written examination for this module has not already been graded at least "pass" (4.0).	
Applicability	This module is one of four elective compulsory modules in the Bachelor's degree program in Physics, one of which must be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 180 minutes and a portfolio equating to 20 hours.	
Credit points and grades	Participants can earn eight credit points for this module. The module grade is calculated from the weighted average grade of the examined assessments. The grade of the written test is weighted two times, the grade of the portfolio one times.	
Module frequency	The module is offered each year, starting in the winter semester.	
Workload	The workload comprises a total of 240 hours.	
Module duration	The module comprises two semesters.	

Module number	Module name	Responsible lecturer
Phy-Ba-NP3	Non-Physics Elective Module Computer Science	Prof. Dr. Heiko Vogler (heiko.vogler@tu-dresden.de)
Qualification objectives	Students will understand the basics of programming and can apply different classes of algorithms. They will be able to think in an interdisciplinary way and can demonstrate practical solutions to issues of computer science and media computer science. They will have personal and social skills such as the ability to work in a team, time management and public speaking and presentation skills.	
Content	The module covers the basics of imperative programming (syntax diagrams, EBNF, functions, modules, data structures) and algorithms for processing classical problems (sorting and search methods, algorithms on trees and graphs). The module also includes various classes of algorithms (divide-and-conquer, dynamic programming, iteration versus recursion, backtracking) and complexity analysis.	
Teaching and learning methods	The module comprises 2 hours per week lectures, 2 hours per week exercises, 4 hours per week practical training and self-study.	
Prerequisites	None.	
Applicability	This module is one of four elective compulsory modules in the Bachelor's degree program in Physics, one of which must be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes and a complex assessment equating to 80 hours.	
Credit points and grades	Participants can earn eight credit points for this module. The module grade is calculated from the unweighted average grade of the examined assessments.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 240 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Phy-Ba-NP4	Non-Physics Elective Module Philosophy	Prof. Dr. Gerhard Schönrich (gerhard.schoenrich@tu-dresden.de)
Qualification objectives	Students will have basic content-related and methodological skills in the subject of philosophy. They will have basic knowledge of logic and be familiar with the forms and problems of philosophical argumentation. They will be able to view natural science and technology in their mutual relationship as well as under scientific-theoretical, epistemological, cultural, ecological or social aspects.	
Content	The module covers the basics of philosophy. At the student's choice, the module includes either the basics of logic or the introduction to theoretical philosophy. The module also includes topics on the main movements in the philosophy of science, general philosophy of science and epistemology.	
Teaching and learning methods	The module comprises lectures, exercises and seminars with a total of 8 hours per week and self-study. The courses are be chosen from the catalog Non-Physics Required Elective Module for the Bachelor's degree program in Physics. This will be announced at the beginning of each semester in the usual manner by the Faculty.	
Prerequisites	None.	
Applicability	This module is one of four elective compulsory modules in the Bachelor's degree program in Physics, one of which must be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes and a non-public oral examination lasting 20 minutes as an individual examination.	
Credit points and grades	Participants can earn eight credit points for this module. The module grade is calculated from the unweighted average grade of the examined assessments.	
Module frequency	The module is offered each semester.	
Workload	The workload comprises a total of 240 hours.	
Module duration	The module comprises two semesters.	

Annex 2:
Study schedule
including type and scope of the courses in hours per week as well as required academic work, the type, scope and design of which can be found in the module descriptions

Module number	Module name	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	CP
		L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	
Compulsory field Experimental Physics								
Phy-Ba-EP1	Experimental Physics I – Mechanics, Heat	4/2/0/0/0 Ex						6
Phy-Ba-EP2	Experimental Physics II – Electromagnetism, Optics		4/2/0/0/0 Ex					6
Phy-Ba-EP3	Experimental Physics III – Waves and Quanta			4/2/0/0/0 Ex				6
Phy-Ba-EP4	Atomic and Molecular Physics				4/2/0/0/0 Ex			6
Phy-Ba-EP5	Solid-State Physics					4/2/0/0/0 Ex		6
Phy-Ba-EP6	Particle and Nuclear Physics					4/2/0/0/0 Ex		6
Compulsory field of Theoretical Physics								
Phy-Ba-TP1	Mathematical Methods in Physics	4/2/0/0/0 Ex						7
Phy-Ba-TP2	Theoretical Mechanics		4/2/0/0/0 Ex					7
Phy-Ba-TP3	Theoretical Electrodynamics			4/2/0/0/0 Ex				7
Phy-Ba-TP4	Quantum Theory I – Basic Concepts				4/2/0/0/0 Ex			7
Phy-Ba-TP5	Thermodynamics and Statistical Physics					4/2/0/0/0 Ex		7
Phy-Ba-TP6	Quantum Theory II – Advanced Concepts						4/2/0/0/0 Ex	7
Compulsory field of Mathematics								
Phy-Ba-MA1	Linear Algebra	4/2/0/0/0 PA, Ex						7
Phy-Ba-MA2	Analysis – Basic Concepts	4/2/0/0/0 PA, Ex						7
Phy-Ba-MA3	Analysis – Advanced Concepts		4/2/0/0/0 PA, Ex					7
Phy-Ba-MA4	Advanced Analysis for Physicists			4/2/0/0/0	4/2/0/0/0 Ex			14
Compulsory field Physical Lab Course and Computational Physics								
Phy-Ba-Pr1	Introductory Lab Course and Basic Lab Course I – Mechanics and Heat	2/2/0/1/0	1/0/0/5/0 Ex					7
Phy-Ba-Pr2	Basic Lab Course II – Electromagnetism, Optics			0/0/0/5/0 Ex				5
Phy-Ba-Pr3	Basic Lab Course III – Structure of Matter				0/0/0/6/0 Ex			7
Phy-Ba-Pr4	Advanced Lab Course					0/0/0/8/0 Ex		10
Phy-Ba-CP	Computational Physics						2/2/0/0/0 Ex	5
Compulsory field Qualifications								
Phy-Ba-PV	Advanced Specialization Course Physics						*/*/0/0/0 Ex	5
Phy-Ba-AQ	General Qualifications		0/0/2/0/6 Ex					8

Module number	Module name	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	CP
		L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	L/E/S/P/PE	
Elective compulsory field[1]								
Phy-Ba-NP1	NP Chemistry			4/1/0/3/0 2x Ex				8
Phy-Ba-NP2	NP Electronics			4/2/0/0/0 Ex	0/0/0/1/0 Ex			8
Phy-Ba-NP3	NP Computer Science			2/2/0/4/0 2x Ex				8
Phy-Ba-NP4	NP Philosophy			**/**/**/0/0 Ex	**/**/**/0/0 Ex			8
							Bachelor's thesis Colloquium	10 2
CP		30	32	29 or 33[2]	27 or 31[2]	29	29	180

[1] Alternatively, depending on the student's choice, one of four elective compulsory modules.

[2] Alternatively, according to the choice of the elective compulsory module.

* Alternatively, depending on the student's choice, courses totaling 4 hours per week according to the Advanced Specialization Course Physics catalog.

** Alternatively, depending on the student's choice, courses totaling 8 hours per week according to the Non-Physics Elective Module for the Bachelor's degree program in Physics.

M mobility window pursuant to § 6 para. 1 sentence 2 Study Regulations

L	Lecture	Ex	Examination(s)
E	Exercise	PA	Preliminary academic work
S	Seminar	NP	Non-Physics Elective Module
P	Practical Training	PE	Practical further education
CP	Credit Points		