Technische Universität Dresden
Faculty of Chemistry and Food Chemistry

Study Regulations
for the Bachelor's degree program in Chemistry
from winter semester 2024/2025

Consolidated version of the official announcements of TU Dresden of March 29, 2022 and the First Amending Statute of the Study Regulations of February 22, 2024.

This is valid for all students newly enrolled in the Bachelor's degree program Chemistry in the winter semester 2024/25 or later, as well as all enrolled students who have provided a written declaration of their transfer.

Please note that the English translation is provided for information purposes only. The English text is not legally binding. Only the original German document has legal validity. The official language at TU Dresden is German. German jurisdiction applies.

Technische Universität Dresden
Faculty of Chemistry and Food Chemistry

Study Regulations for the Bachelor's degree program Chemistry

as of March 29, 2022
(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 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 Chemistry at Technische Universität Dresden.

§ 2
Objectives of the degree program

(1) Upon completion of the Bachelor's degree program in Chemistry, students will have a command of the theoretical and practical fundamentals of the subject of chemistry and they will be able to solve scientific and technical problems on the basis of natural scientific approaches. They know properties of elements as well as compounds and are familiar with synthesis methods and the basic characterization of chemical substances. Upon completion of the program, students will be proficient in both independent work and interdisciplinary collaboration with other scientists or other professionals. In the interweaving of chemistry with other related disciplines, such as mathematics, physics and biology in particular, students are able to apply the interdisciplinary working methods of a chemist in an exemplary manner. They are able to work scientifically referring to specialist and methodological knowledge as well as the rules of academic integrity and assume their responsibility as a natural scientist. In particular, they are cognizant of how to handle hazardous substances, allowing them to judge and act in a socially responsible manner. Students possess general skills such as teamwork, communication and presentation skills, time and organizational management, and critical self-reflection. They have strengthened their English language skills.

(2) Thanks to their broad fundamental education in chemistry and the natural sciences, graduates possess a wide range of specialist and methodological knowledge as well as practical skills, which they usually deepen in a consecutive Master's degree program in Chemistry in order to meet international standards. Chemists may work in chemical and pharmaceutical industries, automotive and food industries, petroleum industries, energy and environmental sectors, or universities and research institutions.

§ 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, independent study, supervised practice periods, and the final 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, seminars, practical training, exercises and self-study.

(2) Lectures introduce the subject matter of the modules. 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 training serves to apply the subject matter taught and to acquire practical skills in potential areas of employment. Exercises allow to apply the subject matter in exemplary sub-areas. Self-study allows students to consolidate what they have learned on their own and to set their own emphases.

§ 6
Structure and organization of the degree program

(1) The program is organized in modules. The curriculum is divided into six semesters. The fifth 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 concentration. Students can choose between the modules Fundamentals of Biochemistry, Macromolecular Chemistry and Sustainable Aspects of Industrial and Circular Chemistry. The selection is binding. A concentration can be re-selected once; 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, contents, comprehensive teaching and learning methods, requirements, usability, frequency, workload, and duration of the individual modules are listed in the module descriptions (Annex 1).

(4) The courses are held in German or, if indicated by the module descriptions, in English. If a module involves the acquisition of foreign language qualifications, courses may also be held in the respective language in accordance with the content and qualification objectives.

(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 shall be announced at the beginning of the semester as is customary at the faculty. The amended study schedule shall apply to all students who have been informed about this as is customary at 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) If participation in a course of an elective compulsory module is limited by the number of available places as specified in the module description, the participants will be selected by drawing lots. Students must enroll in the appropriate courses to be considered for admission to these

modules. The form and deadline for registering will be announced to students as is customary at the faculty in due course. Elective compulsory modules with restricted participation in courses according to sentence 1 will only be deemed a binding selection pursuant to para. 2 sentence 2 if the student is a selected participant.

(8) For the laboratory training in the modules Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electrical Science, Chemistry of Main Group Elements, Chemistry of Transition Elements and Coordination Chemistry, Preparative Inorganic Chemistry, Practice of Instrumental Analysis, Reaction Classes and Mechanisms of Organic Chemistry, Preparative Application of Modern Synthesis Methods in Organic Chemistry, Fundamentals of Physical Chemistry: Electrochemistry and Kinetics, Fundamentals of Physical and Theoretical Chemistry, Special Physical Chemistry, Advanced Theoretical Chemistry, Fundamentals of Biochemistry, Macromolecular Chemistry and Sustainable Aspects of Industrial and Circular Chemistry, students must prove the knowledge that is required to successfully complete the training through non-graded entrance tests in written or oral form. These tests serve to verify that the student is familiar with the safety-related, equipment-related and substance-chemical aspects in order to avoid endangering themselves, other people or the environment. The assessment of the entrance tests is not included in the assessment of the respective module examinations.

§ 7
Content of the degree program

The degree program comprises the area of inorganic chemistry (fundamentals of chemistry, main group and transition elements, inorganic solid state, molecular and complex chemistry), the area of physical chemistry (kinetic gas theory, fundamentals of thermodynamics and phase equilibria, phase boundaries/surfaces, electrochemistry, kinetics, quantum mechanical theory of chemical bonding and spectroscopy, quantum chemical computational methods, and photochemistry), the area of organic chemistry (fundamentals and classes of substances, reaction classes and mechanisms, and applications of organic chemistry), and the area of analytical chemistry (general knowledge of analytical chemistry, instrumental analysis, and molecular structure determination). Furthermore, it includes the area of technical chemistry (chemical reaction engineering and chemical process technologies), biochemistry (descriptive and functional biochemistry) and macromolecular chemistry (fundamentals of macromolecular chemistry). In the field of mathematics, the program includes fundamental mathematical training in the areas of complex numbers, differential and integral calculus, Euclidean geometry, elements of linear algebra and vector algebra, rational functions, and polynomial functions. In the field of physics, the program includes fundamental physical education in mechanics, thermodynamics, electricity, electrodynamics, optics, as well as waves and quanta. Moreover, the program includes English language training.

§ 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, and the final thesis.

(2) The module descriptions indicate the number of credits that can be earned by each module. Credits are awarded upon passing the module examination. § 34 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 Chemistry and Food Chemistry. This subject-specific advisory service assists students with regard to the design 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
Amendments to module descriptions

(1) In order to amend to changed conditions, the module descriptions may be adapted in a simplified procedure in order to optimize study organization, with the exemption of the fields “module name", "qualification objectives", "contents", "teaching and learning methods", "requirements for earning credit points", and "credit points and grades" as well as "duration of the module".

(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 shall be published as is customary at the faculty.

Annex 1: Module descriptions

Module number	Module name	Responsible lecturer
Chem-Ba-MAT	Fundamentals of Mathematics for Chemistry and Food Chemistry	Prof. Gunar Matthies (gunar.matthies@tu-dresden.de)
Qualification objectives	The students have basic knowledge in the areas of complex numbers, differential and integral calculus, Euclidean geometry, elements of linear algebra, polynomial functions and can handle them confidently. They are able to apply their knowledge to problems in their field and independently deepen the acquired knowledge.	
Content	The module includes an overview of mathematical fundamentals from the areas of complex numbers, differential and integral calculus, Euclidean geometry, elements of linear algebra, and polynomial functions.	
Teaching and learning methods	The module comprises lecture (3 hours per week), exercise (4 hours per week) and self-study.	
Prerequisites for participation	Participants require knowledge of mathematic at university entrance-level proficiency.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Fundamentals of Physical Chemistry: Electrochemistry and Kinetics, Fundamentals of Theoretical Chemistry, Instrumental Analysis as well as Orientation Module for Chemistry.	
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 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
Chem-Ba-PH1	Physics for Chemistry and Food Chemistry – Mechanics, Hydro-dynamics and Thermodynamics	Prof. Stefan Kaiser (stefan.kaiser@tu-dresden.de)
Qualification objectives	Students will be able to present the physical fundamentals of mechanics, hydrodynamics and thermodynamics. They will also be able to apply this knowledge of physical principles to problems in their field.	
Content	The module includes an overview of physical principles from the fields of mechanics, hydrodynamics and thermodynamics using chemistry-relevant examples.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require knowledge of physics at university entrance-level proficiency.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electricity Theory, Instrumental Analysis as well as Fundamentals of Physical Chemistry: Electrochemistry and Kinetics.	
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 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
Chem-Ba-PH2	Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electricity Theory	Prof. Stefan Kaiser (stefan.kaiser@tu-dresden.de)
Qualification objectives	Students will be able to present the physical fundamentals of the fields of electrodynamics, optics, and waves and quanta. They will also be able to apply this knowledge of basic physics to problems in their field. Students will be able to apply their theoretical and experimental knowledge in the fields of mechanics, thermodynamics, electrodynamics and optics by learning basic experimental skills and critically analyzing physical measurement results.	
Content	The module includes an overview of basic physics from the fields of electrodynamics, optics, waves, and quanta using examples relevant to chemistry. The module also includes practical and experimental fundamentals in mechanics, thermodynamics, electrodynamics and optics.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Physics for Chemistry and Food Chemistry – Mechanics, Hydrodynamics and Thermodynamics. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Fundamentals of Theoretical Chemistry, Practical Fundamentals of Physical and Theoretical Chemistry as well as Orientation Module for Chemistry.	
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 5 hours, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	
Credit points and grades	Participants can earn five 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 summer semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ba-AC1	Chemistry of Main Group Elements	Prof. Stefan Kaskel (stefan.kaskel@tu-dresden.de)
		Additional lectures: Prof. Michael Ruck (michael.ruck@tu-dresden.de)
Qualification objectives	The students can classify the chemical elements in the periodic table and derive electron configuration, oxidation states and periodic properties. They can present the preparation, structural formulas and chemical properties of the elements and important inorganic compounds of the main group elements and place them in general chemical contexts. They are also able to set up reaction equations, perform stoichiometric calculations and apply basic concepts of chemistry. Students will be able to classify compounds based on their bonding ratios and discuss the geometric arrangement of atoms or ions in compounds. They know the qualitative detection reactions of selected elements, especially non-metals and their compounds. They can work in a chemical laboratory in a hazard-free manner and handle chemicals appropriately so that they are capable of socially responsible judgment and action. They are proficient in laboratory techniques of qualitative analysis and can separate selected main group elements by wet chemistry and detect them analytically in the laboratory as well as synthesize selected compounds of the main group elements.	
Content	The module covers the inorganic chemistry of the main group elements and their reactions. It also includes practical methods of qualitative analysis of the main group elements. Occupational safety in the chemical laboratory, proper handling and disposal of chemicals and environmental protection are further contents.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week), practical training (6 hours per week) and self-study.	
Prerequisites for participation	Participants require knowledge of chemistry at university entrance-level proficiency. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Chemistry of d-block Elements and Coordination Chemistry.	
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, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	

Credit points and grades	Participants can earn ten 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 seven times, the grade of the portfolio three times.
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
Chem-Ba-AC2	Chemistry of d-block Elements and Coordination Chemistry	Prof. Stefan Kaskel (stefan.kaskel@tu-dresden.de)
		Additional lectures: Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	Students can name and classify the chemical subgroup elements in the periodic table and derive essential information about their electron configuration, oxidation states and chemical reactions. They can discuss the representation of elements and selected compounds. In addition, they are able to describe the structures of coordination compounds and master their nomenclature. They know the qualitative detection reactions of selected transition metals and their compounds. They will be able to explain and apply laboratory techniques of qualitative and quantitative analysis. Students are able to analytically detect selected d-block elements in the laboratory, they can independently perform the wet chemical separation procedures for main group and d-block elements and they are able to prepare selected complexes and salts. Relevant laboratory techniques of quantitative analysis, in particular titration, gravimetry and photometry can be performed practically and they are able to quantify selected analytes in solutions and solids.	
Content	The module covers the inorganic chemistry of the d-block elements, coordination compounds and their reactions. In addition, it includes practical methods of qualitative analysis of the main group and d-block elements in the laboratory as well as the main methods of classical quantitative analysis.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (2 hours per week), practical training (8 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Chemistry of Main Group Elements as well as General and Analytical Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Concepts of Inorganic Chemistry as well as Fundamentals of Organic Chemistry.	
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, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	

Credit points and grades	Participants can earn ten 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 seven times, the grade of the portfolio three times.
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
Chem-Ba-AC3	Concepts of Inorganic Chemistry	Prof. Michael Ruck (michael.ruck@tu-dresden.de)
		Additional lectures: Prof. Stefan Kaskel (stefan.kaskel@tu-dresden.de); Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	Students can discuss the methods of synthesis of inorganic solids, molecules and materials and derive synthesis strategies from them. They can describe the main types of crystal structures and link them to the material properties as well as to the chemical bonding present. Furthermore, they can discuss the most important inorganic material classes based on their property profiles and are able to explain the physical fundamentals of the methods used to characterize inorganic compounds and materials and evaluate their measurement results. They are able to describe industrial material processing methods and processes as well as selected applications of inorganic materials. In addition, they are able to prepare special questions and explain complex issues in presentation and discussion.	
Content	Das Modul umfasst die stofflichen, methodischen und konzeptionellen Grundlagen der modernen anorganischen Festkörper-, Molekül- und Materialchemie sowie deren Anwendungen.	
Teaching and learning methods	The module comprises lecture (6 hours per week), seminar (2 hours per week), exercise (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Chemistry of d-block Elements and Coordination Chemistry, Instrumental Analysis as well as Fundamentals of Physical Chemistry: Electrochemistry and Kinetics.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Preparative Inorganic Chemistry as well as Orientation Module for Chemistry.	
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. Pre-examination is a presentation equating to 10 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
Chem-Ba-AC4	Preparative Inorganic Chemistry	Prof. Michael Ruck (michael.ruck@tu-dresden.de)
		Additional lectures: Prof. Stefan Kaskel (stefan.kaskel@tu-dresden.de); Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	Students are able to apply advanced synthesis and characterization methods of inorganic molecular, solid state and materials chemistry with moderate assistance. They link theoretical knowledge with practical skills and are able to handle vacuum, pressure, gas and refrigeration apparatus safely. They master sophisticated working techniques for the synthesis, handling and analysis of air- and moisture-sensitive compounds and materials as well as working with gases under high pressures and at high temperatures. They are able to classify different synthesis methods in terms of their suitability for different classes of compounds and evaluate the synthesis success using modern characterization methods. In addition, they are able to prepare special questions and explain complex issues in presentation and discussion.	
Content	The module covers the practical application of advanced synthesis and characterization methods in inorganic molecular, solid state, and materials chemistry.	
Teaching and learning methods	The module comprises seminar (2 hours per week), practical training (6 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Concepts of Inorganic Chemistry as well as Fundamentals of Organic Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 10 hours. Pre-examination is a presentation equating to 5 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 summer semester.	
Workload	The workload comprises a total of 150 hours.	

Module duration	The module comprises one semester.

Module number	Module name	Responsible lecturer
Chem-Ba-AN1	General and Analytical Chemistry	Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
		Additional lectures: Prof. Stefan Kaskel (stefan.kaskel@tu-dresden.de)
Qualification objectives	Students know the structure of atoms and can classify the elements in the periodic table based on the electron configurations. They are able to discuss periodic properties of the elements such as electronegativity, ionization energy and electron affinity. They will be able to assign the different types of chemical bonding as well as describe the bonding ratios of small molecules using MO theory and predict molecular geometry using VSEPR theory. Students will be able to calculate the concentrations of substances in acid-base and solubility equilibria. They know the basic concepts of classical quantitative analysis and are able to outline various methods for the quantitative determination of different analytes and use their theoretical knowledge to plan and evaluate appropriate experiments for quantification and assess the precision of analytical results.	
Content	The module covers the general principles and concepts of chemistry. It covers atomic structure, periodic properties of the elements and the main types of chemical bonding and their theoretical description, quantitative calculations of acid-base and redox equilibria, and insights into the kinetics of chemical reactions. The manifestations of matter and their classification in phase diagrams are also part of the module. The module covers basic knowledge of classical quantitative analysis. In addition to gravimetry, the focus is on measurement analysis methods using various basic chemical reactions (precipitation, acid-base, complex and redox reactions). An essential aspect is the evaluation and simulation of the corresponding titration curves. Furthermore, the module also includes the use of different separation methods (extraction, ion exchanger) for quantitative analysis.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Participants require knowledge of chemistry and mathematic at university entrance-level proficiency.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Instrumental Analysis as well as Chemistry of d-block Elements and Coordination Chemistry.	
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 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
Chem-Ba-AN2	Instrumental Analysis	Prof. Eike Brunner (eike.brunner@tu-dresden.de)
Qualification objectives	Students know and understand the basics of instrumental analysis and molecular structure determination. They have a sound understanding of the functionality and informative value of important instrumental analytical methods. They possess the necessary theoretical knowledge and skills to independently select and plan chemical analysis experiments appropriate to the problem.	
Content	Methodological focal points of the module include the diverse methods of spectroscopy, chromatography and electroanalytical methods. With regard to structural analysis, the module includes in particular NMR spectroscopy, mass spectrometry and optical spectroscopy. The module also covers the mathematical aspects of data evaluation/statistics and Fourier analysis/Fourier transformation, which are fundamental for analytical chemistry.	
Teaching and learning methods	The module comprises lecture (5 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules General and Analytical Chemistry, Fundamentals of Mathematics for Chemistry and Food Chemistry as well as Physics for Chemistry and Food Chemistry – Mechanics, Hydrodynamics and Thermodynamics.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Concepts of Inorganic Chemistry, Practice of Instrumental Analysis as well as Fundamentals of Organic Chemistry.	
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.	
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
Chem-Ba-AN3	Practice of Instrumental Analysis	Prof. Eike Brunner (eike.brunner@tu-dresden.de)
Qualification objectives	Students are able to plan, carry out and evaluate important experiments in instrumental analysis. They can select the appropriate method for solving an analytical problem and adapt it to the problem. They have in-depth knowledge of obtaining structural information from NMR, mass, infrared, Raman and UV/Vis spectra for the structure determination of molecules and learn the ability to apply it in practice.	
Content	The methodological focus of the module is on the diverse methods of spectroscopy and chromatography. The application of NMR spectroscopy, optical spectroscopy and mass spectrometry for structural analysis, especially in combination of methods is also the focus of the module.	
Teaching and learning methods	The module comprises seminar (2 hours per week), practical training (4 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Instrumental Analysis. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 55 hours and a written test lasting 90 minutes, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	
Credit points and grades	Participants can earn five 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 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ba-OC1	Fundamentals of Organic Chemistry	Prof. Thomas Straßner (thomas.strassner@tu-dresden.de)
Qualification objectives	The students can present and explain the basics of organic chemistry. They can explain important substance classes and functional groups and transfer their reactions. They are able to present and transfer the relationships between structure and reactivity and to apply the rules of nomenclature. Thus, the students are capable of interdisciplinary thinking. In addition, they have strengthened their problem-solving skills and their analytical-critical thinking ability.	
Content	The module teaches basic principles of organic chemistry concerning structure, properties and characterization of organic compounds. Further contents are important substance classes, functional groups and the rules of nomenclature.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Chemistry of d-block Elements and Coordination Chemistry, Instrumental Analysis as well as Fundamentals of Physical Chemistry: Electrochemistry and Kinetics.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Preparative Inorganic Chemistry, Reaction Classes and Mechanisms of Organic Chemistry as well as Orientation Module for Chemistry.	
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.	
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
Chem-Ba-OC2	Reaction Classes and Mechanisms of Organic Chemistry	Prof. Hans-Joachim Knölker (hans-joachim.knoelker@tu-dresden.de)
Qualification objectives	Students will be able to apply the methods of modern organic chemistry based on reaction classes and their molecular mechanisms, as well as the basic techniques of preparative organic chemistry. They will be able to describe the essential knowledge of reaction classes and reaction mechanisms of organic chemistry. Students will be able to describe the basic transformations of organic chemistry and apply them in synthesis sequences. They will be able to work in a chemical laboratory in a hazard-free manner and handle chemicals appropriately so that they are capable of socially responsible judgment and action.	
Content	The module covers reaction classes, reaction mechanisms, methods and techniques of modern organic chemistry, and basic organic chemistry transformations (such as substitution, elimination, addition, and pericyclic reactions), including synthesis sequences.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (2 hours per week), practical training (16 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Fundamentals of Organic Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Modern Methods of Organic Chemistry - Stereochemistry and Organometallics as well as Preparative Application of Modern Synthesis Methods in Organic Chemistry.	
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 portfolio equating to 10 hours, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	
Credit points and grades	Participants can earn fifteen 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 three times, the grade of the portfolio one times.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 450 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ba-OC3	Modern Methods of Organic Chemistry - Stereochemistry and Organometallics	Prof. Bernd Plietker (bernd.plietker@tu-dresden.de)
Qualification objectives	The students master the theoretical basics for the syntheses of multistage organic preparations. They can evaluate the different routes based on a consideration of contemporary parameters (step economy, atom economy, redox economy, etc.).	
Content	The module covers the field of synthetic organic chemistry with a focus on the fundamentals of organometallic and organic catalysis and stereoselective synthesis or catalysis. In addition, aspects of sustainability (step economics, redox economics, etc.) are contents of the module.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Reaction Classes and Mechanisms of Organic Chemistry.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
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.	
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
Chem-Ba-OC4	Preparative Application of Modern Synthesis Methods in Organic Chemistry	Prof. Bernd Plietker (bernd.plietker@tu-dresden.de)
Qualification objectives	Students are able to independently synthesize multistep organic preparations, purify them using chromatographic methods, and characterize the products using modern spectroscopic methods.	
Content	The module covers the field of synthetic organic chemistry, in particular organic stereochemistry, stereoselective synthesis and applications of modern organometallic reactions including catalysis. In addition, reactions using an inert gas atmosphere and modern methods of purification of substance mixtures by means of chromatographic methods are included in the module.	
Teaching and learning methods	The module comprises seminar (2 hours per week), practical training (7 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Reaction Classes and Mechanisms of Organic Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
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 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
Chem-Ba-PC1	Fundamentals of Physical Chemistry: Thermodynamics	Prof. Alexander Eychmüller (alexander.eychmueller@tu-dresden.de)
Qualification objectives	Students will be able to understand and describe basic knowledge of important parameters, definitions and equations of state of classical thermodynamics. They are able to outline the main theorems of thermodynamics and apply them to concrete problems. The students are also able to describe physical-chemical phenomena as well as to convert important parameters such as energies and quantities derived from them. They are also familiar with selected applications from thermodynamics and their significance for chemistry.	
Content	The module covers mathematical fundamentals of physical chemistry, systems, state functions, properties of gases, First Law of Thermodynamics (work, energy, heat, internal energy, enthalpy), Second Law of Thermodynamics (order and entropy, direction of processes, free energy, free enthalpy, driving force of reactions, chemical equilibrium), phase boundaries and phase transitions of pure substances, properties of interfaces. In addition, the module includes selected technical applications (Linde gas liquefaction, heat engines, heat pumps), thermodynamics of mixtures (activities, Raoult's law, Henry's law), colligative properties (boiling point increase, freezing point decrease, osmotic pressure), phase transitions of multicomponent systems.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require knowledge of chemistry at university entrance-level proficiency.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Fundamentals of Physical Chemistry: Electrochemistry and Kinetics.	
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. Bonus performance is a module-accompanying test equating to 10 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
Chem-Ba-PC2	Fundamentals of Physical Chemistry: Electrochemistry and Kinetics	Prof. Alexander Eychmüller (alexander.eychmueller@tu-dresden.de)
Qualification objectives	Students will be able to understand and outline basic principles of electrochemistry and kinetics. They are able to both describe physical-chemical phenomena from these subfields and calculate important parameters such as standard potentials or activation energies. The students are familiar with the structure and functioning of electrochemical cells and are able to quantitatively determine conversion energies in electrochemical processes. Furthermore, the students are able to set up and solve relevant elementary reactions of kinetics. The students know selected applications from electrochemistry (batteries, fuel cells, corrosion protection) and kinetics (catalysis) and their significance for chemistry.	
Content	The module covers in-depth mathematical principles of physical chemistry, electrochemical and galvanic cells, electrochemical voltage series, Nernst equation, properties of electrolyte solutions (ionic mobilities, transfer numbers), principles of batteries and fuel cells, kinetic equations, elementary reactions, catalysis, mass transport, kinetic gas theory, impact theory. Practical experiments on the above topics are also included.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week), practical training (4 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Mathematics for Chemistry and Food Chemistry, Physics for Chemistry and Food Chemistry – Mechanics, Hydrodynamics and Thermodynamics as well as Fundamentals of Physical Chemistry: Thermodynamics. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Practical Fundamentals of Physical and Theoretical Chemistry, Special Physical Chemistry, Concepts of Inorganic Chemistry as well as Fundamentals of Organic Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 20 hours. Bonus performance is a module-accompanying test equating to 10 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 summer semester.	
Workload	The workload comprises a total of 300 hours.	

Module duration	The module comprises one semester.

Module number	Module name	Responsible lecturer
Chem-Ba-PC3	Fundamentals of Theoretical Chemistry	Prof. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	Students can independently solve chemically relevant problems using modern theoretical methods and apply and interpret them to similar problems. They understand the basic concepts of quantum mechanics, the theory of chemical bonding, molecular spectroscopy as well as elementary principles of quantum chemical calculation methods and are able to present them. Thus, they have an understanding of the physical and chemical properties of substances and their mathematical description.	
Content	The module covers the fundamentals of theoretical chemistry including the quantum mechanical theory of chemical bonding and the mathematical and physical principles required for this. The module covers the following topics: Fundamentals of quantum mechanics, Schrödinger equation, vibrational and rotational spectrum of diatomic molecules, hydrogen atom, atomic orbitals, electron configuration, electron terms, molecular orbital theory, Hückel molecular orbital theory, fundamentals of molecular spectroscopy, molecular symmetry, introduction to Hartree-Fock theory and density functional theory, and mathematical concepts (selected partial differential equations, spherical coordinates, eigenvalue problems).	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Mathematics for Chemistry and Food Chemistry as well as Physics for Chemistry and Food Chemistry – Mechanics and Electricity Theory.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Special Physical Chemistry, Advanced Theoretical Chemistry as well as Orientation Module for Chemistry.	
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. Bonus performance is a module-accompanying test equating to 10 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
Chem-Ba-PC4	Practical Fundamentals of Physical and Theoretical Chemistry	Prof. Alexander Eychmüller (alexander.eychmueller@tu-dresden.de)
Qualification objectives	Students are familiar with basic physical-chemical laws and fundamental concepts of quantum mechanics through concrete applications and calculations. They are proficient in investigations of energy transfer processes, heat generation and conversion, phase transitions and phase equilibria, reaction rates, conductivities, chemical and electrochemical equilibria, surface phenomena, and energy and mass transport processes. They are able to apply apparative tools of physical chemistry for the characterization of processes and substances as well as to independently solve simple chemically relevant problems using density functional theory. They thus link their practical skills in the laboratory with their theoretical knowledge. They are also able to perform quantum chemical calculations and thus have an understanding of physical and chemical properties of substances and their mathematical description. They can apply the solution approaches to similar problems and interpret the results.	
Content	The module includes practical implementation on studies of energy transfer processes, heat generation and conversion, phase transitions and phase equilibria, reaction rates, conductivities, chemical and electrochemical equilibria, surface phenomena, and energy and mass transport processes. In addition, the module includes quantum chemical calculations, written measured data processing and analysis, and the application of density functional theory.	
Teaching and learning methods	The module comprises practical training (6 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Physical Chemistry: Electrochemistry and Kinetics as well as Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electricity Theory. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Special Physical Chemistry as well as Advanced Theoretical Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 36 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
Chem-Ba-PC5	Special Physical Chemistry	Prof. Inez Weidinger (inez.weidinger@tu-dresden.de)
Qualification objectives	Students will be able to describe and present their in-depth knowledge of photochemistry and electrochemistry. They are able to outline and practically perform photochemical characterization methods (UV-Vis absorption as well as luminescence spectroscopy). Students also know the mechanisms of electrochemical reactions and are able to apply and interpret common electrochemical methods. They will be familiar with selected electrochemical applications in engineering and industry. The students are able to apply their knowledge to problems in their field and to independently deepen the acquired knowledge.	
Content	The module includes photochemistry and electrochemistry as well as selected problems from mathematics and physics relevant to these topics. In particular, the module covers the following topics: Photochemistry: radiative and non-radiative transitions, transition probabilities and prohibitions, elementary photochemical reactions, chemistry of excited molecules, energy and electron transfer. Electrochemistry: Electrochemical interface processes (exchange current density, overvoltage, Butler-Volmer equation), electrochemical techniques (cyclic voltammetry, linear sweep voltammetry, impedance spectroscopy), electrochemical interfaces, electron transfer theory, design and operation of modern batteries and fuel cells.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week), practical training (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Physical Chemistry: Electrochemistry and Kinetics, Fundamentals of Theoretical Chemistry as well as Practical Fundamentals of Physical and Theoretical Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
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 portfolio equating to 6 hours, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	
Credit points and grades	Participants can earn five 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 three times, the grade of the portfolio two times.	
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
Chem-Ba-PC6	Advanced Theoretical Chemistry	Prof. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	Students can understand and apply the incorporation of modern theoretical and statistical approaches in the solution of synthetic and analytical problems. They are familiar with the mathematical-physical background of the methods and can apply and interpret them independently.	
Content	The module covers topics in quantum and computational chemistry, statistical thermodynamics, and selected problems from mathematics and physics relevant to these topics. It covers the following concepts of quantum chemistry: quantum chemical computational methods (RF formalism, electron correlation, DFT methods, LCAO methods), calculation of molecular structures and reaction pathways. It includes the following concepts of statistical thermodynamics: Boltzmann distribution, molecular and canonical sums of states, their meaning and calculation, thermodynamics of ideal gas and ideal solid.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week), practical training (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Theoretical Chemistry as well as Practical Fundamentals of Physical and Theoretical Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the module Interdisciplinary Aspects of Chemistry.	
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 portfolio equating to 9 hours, which must both be graded at least "sufficient" (4.0) in accordance with § 19 para. 1 of the Examination Regulations.	
Credit points and grades	Participants can earn five 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 three times, the grade of the portfolio two times.	
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
Chem-Ba-OTM	Orientation Module for Chemistry	Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
		Additional lectures: Prof. Tobias Gulder (tobias.gulder@tu-dresden.de); Prof. Rainer Jordan (rainer.jordan@tu-dresden.de)
Qualification objectives	The students know technical key terms and core concepts of biochemistry. They are able to describe the biomolecular structure of the cell as well as the properties and functions of the most important biomacromolecules. They will be able to classify polymers as indispensable materials for applications in daily use, engineering, nanotechnology and biomedicine. Students will also be able to outline the fundamentals of sustainability, environmental protection, recycling management, characteristic processes and basic technical operations as well as the material and energy efficient interrelationships in industrial chemistry.	
Content	The module covers the basics of biochemistry, macromolecular chemistry and sustainable aspects of industrial and circular chemistry. The module covers the structure, physical-chemical properties, occurrence and functions of cells and biological macromolecules (e.g. carbohydrates, lipids, nucleic acids, proteins), selected methods in biochemistry (e.g. purification of proteins, determination of protein structures, function of enzymes), basic concepts of macromolecular chemistry, formation mechanisms, correlations between chemical and physical structure and the polymer properties up to the processing of polymers to fibers, plastics, adhesives, coatings and special applications. The module also covers the basics of industrial chemistry, catalysis, environmental protection, digitalisation, circular economy and recycling strategies.	
Teaching and learning methods	The module comprises lecture (6 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Mathematics for Chemistry and Food Chemistry, Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electricity Theory, Fundamentals of Organic Chemistry, Concepts of Inorganic Chemistry as well as Fundamentals of Theoretical Chemistry.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry. The module is a prerequisite for participation in the modules Fundamentals of Biochemistry, Macromolecular Chemistry as well as Sustainable Aspects of Industrial and Circular Chemistry.	
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 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
Chem-Ba-WP1	Fundamentals of Biochemistry	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students are able to present their in-depth knowledge regarding the function of biomacromolecules and the regulation and interaction of the main metabolic pathways. They understand the mechanistic details of the individual enzymatic reactions from the main metabolic pathways and can transfer these to other enzyme reactions. They have skills to understand biochemical relationships especially of human metabolism and to apply their knowledge constructively in the medical field. In addition, they have strengthened their communication skills through teamwork.	
Content	The module covers the most important relationships between the utilization of nutrients, the principles of cellular energy metabolism (e.g. fermentation, oxidative phosphorylation) and the production of cellular building blocks and biomolecules. It covers in detail enzyme reactions and reaction mechanisms, for example, from glycolysis, the citrate cycle, and the formation and degradation of important biomolecules (for example, nucleotides, fatty acids, carbohydrates).	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (8 hours per week) and self-study. According to § 6 para. 7 of the Study Regulations, participation in the practical training is limited to a total of 25 participants only.	
Prerequisites for participation	Participants require skills acquired in the module Orientation Module for Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is one of three elective compulsory modules of the Bachelor's degree program Chemistry, one of which must be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 40 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
Chem-Ba-WP2	Macromolecular Chemistry	Prof. Rainer Jordan (rainer.jordan@tu-dresden.de)
Qualification objectives	Students are able to apply basic and advanced types of polymerization. In the characterization of polymers, students are able to use the theoretically acquired knowledge to classify the results of common methods. Students will be able to describe processing methods and conditions for polymer classes. Students have developed their presentation skills and can summarize important facts to application examples. They have also strengthened their communication skills through teamwork.	
Content	The module covers the advanced fundamentals of macromolecular chemistry, i.e. more complex relationships between chemical and physical structure and polymer properties as well as processing of polymers into fibers, plastics, adhesives, coatings and special applications. Furthermore, the module includes the complexes (free) radical and controlled radical polymerization, ionic polymerization, polycondensation, molar mass determination as well as kinetic investigations.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (8 hours per week) and self-study. According to § 6 para. 7 of the Study Regulations, participation in the practical training is limited to a total of 25 participants only.	
Prerequisites for participation	Participants require skills acquired in the module Orientation Module for Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is one of three elective compulsory modules of the Bachelor's degree program Chemistry, one of which must be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 40 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
Chem-Ba-WP3	Sustainable Aspects of Industrial and Circular Chemistry	Prof. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	Students will be able to apply basic knowledge of chemical engineering and separation processes. Students will be familiar with the material interdependence of the chemical industry and the principles of sustainable, circular chemistry and recycling strategies in the context of value creation, digitalisation and environmental protection. In addition, they have strengthened their communication skills through teamwork.	
Content	The module covers the fundamentals of chemical engineering, catalysis, environmental protection, digitalisation, circular economy and recycling strategies. There is a strong focus on sustainable and modern industrial scale processes, resource and energy efficient implementation of chemical processes and production integrated environmental protection in the context of digitalisation, raw material change, energy transition, mobility and chemical energy storage.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (8 hours per week) and self-study. According to § 6 para. 7 of the Study Regulations, participation in the practical training is limited to a total of 25 participants only.	
Prerequisites for participation	Participants require skills acquired in the module Orientation Module for Chemistry. According to § 6 para. 8 of the Study Regulations, participation in the practical training an entrance test must be taken and passed for safety-relevant aspects. The form of the entrance test is determined by the lecturer at the beginning of each semester and announced by the Faculty.	
Applicability	This module is one of three elective compulsory modules of the Bachelor's degree program Chemistry, one of which must be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 40 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
Chem-Ba-ENG	English for Chemists	Studiendekan/in der Chemie (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	Students possess the ability to communicate independently in written and oral English at level B2+ of the Common European Framework of Reference for Languages. This includes the comprehension of complex science- and subject-related texts. Students are able to express themselves clearly, in detail and fluently in writing and orally using complex linguistic structures (such as explaining and arguing) and an extensive general as well as limited specialized vocabulary on selected topics in their field in international contexts (scientific language).	
Content	The content of the module is oral and written exchange in English in the areas of study, research and science in the field of chemistry. Here, particular focus is placed on the rule of scientific probity and scientific practice.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week) and self-study. According to § 6 para. 4 sentence 2 of the Study Regulations, the courses will be held in English.	
Prerequisites for participation	None.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of ungraded language examination lasting 25 minutes.	
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 summer semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ba-FAC	Interdisciplinary Aspects of Chemistry	Studiendekan/in der Chemie (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	Students reflect on the fundamentals of inorganic, organic, physical and analytical chemistry and master the use of chemical databases. They understand the interrelationships of the individual disciplines and can link the contents with each other. This enables them to think in an interdisciplinary and reflective manner. They are able to reinforce their own argumentation so that their oral expression and presentation skills are strengthened.	
Content	The module covers in-depth knowledge of the sub-disciplines inorganic chemistry, organic chemistry, analytical chemistry and physical chemistry, focusing on the cross-references between the individual disciplines. Furthermore, the module includes selected examples, i.e. so-called "case studies", and the associated connection to the coherence of the subject of chemistry, as well as outlooks on current issues in basic and application-oriented research. The module also covers the basics of information retrieval in chemistry using chemical databases. This includes the use of electronic research systems, search strategies, working with logical operators and the transfer of information between different database systems.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Preparative Inorganic Chemistry, Practice of Instrumental Analysis, Modern Methods of Organic Chemistry - Stereochemistry and Organometallics, Preparative Application of Modern Synthesis Methods in Organic Chemistry, Special Physical Chemistry as well as Advanced Theoretical Chemistry.	
Applicability	This module is a compulsory module in the Bachelor's degree program Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments equating to 10 hours.	
Credit points and grades	Participants can earn fifteen 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 450 hours.	
Module duration	The module comprises one semester.	

Annex 2: Study schedule

with type and scope of courses given in hrs/week as well as required work, the type, scope and format of which can be found in the module descriptions

Module number	Module name	1st Semester	2nd Semester	3rd Semester	4th Semester	5th Semester (M)	6th Semester	CP
		L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	
Chem-Ba-MAT	Fundamentals of Mathematics for Chemistry and Food Chemistry	3/0/0/4 Ex						5
Chem-Ba-PH1	Physics for Chemistry and Food Chemistry – Mechanics, Hydrodynamics and Thermodynamics	2/2/0/0 Ex						5
Chem-Ba-PH2	Physics for Chemistry and Food Chemistry – Quantum Mechanics and Electricity Theory		2/2/2/0 2xEx					5
Chem-Ba-AC1	Chemistry of Main Group Elements	4/2/6/0 2x Ex						10
Chem-Ba-AC2	Chemistry of d-block Elements and Coordination Chemistry		3/2/8/0 2xEx					10
Chem-Ba-AC3	Concepts of Inorganic Chemistry			6/2/0/2 P-Ex, Ex				10
Chem-Ba-AC4	Preparative Inorganic Chemistry				0/2/6/0 P-Ex, Ex			5
Chem-Ba-AN1	General and Analytical Chemistry	4/1/0/0 Ex						5
Chem-Ba-AN2	Instrumental Analysis		5/0/0/0 Ex					5
Chem-Ba-AN3	Practice of Instrumental Analysis			0/2/4/0 2xEx				5
Chem-Ba-OC1	Fundamentals of Organic Chemistry			3/2/0/0 Ex				5
Chem-Ba-OC2	Reaction Classes and Mechanisms of Organic Chemistry				3/2/16/0 2xEx			15
Chem-Ba-OC3	Modern Methods of Organic Chemistry - Stereochemistry and Organometallics					4/2/0/0 Ex		5
Chem-Ba-OC4	Preparative Application of Modern Synthesis Methods in Organic Chemistry					0/2/7/0 Ex		10

Module number	Module name	1st Semester	2nd Semester	3rd Semester	4th Semester	5th Semester (M)	6th Semester	CP
		L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	L/S/P/E	
Chem-Ba-PC1	Fundamentals of Physical Chemistry: Thermodynamics	4/2/0/0 Ex						5
Chem-Ba-PC2	Fundamentals of Physical Chemistry: Electrochemistry and Kinetics		4/2/4/0 Ex					10
Chem-Ba-PC3	Fundamentals of Theoretical Chemistry			3/2/0/0 Ex				5
Chem-Ba-PC4	Practical Fundamentals of Physical and Theoretical Chemistry			0/0/6/0 Ex				5
Chem-Ba-PC5	Special Physical Chemistry				2/1/2/0 2xEx			5
Chem-Ba-PC6	Advanced Theoretical Chemistry					2/1/2/0 2xEx		5
Chem-Ba-OTM	Orientation Module for Chemistry				6/0/0/0 Ex			5
Chem-Ba-WP1* Chem-Ba-WP2* Chem-Ba-WP3*	Fundamentals of Biochemistry Macromolecular Chemistry Sustainable Aspects of Industrial and Circular Chemistry					2/2/8/0 Ex 2/2/8/0 Ex 2/2/8/0 Ex		10
Chem-Ba-ENG	English for Chemists						2/2/0/0 Ex	5
Chem-Ba-FAC	Interdisciplinary Aspects of Chemistry						4/2/0/0 Ex	15
							Final thesis	10
CP		30	30	30	30	30	30	180

* depending on choice made by the student, one of three modules must be chosen

M	Mobility window according to § 6 para. 1 sentence 3
CP	Credit Points
L	Lecture
S	Seminar
P	Practical training
E	Exercise
Ex	Examination(s)
P-Ex	Pre-examination