Technische Universität Dresden
Faculty of Chemistry and Food Chemistry

Study Regulations
for the Master's degree program in Chemistry
from winter semester 2024/25

Consolidated version of the official announcements of TU Dresden of March 29, 2022 and according to § 6 para. 6 of the Study Regulations the resolution of the Faculty Board of January 24, 2024.

This is valid for all students enrolled in the Master's degree program Chemistry.

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 consecutive Master'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 consecutive Master's program in Chemistry at TU Dresden.

§ 2
Objectives of the degree program

(1) Upon completion of the consecutive Master's degree program in Chemistry, students will have a command of broad theoretical and practical fundamentals and corresponding material knowledge and methodological knowledge of the subject of chemistry. They have in-depth knowledge in the fields of materials chemistry and biologically oriented chemistry. Depending on the student's choice, they have specialized in one or more of the following areas: analytical chemistry, inorganic chemistry, biochemistry, electrochemistry, organic chemistry, macromolecular chemistry, sustainable chemistry, physical chemistry, radiochemistry, radiopharmaceutical chemistry, technical chemistry, theoretical chemistry, and related fields. They recognize the professional interdependencies and have deepened their professional and interdisciplinary knowledge as well as practical skills in selected fields. Moreover, they are able to work on chemistry issues in a scientific and critical way, to solve the arising tasks independently or in interdisciplinary work, and to plan and conduct experiments, and they are committed to good scientific practice. Students are also able to acquire knowledge independently through research and experimentation, critically evaluate and question their own and others' results and findings against the background of comparable work, present them in a scientifically correct way and discuss them in a differentiated manner. Students are empowered to use their knowledge, understanding, and problem-solving skills in new and unfamiliar situations and to work in a team. They contribute to the continued development of the subject and are empowered to socially responsible as well as sustainable judgments and actions. At the same time, they recognize the relevance of references to chemistry-related scientific fields and use them effectively. They possess key qualifications relevant to their profession, such as communication skills and teamwork as well as effective project planning and work organization.

(2) Graduates possess in-depth specialist knowledge required for professional practice, understand interdisciplinary contexts and are qualified for highly qualified activities, e.g. at teaching and research institutions, in industry and in public authorities. The consecutive Master's program prepares students for employment preferably in research-related fields of work in chemistry and related disciplines.

§ 3
Admission requirements

(1) To be admitted to the degree program, candidates must have completed a first recognized vocational university degree acquired in Germany or a qualification from an officially recognized vocational academy in chemistry. In addition, specialist knowledge and skills in the subject of chemistry as well as knowledge of elementary scientific correlations are required. Proof of this particular suitability is provided by an aptitude assessment in accordance with the aptitude assessment regulations.

(2) Furthermore, this degree program also requires English language proficiency at the advanced level of B2 of the Common European Framework of Reference for Languages. Para. 2 sentence 3 shall apply accordingly.

§ 4
Start and duration of the degree program

(1) The program can be started in the winter as well as in the summer semester.

(2) The standard period of study is four semesters and includes on-site attendance, self-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, exercises, seminars, practical training, tutorials, language courses and self-study.

(2) The individual teaching and learning forms according to para. 1 sentence 2 are defined as follows:
1. Lectures introduce the specific content of the modules.
2. Exercises serve to consolidate the acquired knowledge. They are designed to give students the opportunity to apply this knowledge by working through exemplary examples and to self-monitor their level of expertise.
3. Seminars enable students to familiarize themselves under supervision in a selected subject area or area of interest 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.
4. Practical training serves to apply the subject matter taught and to acquire practical skills in potential areas of employment. They are designed to train the careful planning, execution and observation of own experiments and to lead to an independent scientific way of working.
5. Tutorials support students in the acquisition of technical and didactic skills.
6. Language courses convey and hone knowledge, skills and abilities in a foreign language. They foster the development of communication and intercultural competences in academic and professional contexts, as well as in everyday situations.
7. 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 three semesters. The fourth semester is dedicated to the preparation of the Master's thesis including the colloquium. The third 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 two compulsory modules and seven to fourteen elective compulsory modules, which allows students to choose their focus area. In each of the focus areas Materials Chemistry and Biologically Oriented Chemistry, two to six elective compulsory modules with a minimum of 20 to a maximum of 30 credit points must be selected. The modules in the Cross-Sectional Field provide an additional elective option and are counted half toward the credits to be earned in each of the focus areas Materials Chemistry and Biologically Oriented Chemistry. In the focus area Practical Application, one or two elective compulsory modules with a total of ten credit

points must be selected. In the focus area General Education Module, one or two modules amounting to five to ten credit points must be selected. The choice is binding. A focus area 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 English or, if indicated by the module descriptions, in German. If, according to the module description, a module primarily serves to acquire foreign language qualifications, the respective foreign language can also be the language of instruction.

(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 schedules attached (Annex 2a and 2b), 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 schedules. 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 Board shall decide, upon application by the student, on any exceptions to sentence 3.

(9) 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 selection. 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.

§ 7
Content of the degree program

(1) Chemistry is a research-oriented Master's degree program.

2) The content of the program is based on the research guidelines of the Faculty of Chemistry and Food Chemistry and includes the fields of materials chemistry as well as biologically oriented chemistry, corresponding cross-sectional subjects as well as practical applications and current research topics on aspects of chemistry or a chemistry-related discipline. In the various focus areas, there is a choice to sub-specialize in the following areas: analytical chemistry, inorganic chemistry, biochemistry, electrochemistry, organic chemistry, macromolecular chemistry, sustainable chemistry, physical chemistry, radiochemistry, radiopharmaceutical chemistry, technical chemistry, theoretical chemistry, and related fields. This also includes modern methods of synthesis and analysis for the material and application-oriented characterization of differently produced substances in the fields of inorganic chemistry, analytical chemistry, biochemistry, macromolecular chemistry, physical chemistry and organic chemistry.

§ 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 120 credits and comprises the teaching and learning methods according to type and scope stipulated in the module descriptions, the study and examination achievements, the final 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. § 33 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-Ma-RE1	Advanced Research Internship	Dean of Studies Chemistry (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	The students are able to work independently on a given topic. They can plan and design experiments, implement the experimental set-up in practice, select the preparation and analysis methods to be used appropriately and present the results. In addition, they have the necessary theoretical background knowledge	
Content	The module covers a relevant research topic on aspects of chemistry or a chemistry-related discipline.	
Teaching and learning methods	The module comprises practical training (10 hours per week), and self-study. The courses are to be chosen from the catalogue Advanced Research Internship of the Master's degree program Chemistry; this catalogue including the information on the teaching and examination language will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	Participants require Bachelor’s degree-level proficiency in inorganic chemistry, analytical chemistry, biochemistry, macromolecular chemistry, physical chemistry, and organic chemistry.	
Applicability	This module is a compulsory module in the Master’s degree program Chemistry. The module is a prerequisite for participation in the module Research Lab Class.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessments 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 semester.	
Workload	The workload comprises a total of 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-RE2	Research Lab Class	Dean of Studies Chemistry (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	The students have advanced practical knowledge in the planning of new experiments and the practical processing of complex research topics. This enables them to make socially responsible judgments and to act responsibly. In addition, they have the ability to work in a team and have experience in scientific and interdisciplinary exchange as well as in the discussion of research results within a working group.	
Content	The module covers a relevant research topic on aspects of chemistry or a chemistry-related discipline.	
Teaching and learning methods	The module comprises practical training (10 hours per week), and self-study. The courses are to be chosen from the catalogue Research Lab Class of the Master's degree program Chemistry; this catalogue including the information on the teaching and examination language will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	Participants require skills acquired in the module Advanced Research Internship.	
Applicability	This module is a compulsory module in the Master’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 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 semester.	
Workload	The workload comprises a total of 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-M01	Crystal Structure Determination	Prof. Dr. Michael Ruck (michael.ruck@tu-dresden.de)
Qualification objectives	Students can independently perform crystal structure determinations using X-ray diffraction methods, critically analyze the results, place them in the scientific context and publish them.	
Content	The module includes the crystallographic, physical and instrumental fundamentals of structural analysis using diffraction methods. It also covers the performance of X-ray microstructure analysis investigations, including the measurement of data sets on single crystal diffractometers and the subsequent data preparation for structure solution. Furthermore, the module includes the computer-aided creation and refinement of a structural model, its graphical and tabular processing, and the proper discussion and evaluation of the results. Furthermore, basic aspects of radiation protection, safe handling of X-ray equipment and research data management are part of the teaching content.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (1 hour per week), practical training (5 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of physics and mathematics at the undergraduate level is required. The following textbooks are recommended for preparation: W. Massa: Crystal Structure Determination (Springer); D. W. Bennett: Understanding Single-Crystal X-Ray Crystallography (Wiley); Y. Waseda, E. Matsubara, K. Shinoda: X-Ray Diffraction Crystallography (Springer); C. Hammond: The Basics of Crystallography and Diffraction (Oxford).	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, this module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. Furthermore, this module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master'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 70 hours. The language of the examination is German or English, at the student's choice.	
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-Ma-M02	Modern aspects in industrial chemistry	Prof. Dr. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	The students master the conceptual approaches and the theoretical background of technical chemistry and modern catalysis. They have in-depth knowledge of an integrated conception for sustainable production in chemistry. They can critically discuss questions regarding process optimization, sustainability and tailored catalysis and place them in the context of the literature.	
Content	Basic as well as in-depth concepts for technical catalysis, sustainable chemistry in industrial processes as well as the optimization of reaction engineering parameters and economic considerations are the central contents of the module. Furthermore, the module covers in-depth theoretical aspects of all areas of catalysis. Further focal points are concepts for catalyst characterization and deactivation.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (4 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of technical, analytical, inorganic, organic, and physical chemistry at the undergraduate level is required. Literature for preparation: M. Baerns, A. Behr, A. Brehm, J. Gmehling, K. Hinrichsen, H. Hoffmann, U. Onken, R. Palkovits, A. Renken. *Technische Chemie* (2. Auflage). 2013. Wiley-VCH; J. Hagen. *Industrial Catalysis: A Practical Approach* (third edition). 2015. Wiley-VCH.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 public oral examination lasting 20 minutes per student and will take place as a group examination with up to three people. Both examinations must be passed. The language of the examination is English.	
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-Ma-M03	Physical Chemistry of Solids	Prof. Dr. Michael Mertig (michael.mertig@tu-dresden.de)
Qualification objectives	Students are familiar with the fundamentals and applications of ceramic solid electrolytes, organic semiconductor materials, and corrosion metrology.	
Content	The module covers modern topics in the physical chemistry of solid electrolytes and organic semiconductors as well as electrochemical corrosion measurements. In addition to preparation methods, the module includes the defect chemistry of the materials and the derivation therefrom of properties such as structure and conductivity. In addition, the module includes electrochemical investigation methods and applications for these materials such as gas sensors and energy converters. In the area of organic semiconductors, the module includes fundamental knowledge for the chemical, optical, and electrical properties as well as for semiconductor devices such as organic light-emitting diodes, solar cells, and transistors and new applications in biology and medicine. Theoretical fundamentals of corrosion, experimental determination of planar corrosion, various manifestations of non-uniform corrosion and bio-corrosion, and testing methods for corrosion phenomena are also components of the module.	
Teaching and learning methods	The module comprises lecture (5 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge of physical chemistry, electrochemical instrumentation, photochemistry, and inorganic and organic chemistry at the undergraduate level is required. Literature for preparation: Köhler/Bässler: Electronic Processes in Organic Semiconductors, Wiley-VCH Verlag GmbH, 2015; H. Rickert, Electrochemistry of Solids: An Introduction, Springerverlag, Berlin, 1982; Institut für Korrosionsschutz Dresden: Vorlesungen über Korrosion und Korrosionsschutz von Werkstoffen, TAW-Verlag, Wuppertal 1996, ISBN 3-930526-05-0.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The examination language is German.	
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-Ma-M04	Physical Chemistry of Modern Materials	Prof. Dr. Alexander Eychmüller (alexander.eychmueller@tu-dresden.de)
		Additional lectures: Prof. Dr. Nikolai Gaponik (nikolai.gaponik@tu-dresden.de)
Qualification objectives	The students are familiar with the special features of modern materials and the possibilities of their physical-chemical description and can use and combine them in a meaningful way.	
Content	The module includes a focus on nanomaterials and nanostructures, as well as the physical chemistry of inorganic (insulators, semiconductors, metals) nanocrystals and hybrid nanoparticles. Furthermore, the module includes Surfaces: Design and Characterization and Assembly and Self-Assembly of Nanoparticles. Also included in the module are physical chemistry aspects of nanostructured catalysts, light-emitting nanomaterials, and physical chemistry in energy research (new materials and technologies for lighting, LEDs, solar cells, thermoelectrics, fuel cells, sensors and detectors).	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of physical chemistry, photochemistry, inorganic chemistry, and macromolecular chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The examination language is English.	
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-Ma-M05	Polymer Materials	Prof. Dr. Brigitte Voit (brigitte.voit@tu-dresden.de)
Qualification objectives	The students have a deep insight into the modern synthesis and characterization possibilities of polymers for application as functional and structural materials. They are able to recognize correlations between the chemical, physical and morphological structure of polymers and their property profile. They understand advanced and special methods of polymer analysis and the analysis of the properties of polymers and can apply them in a problem-oriented manner.	
Content	The module covers advanced synthesis methods on various polymer materials and polymer architectures, structure and active principles of polymer therapeutics, modern methods of polymer characterization in solution, in bulk and at interfaces, and advanced knowledge of physical chemistry of polymers and their properties.	
Teaching and learning methods	The module comprises lecture (8 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of macromolecular chemistry, physical chemistry, and organic chemistry at the undergraduate level is required. Literature for preparation: Polymer Chemistry, Koltzenburg, Maskos, Nuyken (Springer, 2017).	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 120 minutes. The language of the examination is German or English, at the student's choice.	
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-Ma-M06	Environmental and Actinide Chemistry	Prof. Dr. Thorsten Stumpf (t.stumpf@hzdr.de)
		Additional lectures: PD Dr. Moritz Schmidt (moritz.schmidt@hzdr.de)
Qualification objectives	Students will know the basic physical and chemical properties of actinides and lanthanides including redox behavior, aquatic chemistry, coordination chemistry and solubilities. Students will know how these basic properties affect the behavior of the elements in natural and engineered processes and the spectroscopic and analytical methods used to characterize them. Students are able to identify natural and anthropogenic sources of radioactivity in the environment and have a basic understanding of accumulation processes and mobility of radionuclides in the environment.	
Content	The module covers the two main topics of radioecology and the chemistry of f-elements especially the 5f actinides. Radioecology includes origins of radionuclides in the environment, migration and uptake of radionuclides in food chains and ecosystems, sampling and pretreatment of environmental samples, and radionuclide separation techniques. Chemistry of f-elements includes analogies and differences between lanthanides and actinides, their basic physicochemical properties and resulting applications, magnetism, lasers, superconductivity. In addition, the module covers lanthanides and actinides as resources, including their extraction, recycling strategies, and final disposal.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge in the areas of inorganic, physical, and analytical chemistry at the undergraduate level is required. Literature for preparation: S. Cotton: Lanthanide and Actinide Chemistry, Wiley Verlag, 2006, ISBN 978-0-470-01005-1, J.-V. Kratz, K. H. Lieser: Nuclear and Radiochemistry, 2013, Wiley-VCH, Weinheim, ISBN 978-3-527-32901-4, D. A. Atwood: Radionuclides in the Environment, 2010, Wiley & Sons Ltd, ISBN 978-0-470-71434-8, J. Lehto, X. Hou: Chemistry and Analysis of Radionuclides: Laboratory Techniques and Methodology, 2011, Wiley-VCH Verlag GmbH & Co. KGaA, ISBN 978-3-527-63302-9.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. The module is a prerequisite for participation in the module Radiochemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 25 minutes per	

	student and will take place as a group examination with up to three people. The language of the examination is German or English, at the student's choice.
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-Ma-M07	Advanced Functional Materials	Prof. Dr. Stefan Kaskel (stefan.kaskel@tu-dresden.de)
Qualification objectives	The students are able to recognize correlations between the structural composition, chemical composition and physical properties of inorganic functional materials. They can select and evaluate materials for special requirements, for example, energy storage, catalysis and environmental applications. They understand advanced and special methods of materials analysis and can apply them in a problem-oriented manner.	
Content	The module covers the fabrication, structure and function of porous and nano-structured functional materials, as well as specific analytical methods for these materials.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (6 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of inorganic chemistry, analytical chemistry, physical chemistry, and organic chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 30 hours. The examination language is English.	
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 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 300 hours.	
Module duration	The module comprises one semester.	

Module number	**Module name**	**Responsible lecturer**
Chem-Ma-M08	Advanced Theoretical Chemistry	Prof. Dr. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	Students are familiar with various concepts of quantum chemical computational methods and solution approaches in statistical thermodynamics. They are familiar with the basics for a competent use of quantum chemical computational procedures and methods of statistical physics for solving chemical problems.	
Content	The module covers concepts of quantum chemical computational methods (HF, DFT, post-HF methods), statistical thermodynamics (gas, solids, liquids and polymers, quantum statistics) and current research topics.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	A basic knowledge of mathematics, theoretical chemistry, and chemical and statistical thermodynamics at the undergraduate level is required. Literature for preparation: Attila Szabo, Neil S. Ostlund: Modern Quantum Chemistry: Introduction to Advanced Electronic Structure Theory; Christopher J. Cramer: Essentials of Computational Chemistry: Theories and Models.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. The module is a prerequisite for participation in the module Mathematical and Numerical Foundations of Theoretical 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 and a portfolio equating to 25 hours, which must both be passed. The language of the examination is German or English, at the student's choice.	
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-Ma-M09	Batteries and Supercapacitors	Prof. Dr. Stefan Kaskel (stefan.kaskel@tu-dresden.de)
Qualification objectives	Students are able to describe the structure and function of electrochemical energy storage systems, in particular accumulators and electrochemical double-layer capacitors. They have in-depth knowledge of the composition of cathode and anode materials and electrolytes and can evaluate their special requirements. They understand advanced and special methods of electrochemical analysis and can apply them in a problem-oriented manner. They have insights into production methods of materials and battery cells.	
Content	The module covers the structure and function of batteries, accumulators, and supercapacitors, as well as special analytical methods for these cell systems.	
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	Basic knowledge of inorganic chemistry, analytical chemistry, physical chemistry, electrochemistry, and organic chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 portfolio equating to 20 hours, which must both be passed. The examination language is English.	
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 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-Ma-M10	Colloids and Interfaces	Prof. Dr. Andreas Fery (fery@ipfdd.de)
Qualification objectives	Students are familiar with interactions and structure formation mechanisms at the nanoscale and can use them to control surface wetting behaviour, colloidal stability of nanoparticles in solution, and self-assembly processes at the molecular and colloidal scales.	
Content	The module focuses on surface tension and wetting behavior of liquids on interfaces, adhesion and cohesion of solids, colloidal interactions (bi-layer interaction, van der-Waals interaction, steric interactions, specific interactions), colloidal stability and functionalization, self-assembly in molecular and colloidal systems, characterization methods to quantify the above interactions, assembly of supracolloidal structures and particle-based materials.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Basic knowledge of physical chemistry and macromolecular chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The examination language is English.	
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-Ma-M11	Functional Polymers	Prof. Dr. Rainer Jordan (rainer.jordan@tu-dresden.de)
Qualification objectives	Students are able to understand advanced methods of polymer synthesis and characterization and can apply them in a problem-oriented manner.	
Content	The module covers modern methods of polymer synthesis in solution and on surfaces, synthesis of polymers for specific applications, and methods of elucidating structure-property relationships and specific analytical methods for these polymers.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Basic knowledge of macromolecular chemistry, physical chemistry, and organic chemistry at the undergraduate level is required. Literature for preparation: Polymer Chemistry, Koltzenburg, Maskos, Nuyken (Springer); Macromolecules, Elias (Wiley).	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The examination language is English.	
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-Ma-M12	Modern Methods of Electrochemistry	Prof. Dr. Inez Weidinger (inez.weidinger@tu-dresden.de)
Qualification objectives	Students master modern electrochemical measurement techniques in corrosion and environmental protection as well as spectroscopic methods of electrochemistry. They are familiar with all important current systems of primary and secondary electrochemical energy storage and conversion.	
Content	In addition to the fundamentals of the generation and storage of electrical energy, the module includes the properties of all current primary and secondary elements. Another focus is on the characteristics of electrochemical cells, their comprehensive characterization, various manifestations of corrosion, and their testing methods. The module also covers potentiometric, amperometric and conductometric electrochemical measurement techniques and sensors, including examples of their use in medicine, biology, agriculture and limnology. Furthermore, the module includes pure chemical methods and operando spectro-electrochemical measurement methods and the resulting knowledge gain for electrochemical storage and conversion systems.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses are held in German**.	
Prerequisites for participation	Basic knowledge of physical chemistry and electrochemistry at the undergraduate level is required. Literature for preparation: P.W. Atkins & J. de Paula, Physikalische Chemie, Wiley-VCH, Weinheim, 2013; D. Linden, Handbook of Batteries, McGraw-Hill, New York, 2001.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The examination language is German.	
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-Ma-M13	Polymer Topologies and Polymer Processing	Prof. Dr. Xinliang Feng (xinliang.feng@tu-dresden.de)
Qualification objectives	The students know the different topologies of polymers and polymer blends as well as their production methods and strategies. The students are able to recognize correlations between the chemical, physical and morphological structure of polymers as well as polymer blends and their property profile up to the application in technology and industry. They will be able to select and evaluate polymers and polymer blends for specific requirements. Advanced and specialized methods of polymer analysis are understood and can be applied. In addition, students are familiar with the various processing procedures and mechanical testing of polymers, polymer blends and composites up to polymer recycling.	
Content	The module covers polymer topologies (ladder polymers, polymer tapes, 2D polymers, 3D polymers), direct synthesis of polymers with different architectures (solid state synthesis, solvent assisted synthesis; surface as well as interfacial polymerization, polymer modification) and characterization of their structure (composition, morphology, crystallinity, defects, etc.). Furthermore, the module includes the processing of polymers (especially extrusion/injection molding) as well as the determination of process engineering parameters (rheology of polymer melts, mechanical parameters, morphology). The production and properties of polymer blends, polymer composites and composite materials are also part of the module.	
Teaching and learning methods	The module comprises lecture (3 hours per week), practical training (2 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of macromolecular chemistry, physical chemistry, analytical chemistry, and organic chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 portfolio equating to 20 hours, which must both be passed. The examination language is English.	
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-Ma-M14	Radiochemistry	Prof. Dr. Thorsten Stumpf (t.stumpf@hzdr.de)
Qualification objectives	The students can critically deal with questions about radioactivity and radiation on a scientific basis. They know the different types of radiation, their spectra, measurement and physical principles. They know why radioactivity occurs in which elements, what effects it has on humans and the environment and how it can be applied technically. In addition, the students are able to handle open radioactive materials.	
Content	The module includes the topics of radioactivity (types of radiation, nuclide map, nuclear structure, nuclear stability, transformation laws, equilibria), radioanalytics, nuclear engineering, and nuclear waste management.	
Teaching and learning methods	The module comprises lecture (2 hours per week), practical training (3 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Participants require skills acquired in the module Environmental and Actinide Chemistry.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master'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 30 hours. The language of the examination is German or English, at the student's choice.	
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-Ma-M15	Synthetic Two-Dimensional Materials	Prof. Dr. Xinliang Feng (xinliang.feng@tu-dresden.de)
Qualification objectives	Students are comprehensively familiar with synthesis and characterization methods of synthetic two-dimensional materials in theory and practice. They know their structural and electronic properties and can describe them with computer simulations. Students are familiar with the range of applications of synthetic two-dimensional materials in technology and industry. The students are also able to apply their comprehensive knowledge to problems in their field and to independently further specialize the knowledge they have acquired.	
Content	The module includes direct synthesis of challenging 2DM (solvent assisted assembly; surface as well as interfacial polymerization, exfoliation/delamination; functionalization, multifunctional hybrid structures, hierarchical heterostructures) as well as state-of-the-art in-/ex-situ characterization of their structure (composition, morphology, crystallinity, defects, et cetera) and mechanical, electronic, optical, thermal, catalytic and magnetic properties. Furthermore, the module includes in-/ex-situ characterization methods for example electron microscopy, X-ray scattering, optical spectroscopy. The deepening of the theoretical description with tight-binding and density functional methods, among others, for the prediction of 2DM formation (reaction mechanisms/optimization), stability as well as physicochemical properties and the application areas of 2DM, for example gas adsorption, catalysis, ion transport are also contents of the module.	
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	Basic chemical and physical knowledge at the undergraduate level, including macromolecular, physical, or analytical chemistry, is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 portfolio equating to 20 hours, which must both be passed. The examination language is English.	
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 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-Ma-M16	Advanced Solid State Chemistry	Prof. Dr. Michael Ruck (michael.ruck@tu-dresden.de)
		Additional lectures: Prof. Dr. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	Students understand the essential aspects of solid state chemistry and the interrelationships between synthesis, composition, structure, reactivity, physical and thermodynamic properties, chemical bonding, electronic, magnetic and topological properties in theory and experiment.	
Content	Essential contents of the module are the structures and properties of semiconductors, metals, superconductors, magnetic materials and quantum materials as well as the models and theoretical methods for their description. In addition, the module covers structure-property relationships and approaches to the quantum theoretical description of periodic systems. In addition to experimental characterization and phenomenological description, the module includes fundamentals of quantum chemical computational methods and the electronic and vibronic structure of solids and their model description, as well as symmetries, band structures, and densities of states of various materials, magnetism, phonons, low-dimensional structures, and quantum materials. Examples of current research fields in materials chemistry are also included in the module.	
Teaching and learning methods	The module comprises lecture (5 hours per week), practical training (5 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of inorganic chemistry, physical chemistry, theoretical chemistry, and basic knowledge of physics and mathematics at the undergraduate level is required. The following textbooks are recommended for preparation: R. Tilley: Understanding Solids (Wiley); S. Elliot: The Physics and Chemistry of Solids (Wiley); R. Hoffmann, Solids and Surfaces (Wiley); C. Kittel: Introduction to Solid State Physics (Wiley); N. W. Ashcroft, N. D. Mermin: Solid State Physics (Saunders College Publ.), P. Hofmann: Solid State Physics – An Introduction (Wiley); R. Dronskowski: Computational Chemistry of Solid State Materials (Wiley).	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 30 minutes as an individual examination and a complex assessments equating to 50 hours,	

	which must both be passed. The language of the examination is German or English, at the student's choice.
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 oral examination is weighted seven times, the grade of the complex assessments three times.
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-Ma-M17	Mathematical and Numerical Foundations of Theoretical Chemistry	Prof. Dr. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	The students have in-depth, qualified knowledge of higher mathematics (mathematical statistics, partial differential equations, numerical methods), numerical methods for solving chemical problems and the basics of programming. They are able to solve chemical problems using various quantum chemical computational methods and methods of statistical physics. In addition to subject-specific competencies, they also possess general skills in the qualified use of computer programs.	
Content	The module includes mathematical statistics, partial differential equations, numerical methods, and scientific programming.	
Teaching and learning methods	The module comprises lecture (2 hours per week), practical training (3 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Advanced Theoretical Chemistry. Furthermore, basic knowledge of mathematics, theoretical chemistry and chemical or statistical thermodynamics at the undergraduate level is required. Literature for preparation: Ansgar Jüngel, Hans G. Zachmann: Mathematik für Chemiker.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 30 minutes as an individual examination and a portfolio equating to 30 hours, which must both be passed. The language of the examination is German or English, at the student's choice.	
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 oral examination is weighted three times, the grade of the portfolio one 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-Ma-M18	Modern aspects in coordination and main-group chemistry	Prof. Dr. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	Students master sophisticated preparative methods (high vacuum and inert gas techniques for the synthesis of air-sensitive compounds, reactions in unusual solvents such as SO_2) and are familiar with the targeted synthesis of challenging inorganic molecular compounds. They know in-depth theoretical aspects of characterization methods (heteronuclear liquid NMR spectroscopy, cyclic voltammetry, Raman IR, et cetera). Students are able to present and discuss scientific results correctly.	
Content	The module covers methods of synthesis and complete characterization of inorganic coordination and molecular compounds.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week), practical training (6 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 20 participants only.	
Prerequisites for participation	Basic knowledge of analytical chemistry and physical chemistry at the undergraduate level is required. Literature for preparation: E. Riedel, Moderne Anorganische Chemie, de Gruyter, 2003. H. Fribolin, Ein- und zweidimensionale NMR-Spektroskopie, Wiley-VCH, 2006. J. Rydberg, M. Cox, C. Musikas, G.R. Choppin, Eds., Solvent Extraction Principles and Practice, M. Dekker, New York, 2004. A. von Zelewsky, Stereochemistry of Coordination Compounds, Wiley-VCH, 1996.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 complex assessments equating to 50 hours, which must both be passed. The examination language is English.	
Credit points and grades	Participants can earn ten 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 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-M19	Modern Topics in Theoretical and Computational Chemistry	Prof. Dr. Thomas Heine (thomas.heine@tu-dresden.de)
Qualification objectives	The students master the basics of current methods for the simulation of states and processes in molecular and condensed systems. They are familiar with the methods of molecular dynamics, stochastic approaches (Monte Carlo simulations) and also machine learning. They have knowledge of the fundamentals and procedures for calculating spectroscopic quantities using methods of modern computational chemistry. The students are able to competently apply the various computer simulation methods by means of qualified computer program use to solve chemical problems.	
Content	The module covers fundamentals and in-depth study of molecular dynamics simulations, Monte Carlo simulations and machine learning approaches, and calculation of spectroscopic quantities using methods of modern computational chemistry, including vibrational spectroscopy (IR and Raman), NMR, EPR, and UV/Vis spectroscopy.	
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	Basic knowledge of computer use to perform quantum chemical calculations and in physical chemistry (thermodynamics, theory of chemical bonding) at the undergraduate level is required. Literature for preparation: Jörg Grunenberg: Computational Spectroscopy: Methods, Experiments and Applications; Thomas Heine, Jan-Ole Joswig, Achim Gelessus: Computational Chemistry Workbook.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 30 minutes as an individual examination and a portfolio equating to 25 hours, which must both be passed. The language of the examination is German or English, at the student's choice.	
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 oral examination 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 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-M20	Methods of Polymer Synthesis	Prof. Dr. Rainer Jordan (rainer.jordan@tu-dresden.de)
Qualification objectives	Students are able to understand advanced methods of polymer synthesis and characterization and can apply them in a problem-oriented manner.	
Content	With a focus on practical application, the module covers modern methods of polymer synthesis in solution and/or on surfaces and specific analytical methods for these polymers.	
Teaching and learning methods	The module comprises practical training (10 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of macromolecular chemistry, physical chemistry, and organic chemistry at the undergraduate level is required.	
Applicability	This module is one of 20 elective compulsory modules in the focus area Materials Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program Chemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a portfolio equating to 50 hours. The language of the examination is German or English, at the student's choice.	
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-Ma-B01	Bioinorganic Chemistry and Pathobiochemistry	Prof. Dr. Jens Pietzsch (j.pietzsch@hzdr.de)
Qualification objectives	The students have an insight into the topics, work and application fields of bioinorganic chemistry and pathobiochemistry (or medical biochemistry) and are familiar with key technical terms. They understand the two chemical subdisciplines as an important basis of modern pharmacy and medicine and grasp the interdisciplinary context. The students have a general understanding of the coordination chemical view in biochemistry, medicine and ecology. They know pathobiochemical changes of intra- and extracellular regulatory mechanisms, in cell-cell interaction, in the interaction of different tissues and organs, and in the generation of reactive oxygen and nitrogen species. They are able to make references to genetic predisposition and civilizational causes of the selected diseases. In addition, they are familiar with modern analytical procedures and diagnostic methods from clinical practice and research, in particular molecular imaging methods. In intensive group work, the students put their knowledge into practice by working out and dealing with technical aspects of bioinorganic chemistry and pathobiochemistry or medical biochemistry.	
Content	The module defines the terms of bioinorganic chemistry and pathobiochemistry or medical biochemistry and gives an overview of fields of application, methods, and model organisms. Contents of the module are knowledge and skills of biochemical changes in organisms, especially in humans under consideration of medical-diagnostic, medical-therapeutic, toxicological, pharmacological and environmental aspects. In addition, the module includes new findings on the development, manifestation and progression of selected diseases with high public health significance and also includes independent research, preparation, presentation and critical discussion of scientific facts.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses will be held either in German or English**. This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Basic knowledge of general and inorganic chemistry, organic chemistry, physical chemistry, (bio)analytical chemistry, coordination chemistry, biochemistry and radioactivity (physics) at the undergraduate level is required. For preparation, textbooks of bioinorganic chemistry and biochemistry in the respective current version are recommended (see examples). • Kaim/Schwederski, Bioanorganische Chemie; Verlag Teubner, • Herres-Pawlis/Klüfers, Bioanorganische Chemie; Verlag Wiley-VCH, • Löffler/Petrides, Biochemie und Pathobiochemie, Verlag Springer, • Voet/Voet/Pratt/Beck-Sickinger/Hahn, Lehrbuch der Biochemie; Verlag Wiley-VCH.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected.	

Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 60 minutes as an individual examination. The language of the examination is German or English, at the student's choice.
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-Ma-B02	Water Chemistry and Treatment	Prof. Dr. Stefan Stolte (stefan.stolte@tu-dresden.de)
Qualification objectives	The students know the basic (bio-)chemical processes in soils and waters and are able to assess their environmental behavior on the basis of physico-chemical properties of chemicals. In addition, the students master the practical assessment of water quality and have extensive knowledge in the field of chemical-physical (drinking) water treatment as well as the practical skills for laboratory experiments in the field of water treatment.	
Content	The module covers essential basics of environmental chemistry as well as classical and innovative processes of (drinking) water treatment.	
Teaching and learning methods	The module comprises lecture (4 hours per week), practical training (1 hour per week) and self-study. **The courses will be held either in German or English**. This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Knowledge of inorganic, organic, and physical chemistry at the undergraduate level is required. Literature for preparation: Worch, E. Drinking Water Treatment, Walter de Gruyter GmbH, Berlin/Boston, 2019. Gimbel, R., Jekel, M., Ließfeld, R.: Wasseraufbereitung – Grundlagen und Verfahren, Oldenbourg Industrieverlag, München/Wien, 2004. Hites, R. A., Raff, J. D., Wiesen, P. Umweltchemie, Wiley-VCH, Weinheim, 2017.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 40 minutes as an individual examination and an ungraded portfolio equating to 30 hours. The language of the examination is German or English, at the student's choice.	
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 pursuant to § 15 para. 1 sentence 6 of the Examination Regulations.	
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-Ma-B03	Heterocyclic Chemistry and Organometallic Synthesis	Prof. Dr. Hans-Joachim Knölker (hans-joachim.knoelker@tu-dresden.de)
Qualification objectives	The students know the modern synthesis methods of the chemistry of heterocycles and organometallic chemistry.	
Content	In terms of content, the module covers the fundamentals of the synthesis and reactivity of the various heterocyclic compound classes (for example, pyrroles, furans, imidazoles, indoles, pyridines, β-lactams, benzodiazepines), which are of central importance for natural and drug chemistry. In addition, the module includes the modern organometallic methods for synthesis of biologically active compounds, reactions of organo-transition metal complexes and catalysis.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Basic knowledge of organic chemistry and inorganic chemistry at the undergraduate level is required. Literature for preparation: J. A. Joule, K. Mills, Heterocyclic Chemistry, Wiley, 2010. J. Tsuji, Transition Metal Reagents and Catalysts, Wiley, 2000.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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. The language of examination corresponds to the teaching language determined at the beginning of the semester.	
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-Ma-B04	Medical Biochemistry	Prof. Dr. Tobias Gulder (tobias.gulder@tu-dresden.de)
		Additional lectures: Dr. Anke Matura (anke.matura@tu-dresden.de)
Qualification objectives	The students know biochemical relationships for diagnosis, cause, effect and therapy for numerous metabolic diseases. They know the principles of metabolic regulation, biotransformation and the effect of therapeutics. They know the methods of analysis with enzymes in free and immobilized form as well as the special requirements of clinical chemistry (preanalytics, interfering factors, pharmacokinetics). In addition, the students have an overview of the methods for the detection of clinically diagnostically important enzymes and for organ- or disease-specific diagnostics.	
Content	The module includes basic knowledge of biochemical changes in humans. The module further includes basic facts regarding the biochemical and regulatory relationships in the development and therapy of metabolic diseases.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (1 hour per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Knowledge of organic and analytical chemistry, as well as a sound knowledge of general and special biochemistry at the undergraduate level is required. Literature for preparation: G. Löffler, P. E. Petrides: Biochemie und Pathobiochemie, U. Wollenberger, R. Renneberg, F. F. Bier, F. W. Scheller: Analytische Biochemie, Dörner, K.: Taschenlehrbuch Klinische Chemie und Hämatologie Thieme Verlag, 2009.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 public oral examination lasting 15 minutes as an individual examination. The examination language is German.	
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 oral examination one 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-Ma-B05	Water Constituents and their Analysis	Prof. Dr. Stefan Stolte (stefan.stolte@tu-dresden.de)
		Additional lectures: Dr. Hilmar Börnick (hilmar.boernick@tu-dresden.de))
Qualification objectives	The students know the most important inorganic and organic water constituents, their input pathways into the hydrosphere as well as the complex relationships regarding the behaviour of these compounds and their interactions with each other. They also understand their potential toxicological relevance and the importance of water protection and remediation. They have an overview of analytical methods and techniques for qualitative and quantitative detection and are able to use them to determine inorganic and organic water constituents, interpret and evaluate the measurement data obtained.	
Content	The module covers occurrence, pathways, removability, toxicological relevance and determination of the main natural and anthropogenic water constituents in the hydrosphere.	
Teaching and learning methods	The module comprises lecture (4 hours per week), practical training (4 hours per week) and self-study. **The courses will be held either in German or English**. This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	A basic knowledge of inorganic, physical, and analytical chemistry at the undergraduate level is required. Literature for preparation: Worch, E.: Hydrochemistry – Basic Concepts and Exercises, Walter de Gruyter GmbH, Berlin/Boston, 2015; Schwedt, G, Schmidt, T. C., Schmitz O. J. : Analytische Chemie – Grundlagen, Methoden und Praxis, Wiley-VCH, Weinheim, 2016.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 and an ungraded portfolio equating to 100 hours. The language of examination corresponds to the teaching language determined at the beginning of the semester.	
Credit points and grades	Participants can earn ten credit points for this module. The module grade is calculated from the unweighted average grade of the examined assessments pursuant to § 15 para. 1 sentence 6 of the Examination Regulations.	

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-Ma-B06	(Bio-)Chemistry of Natural Product Biosynthesis	Prof. Dr. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will be familiar with important classes of natural products and biosynthetic pathways, especially of biomedically relevant compounds (e.g. polyketides, peptides) and recognize individual biosynthetic building blocks in natural product structures as well as their origin from primary metabolism. They can predict the resulting product structures based on the structure of biosynthetic pathways and likewise propose biosynthetic pathways for given structures. They recognize how natural product biosynthetic pathways can be modified to produce new drugs optimized in structure and function. They will also be able to analyze and comparatively evaluate concepts for the production of natural products for drug discovery using current examples.	
Content	The module includes basic principles of enzyme catalysis and metabolic intersections of primary and secondary metabolism. It includes mechanistic analyses of biosynthetic pathways of medically important classes of natural products as well as methods for elucidating biosynthetic pathways. Current examples from the literature in the field of natural product biosynthesis and total synthesis are also included in the module.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (4 hours per week) and self-study.	
Prerequisites for participation	Knowledge of organic and analytical chemistry and a sound knowledge of general biochemistry at the undergraduate level is required. For example, the textbook "Stryer Biochemistry" by J. L. Tymoczko and L. Stryer is suitable for preparation.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. The module is a prerequisite for participation in the module Practical Concepts of Natural Product Biosynthesis.	
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. The examination language is English.	
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 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 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-B07	Food Chemistry	Prof. Dr. Thomas Henle (thomas.henle@tu-dresden.de)
Qualification objectives	The students know the properties of food ingredients, their reactions during food processing as well as techno- and biofunctional consequences for the food. They know the structure and functional properties of packaging materials and possible substance transfers from these to food.	
Content	The content of the module covers important biomolecules in their capacity as food ingredients. Furthermore, the module covers selected chemical reactions occurring during food processing and storage, including functional and toxicological consequences. Food contact materials (FCMs) and their functionality as food packaging are also included in the module. Substance transfers from FCM to food based on case studies are further contents.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Basic knowledge regarding major biomolecules and their analysis at the undergraduate level is required. Literature for preparation: - Belitz et al.: Lehrbuch der Lebensmittelchemie, Springer, 2001, - Buchner: Verpackung von Lebensmitteln, Springer, 1999.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to 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 120 minutes. The language of examination corresponds to the teaching language determined at the beginning of the semester.	
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-Ma-B08	Wood and Plant Chemistry	Prof. Dr. Steffen Fischer (steffen.fischer@tu-dresden.de)
Qualification objectives	The students are able to evaluate primary and secondary plant constituents of lignocelluloses in their structure-property relationships and to understand chemical subsequent reactions. Furthermore, the students are able to classify the application of such substances.	
Content	The module covers the occurrence, structure and properties of low molecular weight and polymeric wood and plant constituents. Emphasis is also placed on important chemical reactions of the constituents, processes for their isolation, and their application and use.	
Teaching and learning methods	The module comprises lecture (2 hours per week), practical training (4 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic chemistry skills in organic and inorganic synthesis and structure elucidation at the undergraduate level are required. Literature for preparation: Fengel, D., Wegener, G.: Wood Chemistry, Ultrastructure, Reactions, De Gruther, 1989, Buchanan, B., Grussem, W., Jones, R.L.: Biochemistry & Molecular Biology of Plants, American Society of Plants Physiologist, 2000, Tsai, C. Stan: Biomacromolecules, Introduction to Structure, Function and Informatics, Wiley–VCH, 2006.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 30 hours, which must both be passed. The examination language is German.	
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 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-Ma-B09	Organometallic Chemistry	Prof. Dr. Thomas Straßner (thomas.strassner@tu-dresden.de)
Qualification objectives	Students have in-depth knowledge in the field of organometallic chemistry, in the performance of catalytic reactions and their investigation. The students master syntheses under inert gas.	
Content	Fundamentals of organometallic chemistry; metal carbonyls (bonding theory, synthesis and reactions); complexes with metal/C-sigma bonds, carbene and carbine complexes; complexes with pi ligands; C-C coupling reactions; sandwich and half-sandwich compounds; heterocyclic ligands.	
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. **The courses are held in German**.	
Prerequisites for participation	Basic knowledge of organic, physical, and theoretical chemistry and experimental experience at the undergraduate level are required. Literature for preparation: Elschenbroich: Organometallchemie, Teubner-Verlag.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 complex assessments equating to 100 hours, which must both be passed. The examination language is German.	
Credit points and grades	Participants can earn ten 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 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-Ma-B10	Natural Product Synthesis – Strategies and Synthesis Planning	Prof. Dr. Bernd Plietker (bernd.plietker@tu-dresden.de)
Qualification objectives	Students are able to independently develop and present their own synthesis concepts for complex molecules such as natural products. The students plan the experimental implementation of the syntheses and are able to implement this planning experimentally using advanced preparative techniques.	
Content	The module includes synthetic methods and in-depth discussions. The module also covers basic aspects of retrosynthesis and synthesis, critical comparative evaluation of concepts, and working out your own concepts and ideas in the context of total synthesis.	
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.	
Prerequisites for participation	Basic knowledge of organic synthesis in theory (synthetic methods, mechanisms of organic reactions, methods for structural elucidation of organic compounds) and practice (ability to perform multi-step preparations independently) at the undergraduate level is required. Literature for preparation: S. Warren: Organic Synthesis: The Disconnection Approach, J. Wiley, New York, 1983. S. Warren: Workbook for Organic Synthesis: The Disconnection Approach, J. Wiley, New York, 1983, P. Wyatt, S. Warren: Organic Synthesis: Strategy and Control, J. Wiley, New York, 2007, E. J. Corey, X.-M. Cheng: The Logic of Chemical Synthesis, J. Wiley, New York, 1995.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master'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 30 hours. The examination language is English.	
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-Ma-B11	Principles of Medicinal Chemistry	Prof. Dr. Bernd Plietker (bernd.plietker@tu-dresden.de)
Qualification objectives	The students master the basic knowledge of medicinal chemistry. They know aspects of drug chemistry (design and synthesis of drugs, properties of drugs, ligand-receptor interactions, structure-activity relationships).	
Content	The module covers basic contents of medicinal chemistry, in particular design and function of active substances, ligand-receptor interactions, structure-activity relationships. Contents also include the fundamentals based on selected substance classes and indications.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Basic knowledge of organic synthesis in theory (synthetic methods, mechanisms of organic reactions, methods for structural elucidation of organic compounds) at the undergraduate level is required. Literature for preparation: G. Patrick: An Introduction to Medicinal Chemistry, Oxford University Press; 6. Edition (20. April 2017).	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected.	
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. The examination language is English.	
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-Ma-B12	Radiopharmaceutical Chemistry	Prof. Dr. Klaus Kopka (k.kopka@hzdr.de)
		Additional lectures: PD Dr. Constantin Mamat (c.mamat@hzdr.de)
Qualification objectives	Students will be able to apply the fundamentals of radiochemistry and the general principles and mechanisms of radiopharmaceutical chemistry. Based on organic and complex chemistry, they are able to recognize the presentation, structure and function of radio-labeld substances (so-called radiotracers) and to understand the complex interplay between nuclear physics and biochemical principles, the use of these substances for diagnostics and therapy in connection with medical measurement technology.	
Content	The module covers the radiopharmaceutical chemistry of radioactive drugs (radiopharmaceuticals) for use in nuclear medicine as radiodiagnostics and radiotherapeutics (theranostic concept) and for basic biomedical research. The module includes questions of application, distribution, biotransformation and elimination, as well as on the molecular mechanisms of action of specific radiopharmaceuticals, and basic concepts of the biological effects of ionizing radiation.	
Teaching and learning methods	The module comprises lecture (4 hours per week), practical training (1 hour per week) and self-study. **The courses will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Basic knowledge of general and inorganic chemistry, organic chemistry, physical chemistry, analytical chemistry, coordination chemistry, biochemistry, and of radioactivity (physics) at the undergraduate level is required.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a non-public oral examination lasting 60 minutes as an individual examination and a portfolio equating to 20 hours. The language of the examination is German or English, at the student's choice.	
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 oral examination 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-Ma-B13	Quantum Chemistry	Prof. Dr. Thomas Straßner (thomas.strassner@tu-dresden.de)
Qualification objectives	The students are able to apply modern quantum chemical programs and master the calculation of ground and transition states of molecular systems by means of DFT calculations for the "in silico" investigation of reactions and their mechanisms. In addition, they are able to work with different software packages (under LINUX).	
Content	The module includes an introduction to molecular modeling techniques and the practical performance of semiempirical, ab initio, and DFT calculations with special emphasis on organic / organometallic reactions. Basis sets, electron correlation, perturbation theory, population analyses and interpretation of results using qualitative MO theory are contents of the module.	
Teaching and learning methods	The module comprises lecture (2 hours per week), practical training (4 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge of organic, physical, and theoretical chemistry at the undergraduate level is required. Literature for preparation: F. Jensen; Introduction to Computational Chemistry; Wiley-VCH.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 complex assessments equating to 50 hours, which must both be passed. The examination language is German.	
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-Ma-B14	Practical Concepts of Natural Product Biosynthesis	Prof. Dr. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will be familiar with important classes of natural products and biosynthetic pathways, especially of biomedically relevant compounds (e.g. polyketides, peptides) and recognize individual biosynthetic building blocks in natural product structures. Based on the structure of biosynthetic pathways, they can predict the resulting product structures and also propose biosynthetic pathways for given structures. They recognize how natural product biosynthetic pathways can be modified to produce new, unnatural active ingredients.	
Content	The module covers mechanistic analyses of biosynthetic pathways of medically important classes of natural products as well as methods for elucidating biosynthetic pathways and first basic principles for manipulating biosynthetic processes in vivo and in vitro. In addition to current examples from the literature in the field of natural product biosynthesis, the practical implementation of selected aspects, in particular for the production and application of natural products and biosynthetic enzymes or for the recombinant production of natural product molecules, is the content of the module.	
Teaching and learning methods	The module comprises practical training (6 hours per week) and self-study.	
Prerequisites for participation	The competences to be acquired in the module (Bio-)Chemistry of Natural Product Biosynthesis are assumed. Basic knowledge of biochemistry at the undergraduate level is also required. For example, the textbook "Stryer Biochemistry" by J. L. Tymoczko and L. Stryer is suitable for preparation.	
Applicability	This module is one of 15 elective compulsory modules in the focus area Biologically Oriented Chemistry of the Master's degree program Chemistry, out of which modules comprising 20 to 30 credits are to be selected. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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. The examination language is English.	
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 semester.	
Workload	The workload comprises a total of 150 hours.	

Module duration	The module comprises one semester.

Module number	Module name	Responsible lecturer
Chem-Ma-C01	Biofunctional Polymer Materials for Tissue Engineering	Prof. Carsten Werner (werner@ipfdd.de)
Qualification objectives	Students understand basic principles of the application of biofunctional polymeric materials in tissue engineering. They are familiar with common approaches of exogenous control of cell fate decisions by synthetic, biological or biohybrid polymeric materials. Students understand the effect of chemical and physical material properties for specific tissue engineering applications and can fabricate and test simple, biodegradable polymeric materials for tissue culture. They will be aware of current research trends in biomaterials for regenerative therapies and drug discovery.	
Content	The module covers the main aspects of the composition, structure and function of extracellular matrices. Further contents of the module are the discussion of design concepts for different types of cell-instructive biomaterials. In addition, adapted materials that support specific therapeutic concepts as well as enable in vitro models for tissues and diseases are part of the module.	
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	Basic knowledge of polymer chemistry at the undergraduate level is required.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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. The examination language is English.	
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-Ma-C02	Biomimetic Synthesis of Materials	Prof. Dr. Michael Mertig (michael.mertig@tu-dresden.de)
Qualification objectives	Students are familiar with the fundamentals of biomimetic-based synthesis of molecularly defined nanostructures as well as state-of-the-art methods of characterizing their structure and properties.	
Content	Using modern approaches to biomimetic materials synthesis, the module covers the application of biological principles such as molecular recognition and self-assembly, and the use of cellular mechanisms and motors to generate new materials with tailored structural and physicochemical properties. The module also covers properties of biological structures for use as templates for controlled organization of inorganic matter at the molecular scale. Advanced methods for characterization of biomolecular hybrid structures and their manipulation are also components of the module.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week), practical training (1 hour per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge of physical and inorganic chemistry, biology, and physics at the undergraduate level is required. Literature for preparation: Nanobiotechnology I + II, Eds.: C.M. Niemeyer, C.A. Mirkin, Wiley Verlag, Weinheim, 2004/2007; Bio-Nanomaterials: Designing Materials Inspired by Nature, W. Pompe, G. Rödel, H.-J. Weiss, M. Mertig, Wiley Verlag, Weinheim, 2013, ISBN: 978-3-527-41015-6.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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 8 hours. The examination language is German.	
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 one 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-Ma-C03	Chemometrics	Prof. Dr. Thomas Simat (thomas.simat@tu-dresden.de)
Qualification objectives	Students will be able to graphically represent and statistically describe measured values, formulate hypotheses and test them using statistical methods, and apply the necessary statistical tools for quality assurance in the laboratory and validation of analytical procedures.	
Content	The module includes the following contents: – location and dispersion measures, – empirical and theoretical distributions, – 2-sample tests, parametric and non-parametric, – one and two-way analysis of variance, – correlation and regression analysis, – quality assurance and validation in analytical chemistry and – performing the procedures using Excel and Origin Pro.	
Teaching and learning methods	The module comprises lecture (2 hours per week), exercise (2 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge of mathematics and analytical chemistry at the undergraduate level is required.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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. Preliminary academic work is a presentation. **The examination language is German**.	
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-Ma-C04	NMR Spectroscopy in Chemistry, Materials and Life Sciences	Prof. Dr. Eike Brunner (eike.brunner@tu-dresden.de)
Qualification objectives	The students master the application of modern NMR methods in chemistry and materials science. They possess the necessary theoretical knowledge and can independently select and plan problem-oriented NMR experiments.	
Content	The methodological focus of the module is NMR spectroscopy and its combination with other methods, especially with regard to the structure determination of molecules/macromolecules in solution as well as solids/materials.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Basic knowledge of analytical chemistry and physical chemistry on the undergraduate level is required. Literature for preparation: Matthias Otto, Analytical Chemistry: A Modern Approach to Analytical Science, Wiley-VCH, 5.th Edition 2019.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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 combined term paper equating to 20 hours, which must both be passed. The examination language is English.	
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 combined term paper one 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-Ma-C05	Concepts of sustainable Chemistry	Prof. Dr. Jan J. Weigand (jan.weigand@tu-dresden.de)
Qualification objectives	The students master the conceptual approaches and the theoretical background of sustainable chemistry. They have in-depth knowledge of an integrated concept for sustainable production in chemistry. They are able to work on questions concerning the recovery of valuable materials and to critically discuss experimental results and place them in the context of the literature.	
Content	Concepts for a sustainable chemistry, methods for a resource-efficient synthesis chemistry as well as processes for a recovery of valuable materials are the central contents of the module. Furthermore, the module covers in-depth theoretical aspects for a more sustainable model and integrated conception in the chemical industry as well as possibilities for a more resource-efficient extraction of basic chemicals. Further focal points are concepts for a recovery of valuable substances as well as the application of different separation processes and important characterization methods. Basic modes of operation and the interpretation of results based on concrete examples for the recovery and separation of valuable substances are also part of the module.	
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	Basic knowledge of technical chemistry, inorganic chemistry, organic chemistry, and analytical chemistry at the undergraduate level is required.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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 assessments equating to 40 hours, which must both be passed. The examination language is English.	
Credit points and grades	Participants can earn ten 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 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-Ma-C06	Electrochemistry	Prof. Dr. Inez Weidinger (inez.weidinger@tu-dresden.de)
Qualification objectives	Students are familiar with the principles and applications of electrochemical energy storage and conversion. They master electrochemical and spectro-electrochemical techniques for elucidating the structure and functionality of modern electrochemical systems, and can apply and pass them on.	
Content	The module includes the principles and applications of electrochemical energy storage (batteries, supercapacitors), fuel cells, sensors, and electrosynthesis (water electrolysis, CO_2 reduction). Applications include molecular, biological, and materials-based systems. The module also covers fundamental processes (mass transport, electron transfer, catalysis) necessary to describe electrochemical systems. The module further covers electrochemical (chronoamperometry, cyclic voltammetry) and spectro-electrochemical (impedance, Raman, IR, UV-vis) measurement techniques and explains their importance for the analysis of electrochemical processes.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Basic knowledge of physical chemistry, electrochemistry, inorganic chemistry, and biochemistry at the undergraduate level is required. Literature for preparation: P.W. Atkins & J. de Paula, Physical Chemistry, Wiley-VCH, Weinheim, 2013.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas.	
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. The examination language is English.	
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 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-Ma-C07	Modern Analytical Methods	Prof. Dr. Eike Brunner (eike.brunner@tu-dresden.de)
		Additional lectures: Dr. Susanne Machill (susanne.machill@tu-dresden.de)
Qualification objectives	Students are able to correctly assess the possibilities and limitations of modern analytical methods and have the ability to reasonably select a method appropriate to the analytical problem at hand. The students possess the experimental skills required to carry out analytical investigations. The students are able to apply their acquired knowledge to current problems in analytics.	
Content	The module covers the functional principle and possible applications of modern analytical methods such as mass spectrometry, vibrational spectroscopy and chromatography. In addition, the module includes the practical application (including NMR spectroscopy) of these methods to current problems in analytics.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (1 hour per week), practical training (4 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Basic knowledge of instrumental analysis at the undergraduate level is required. Literature for preparation: Matthias Otto, Analytical Chemistry: A Modern Approach to Analytical Science, Wiley-VCH, 5.th Edition 2019.	
Applicability	This module is one of 7 elective compulsory modules in the Cross-Sectional Field of the Master's degree program Chemistry. The assigned credit points are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry. Modules with a total of 20 to 30 credit points must be selected in each of the two focus areas. In addition, the module is one of 14 elective compulsory modules in the focus area Practical Application in the Master's degree program Chemistry, out of which modules comprising 10 credits are to be selected. The module can only be selected once in the Master's degree program 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 complex assessments equating to 70 hours, which must both be passed. The examination language is German.	
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 three times, the grade of the complex assessments two times.	
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-Ma-G01	General Qualifications in Chemistry	Dean of Studies Chemistry (studiendekan_chm@chemie.tu-dresden.de)
Qualification objectives	Students are able to critically examine an area of socially relevant topics. Due to the acquired linguistic, social and personal knowledge and competences, they are able to engage in intercultural discourse and to judge and act in a socially responsible manner.	
Content	The module includes, at the student's choice, interdisciplinary content on topics related to life in a pluralistic and open society, such as sustainability, diversity, globalization, interculturality, digitalization, culture, democracy, or similar topics.	
Teaching and learning methods	The module comprises lecture, seminar, exercise and tutorial totalling 4 hours per week and self-study. The courses are to be chosen from the catalogue “General Qualifications in Chemistry”; this catalogue including the information on the teaching and examination language as well as the respective required examinations will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	There are no specific prerequisites for participation.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master’s degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of an ungraded examination assessment specified in the "General Qualifications in Chemistry" catalogue.	
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
Chem-Ma-G02	Introduction to Professional and Academic Language: Working with Texts and Oral Communication	Antonella Wermke (antonella.wermke@tu-dresden.de)
Qualification objectives	Students possess the ability to effectively use subject- and science-related texts for study and work as well as study- and work-related oral communication in English. They master relevant communication techniques and also possess intercultural competence. The foreign language competence in the above-mentioned areas corresponds at least to level $B2^+$ of the Common European Framework of Reference for Languages.	
Content	The module includes use of subject- and science-related texts for study and work, competent use of campus language, and use of media for (autonomous) language acquisition. The module also includes giving subject-related presentations and papers and acquiring appropriate oral communication in an academic context.	
Teaching and learning methods	The module comprises language course (4 hours per week) and self-study. The courses are to be chosen from the catalogue offered by the TU Dresden language training; this catalogue including the respective required examinations will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	General language knowledge and skills in English at level B2 of the Common European Framework of Reference for Languages are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of examination assessments specified in the catalogue of the language training TU Dresden. The examination language is English.	
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 semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-G03	Introduction to Professional and Academic Language: Applying for a Job and Written Communication	Antonella Wermke (antonella.wermke@tu-dresden.de)
Qualification objectives	Students will have the ability to communicate adequately in English, both in writing and orally, at a level of at least B2+ of the Common European Framework of Reference for Languages, in relation to their studies and careers.	
Content	The module covers appropriate written communication in university and professional contexts, writing application documents and coping with job interviews in the foreign language, including the presentation and discussion of relevant study and subject-related topics.	
Teaching and learning methods	The module comprises language course (4 hours per week) and self-study. The courses are to be chosen from the catalogue offered by the TU Dresden language training; this catalogue including the respective required examinations will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	General language knowledge and skills in English at level B2 of the Common European Framework of Reference for Languages are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of examination assessments specified in the catalogue of the language training TU Dresden. The examination language is English.	
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 semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-G04	Advanced Professional English	Antonella Wermke (antonella.wermke@tu-dresden.de)
Qualification objectives	Students possess advanced communicative and intercultural skills in English at level C1 of the Common European Framework of Reference for Languages. Students will be able to use this knowledge flexibly and competently in the context of study abroad and in a professional context.	
Content	The contents of the module are, at the student's choice, oral communication in the world of work, international negotiations, professional writing, and project development and management, each in various forms.	
Teaching and learning methods	The module comprises language course (4 hours per week) and self-study. The courses are to be chosen from the catalogue offered by the TU Dresden language training; this catalogue including the respective required examinations will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	General language knowledge and skills in English at level B2 of the Common European Framework of Reference for Languages are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of examination assessments specified in the catalogue of the language training TU Dresden. The examination language is English.	
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 semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-G05	Introduction to Applied Molecular Biology and Biotechnology	Prof. Marion Ansorge-Schumacher (marion.ansorge@tu-dresden.de)
Qualification objectives	The students have an insight into the central topics, working and fields of biotechnology and are familiar with key technical terms. They grasp molecular biology as the central basis of modern biotechnology and can describe the overall interdisciplinary context. They survey the technical breadth of applied molecular biology and biotechnology. Students have initial experience with research, preparation and presentation of facts as well as with critical discussion of socially relevant topics. They have strengthened their communication skills through teamwork.	
Content	The module includes the definition of the field of biotechnology, the categorization based on fields of application, organisms and methods as well as the location in the interdisciplinary context of molecular biology, biological and non-biological basic subjects. Further contents are essential methodological molecular and organism-related concepts of biotechnology as well as exemplary classical and modern applications from the fields of application of agricultural biotechnology, food biotechnology, industrial and aquatic biotechnology, environmental biotechnology, medical, forensic and analytical biotechnology. This also includes the technical, ethical and social aspects of selected topics. Furthermore, the categorization of activities within applied molecular biology and biotechnology and their assignment to the required academic qualification level is included.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Participants require elementary knowledge of biology at university entrance-level proficiency. The textbook "LINDER Biologie" by H. Bayrhuber, W. Hauber, U. Kull (eds.) (Schroedel Verlag) is suitable for preparation.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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. The examination language is German.	
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-Ma-G06	Basic Cell Biology and Molecular Genetics	Prof. Christian Dahmann (christian.dahmann@tu-dresden.de)
Qualification objectives	Students have a basic knowledge of cellular biology and molecular genetics and are familiar with key technical terms. They grasp the central importance of the subject content as the basis of modern biology and biotechnology.	
Content	The module includes key concepts in cell biology and molecular genetics. This includes the structure of the eukaryotic cell, construction and function of cell membrane and organelles, structure and function of the cytoskeleton, protein modifications, cell division and formation of cell assemblies, construction, replication, mutagenesis and repair of the genome, expression of genomic information in cells and its control, and the genetic basis of development of organisms. Furthermore, microscopy and other key cell biology methods are included.	
Teaching and learning methods	The module comprises lecture (3 hours per week) and self-study. **The courses are held in German**.	
Prerequisites for participation	Participants require elementary knowledge of biology at university entrance-level proficiency. The textbook "LINDER Biologie" by H. Bayrhuber, W. Hauber, U. Kull (eds.) (Schroedel Verlag) is suitable for preparation.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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. The examination language is German.	
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-Ma-G07	Basic Microbiology	Prof. Thorsten Mascher (thorsten.mascher@tu-dresden.de)
Qualification objectives	Students have a basic understanding of the topics and fields of work in microbiology and know key technical terms. They are able to classify microbiology as a central field within modern (molecular) biology and the fundamental role that microbes play in global processes. Students will be able to describe the relevance that microorganisms have for humans. They can critically assess the possibilities and limitations of modern microbiology.	
Content	The module includes the definition of the field of microbiology and the concept of microbes, the geological and phylogenetic classification of microorganisms, and the structure and function of the relevant components of a microbial cell. It includes an overview of the diversity of microorganisms (including viruses), their metabolic activities and their influence on global metabolic cycles. In addition to the basics of microbial growth, including the concept of bacterial multicellularity as an essential life form of microorganisms, basic concepts of bacterial and phage genetics are contents of the module.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. **The courses are held in German.**	
Prerequisites for participation	Participants require elementary knowledge of biology at university entrance-level proficiency. The textbook "LINDER Biologie" by H. Bayrhuber, W. Hauber, U. Kull (eds.) (Schroedel Verlag) is suitable for preparation.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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. The examination language is German.	
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-Ma-G08	Mechanical Engineering	Prof. Stefan Odenbach (stefan.odenbach@tu-dresden.de)
Qualification objectives	Students have a basic understanding of mechanical engineering problems and the ability to work in an interdisciplinary manner.	
Content	The module covers two topics in mechanical engineering at the student's option, including energy sources, power engineering, flight mechanics, aero and gas dynamics, food engineering, space systems, hydrogen engineering, or reactor physics.	
Teaching and learning methods	The module comprises lecture, exercise, seminar or practical training totalling 4 hours per week and self-study. The courses are to be chosen from the minor catalogue of the Master's degree program Chemistry; this catalogue including the information on the teaching and examination language as well as the respective required examinations will be announced at the beginning of each semester by the Faculty.	
Prerequisites for participation	Mathematics and science knowledge and skills at the basic course baccalaureate level are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master’s degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of examination assessments specified in the minor catalogue.	
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 semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-G09	Introduction to Business Management	Prof. Michael Schefczyk (michael.schefczyk@tu-dresden.de)
Qualification objectives	The students have basic knowledge of the terms and principles of business administration. They have the methodological tools and the systematic orientation to be able to successfully deal with simple business management issues.	
Content	The module covers the essentials of business administration.	
Teaching and learning methods	The module comprises lecture (2 hours per week), tutorial (1 hour per week) and self-study. **The courses are held in German**.	
Prerequisites for participation	There are no specific prerequisites for participation.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to be selected. The module is a prerequisite for participation in the modules Marketing and Sustainability Management as Manufacturing and Logistics.	
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. The examination language is German.	
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-Ma-G10	Marketing and Sustainability Management	Prof. Florian Siems (florian.siems@tu-dresden.de)
Qualification objectives	Students will be familiar with the most important basic principles of sustainable management and marketing, in particular marketing strategy and informational basics such as consumer behaviour and market research. They will be able to apply selected theories and approaches to practical issues.	
Content	The module covers the basics of sustainable business management as well as the basics of marketing.	
Teaching and learning methods	The module comprises lecture (3 hours per week) and self-study. **The courses are held in German**.	
Prerequisites for participation	Participants require skills acquired in the module Introduction to Business Management. Participants also require elementary knowledge of mathematic at university entrance-level proficiency.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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 term paper equating to 15 hours. The examination language is German.	
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 term paper 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-Ma-G11	Manufacturing and Logistics	Prof. Udo Buscher (udo.buscher@tu-dresden.de)
Qualification objectives	The students know essential tasks in the areas of manufacturing and logistics. They are able to carry out production program planning and to design production processes effectively and efficiently, taking into account the selected manufacturing organization. The students know analysis and design principles for the logistics system and for the subsystems as well as rules for the coordination of logistical processes. They are able to apply quantitative methods in logistics, model practical logistics problems and solve them using suitable mathematical methods.	
Content	The module covers fundamentals in the areas of manufacturing and logistics.	
Teaching and learning methods	The module comprises lecture (2 hours per week), exercise (2 hours per week) and self-study. **The courses are held in German**.	
Prerequisites for participation	Participants require skills acquired in the module Introduction to Business Management. Participants also require elementary knowledge of mathematic at university entrance-level proficiency.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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 120 minutes. The examination language is German.	
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-Ma-G12	Solid-State Physics	Director of the Institute of Solid State and Materials Physics (ifmp@mailbox.tu-dresden.de)
Qualification objectives	Students master basic terms, models, experimental methods and theoretical concepts to describe condensed matter. They know the essential phenomena that characterize the behaviour of condensed matter and understand technological applications. Students are 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, densities of states, an-harmonic properties), conduction electrons (Fermi gas, band model, transport properties, behavior in magnetic fields) and semiconductors (intrinsic and doped semiconductors, simple devices and hetero structures). The module also covers magnetism (dia-, para-, and ferromagnetism), dielectric and optical properties (local field, dielectric function, collective excitations), and superconductivity (fundamental properties, Cooper pairs, macroscopic wave function).	
Teaching and learning methods	The module comprises lecture (4 hours per week), exercise (2 hours per week) and self-study. **The courses and examinations will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Mathematics and physics knowledge and skills at the basic course baccalaureate level are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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.	
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-Ma-G13	Atomic and Molecular Physics	Dean of Studies of the Faculty of Physics (studiendekan.physik@tu-dresden.de)
Qualification objectives	Students know the most important general properties of atoms and molecules and are able to calculate them for simple cases. Students are able to apply this knowledge to a wide range of atomic and molecular physical phenomena.	
Content	The module covers 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 includes quantum mechanical treatment of H_2^+ and H_2, "valence bond" and "molecular orbital" model, rotation and vibration of molecules, and spectroscopy.	
Teaching and learning methods	The module comprises lecture (4 hours per week), exercise (2 hours per week) and self-study. **The courses and examinations will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Mathematics and physics knowledge and skills at the basic course baccalaureate level are required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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.	
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-Ma-G14	Quantum Theory - Basic Concepts	Director of the Institute of Theoretical Physics (itp@tu-dresden.de)
Qualification objectives	The students know and understand the systematizing way of thinking and formal description of quantum mechanics. They are able to derive fundamental quantum effects from the postulates of quantum theory and to describe them analytically and quantitatively. Students are able to apply the acquired knowledge to a wide range of quantum physical phenomena. They are capable of general problem-solving competence and possess 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 the approximation methods (time-independent and time-dependent perturbation calculus, variational methods, WKB).	
Teaching and learning methods	The module comprises lecture (4 hours per week), exercise (2 hours per week) and self-study. **The courses and examinations will be held either in German or English.** This will be specified by the lecturer at the beginning of each semester and announced by the Faculty.	
Prerequisites for participation	Basic knowledge in mathematics and physics at the undergraduate level is required.	
Applicability	This module is one of 14 elective compulsory modules in the focus area General Education Modules of the Master's degree program Chemistry, out of which modules comprising 5 to 10 credits are to 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.	
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.	

Annex 2a:
Study schedule – start of study in the winter semester
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 (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Compulsory Field						
Chem-Ma-RE1	Advanced Research Internship		0/0/0/10/0/0 Ex			10
Chem-Ma-RE2	Research Lab Class			0/0/0/10/0/0 Ex		10
					Final thesis[1]	25
					Colloquium	5
Elective Compulsory Field[2]						
Focus Area Materials Chemistry[3]						
Chem-Ma-M01	Crystal Structure Determination	4/1/0/5/0/0 Ex				10
Chem-Ma-M02	Modern aspects in industrial chemistry	2/4/0/0/0/0 2xEx				5
Chem-Ma-M03	Physical Chemistry of Solids	5/0/0/0/0/0 Ex				5
Chem-Ma-M04	Physical Chemistry of Modern Materials	4/2/0/0/0/0 Ex				5
Chem-Ma-M05	Polymer Materials	8/0/0/0/0/0 Ex				10
Chem-Ma-M06	Environmental and Actinide Chemistry	4/0/0/0/0/0 Ex				5
Chem-Ma-M07	Advanced Functional Materials		2/2/0/6/0/0 2xEx			10
Chem-Ma-M08	Advanced Theoretical Chemistry		3/2/0/0/0/0 2xEx			5
Chem-Ma-M09	Batteries and Supercapacitors		2/1/0/2/0/0 2xEx			5
Chem-Ma-M10	Colloids and Interfaces		4/1/0/0/0/0 Ex			5
Chem-Ma-M11	Functional Polymers		4/1/0/0/0/0 Ex			5
Chem-Ma-M12	Modern Methods of Electrochemistry		4/0/0/0/0/0 Ex			5
Chem-Ma-M13	Polymer Topologies and Polymer Processing		3/0/0/2/0/0 2xEx			5
Chem-Ma-M14	Radiochemistry		2/0/0/3/0/0 Ex			5
Chem-Ma-M15	Synthetic Two-Dimensional Materials		2/1/0/2/0/0 2xEx			5
Chem-Ma-M16	Advanced Solid State Chemistry		5/0/0/5/0/0 2xEx			10

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Chem-Ma-M17	Mathematical and Numerical Foundations of Theoretical Chemistry			2/0/0/3/0/0 2xEx		5
Chem-Ma-M18	Modern aspects in coordination and main-group chemistry			2/2/0/6/0/0 2xEx		10
Chem-Ma-M19	Modern Topics in Theoretical and Computational Chemistry			2/1/0/2/0/0 2xEx		5
Chem-Ma-M20	Methods of Polymer Synthesis			0/0/0/10/0/0 Ex		10
Focus Area Biologically Oriented Chemistry[3]						
Chem-Ma-M01	Crystal Structure Determination	4/1/0/5/0/0 Ex				10
Chem-Ma-B01	Bioinorganic Chemistry and Pathobiochemistry	4/0/0/0/0/0 Ex				5
Chem-Ma-B02	Water Chemistry and Treatment	4/0/0/1/0/0 2xEx				5
Chem-Ma-B03	Heterocyclic Chemistry and Organometallic Synthesis	4/0/0/0/0/0 Ex				5
Chem-Ma-B04	Medical Biochemistry	3/1/0/0/0/0 2xEx				5
Chem-Ma-B05	Water Constituents and their Analysis	4/0/0/4/0/0 2xEx				10
Chem-Ma-B06	(Bio-)Chemistry of Natural Product Biosynthesis		4/4/0/0/0/0 2xEx			10
Chem-Ma-B07	Food Chemistry		4/0/0/0/0/0 Ex			5
Chem-Ma-B08	Wood and Plant Chemistry		2/0/0/4/0/0 2xEx			5
Chem-Ma-B09	Organometallic Chemistry		2/2/0/8/0/0 2xEx			10
Chem-Ma-B10	Natural Product Synthesis – Strategies and Synthesis Planning		2/2/0/8/0/0 Ex			10
Chem-Ma-B11	Principles of Medicinal Chemistry		2/2/0/0/0/0 Ex			5
Chem-Ma-B12	Radiopharmaceutical Chemistry		4/0/0/1/0/0 2xEx			5
Chem-Ma-B13	Quantum Chemistry			2/0/0/4/0/0 2xEx		5
Chem-Ma-B14	Practical Concepts of Natural Product Biosynthesis			0/0/0/6/0/0 Ex		5
Cross-Sectional Field[4]						
Chem-Ma-C01	Biofunctional Polymer Materials for Tissue Engineering	2/1/0/2/0/0 Ex				5

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Chem-Ma-C02	Biomimetic Synthesis of Materials	2/1/0/1/0/0 2xEx				5
Chem-Ma-C03	Chemometrics	2/0/2/0/0/0 PA, Ex				5
Chem-Ma-C04	NMR Spectroscopy in Chemistry, Materials and Life Sciences	3/1/0/0/0/0 2xEx				5
Chem-Ma-C05	Concepts of sustainable Chemistry		4/2/0/4/0/0 2xEx			10
Chem-Ma-C06	Electrochemistry		3/1/0/0/0/0 2xEx			5
Chem-Ma-C07	Modern Analytical Methods		3/1/0/4/0/0 2xEx			10
Focus Area Practical Application[5]						
Chem-Ma-M01	Crystal Structure Determination	4/1/0/5/0/0 Ex				10
Chem-Ma-M07	Advanced Functional Materials		2/2/0/6/0/0 2xEx			10
Chem-Ma-M14	Radiochemistry		2/0/0/3/0/0 Ex			5
Chem-Ma-M16	Advanced Solid State Chemistry		5/0/0/5/0/0 2xEx			10
Chem-Ma-M17	Mathematical and Numerical Foundations of Theoretical Chemistry			2/0/0/3/0/0 2xEx		5
Chem-Ma-M18	Modern aspects in coordination and main-group chemistry			2/2/0/6/0/0 2xEx		10
Chem-Ma-M20	Methods of Polymer Synthesis			0/0/0/10/0/0 Ex		10
Chem-Ma-B05	Water Constituents and their Analysis	4/0/0/4/0/0 2xEx				10
Chem-Ma-B08	Wood and Plant Chemistry		2/0/0/4/0/0 2xEx			5
Chem-Ma-B09	Organometallic Chemistry		2/2/0/8/0/0 2xEx			10
Chem-Ma-B10	Natural Product Synthesis – Strategies and Synthesis Planning		2/2/0/8/0/0 Ex			10
Chem-Ma-B13	Quantum Chemistry			2/0/0/4/0/0 2xEx		5
Chem-Ma-B14	Practical Concepts of Natural Product Biosynthesis			0/0/0/6/0/0 Ex		5
Chem-Ma-C07	Modern Analytical Methods		3/1/0/4/0/0 2xEx			10

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Focus Area General Education Modules[6]						
Chem-Ma-G01**	General Qualifications in Chemistry	*/*/*/0/*/0 Ex*				5
Chem-Ma-G02	Introduction to Professional and Academic Language: Working with Texts and Oral Communication	0/0/0/0/0/4 Ex*				5
Chem-Ma-G03	Introduction to Professional and Academic Language: Applying for a Job and Written Communication	0/0/0/0/0/4 Ex*				5
Chem-Ma-G04	Advanced Professional English		0/0/0/0/0/4 Ex*			5
Chem-Ma-G05	Introduction to Applied Molecular Biology and Biotechnology	2/1/0/0/0/0 Ex				5
Chem-Ma-G06	Basic Cell Biology and Molecular Genetics	3/0/0/0/0/0 Ex				5
Chem-Ma-G07	Basic Microbiology			4/0/0/0/0/0 Ex		5
Chem-Ma-G08***	Mechanical Engineering	*/*/*/*/0/0 Ex*				5
Chem-Ma-G09	Introduction to Business Management	2/0/0/0/1/0 Ex				5
Chem-Ma-G10	Marketing and Sustainability Management		3/0/0/0/0/0 2xEx			5
Chem-Ma-G11	Manufacturing and Logistics			2/0/2/0/0/0 Ex		5
Chem-Ma-G12	Solid-State Physics	4/0/2/0/0/0 Ex				10
Chem-Ma-G13	Atomic and Molecular Physics		4/0/2/0/0/0 Ex			10
Chem-Ma-G14	Quantum Theory - Basic Concepts		4/0/2/0/0/0 Ex			10
CP		**30**	**30**	**30**	**30**	**120**

[1] The topic of the master thesis is assigned at the end of the 3rd semester.

[2] In the Elective Compulsory Field, modules amounting to 70 credit points must be selected.

[3] Modules with a total of 20 to 30 credit points must be selected.

[4] The assigned credit points of the modules in the Cross-Sectional Field are allocated in equal parts to the focus areas Materials Chemistry and Biologically Oriented Chemistry.

[5] Modules with a total of 10 credit points must be selected.

[6] Modules with a total of 5 to 10 credit points must be selected.

* depending on choice made by the student

** The module comprises lecture, exercise, seminar or tutorial totalling 4 hours per week.

*** The module comprises lecture, exercise, seminar or practical training totalling 4 hours per week.

M	Mobility window according to § 6 para. 1 sentence 2 Study Regulations
CP	Credit Points
L	Lecture
S	Seminar
E	Exercise
P	Practical training
T	Tutorial
LC	Language course
PA	Preliminary academic work
Ex	Examination(s)

Annex 2b:
Study schedule – start of study in the summer semester
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 (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Compulsory Field						
Chem-Ma-RE1	Advanced Research Internship		0/0/0/10/0/0 Ex			10
Chem-Ma-RE2	Research Lab Class			0/0/0/10/0/0 Ex		10
					Final thesis[1]	25
					Colloquium	5
Elective Compulsory Field[2]						
Focus Area Materials Chemistry[3]						
Chem-Ma-M01	Crystal Structure Determination		4/1/0/5/0/0 Ex			10
Chem-Ma-M02	Modern aspects in industrial chemistry		2/4/0/0/0/0 2xEx			5
Chem-Ma-M03	Physical Chemistry of Solids		5/0/0/0/0/0 Ex			5
Chem-Ma-M04	Physical Chemistry of Modern Materials		4/2/0/0/0/0 Ex			5
Chem-Ma-M05	Polymer Materials		8/0/0/0/0/0 Ex			10
Chem-Ma-M06	Environmental and Actinide Chemistry		4/0/0/0/0/0 Ex			5
Chem-Ma-M07	Advanced Functional Materials			2/2/0/6/0/0 2xEx		10
Chem-Ma-M08	Advanced Theoretical Chemistry	3/2/0/0/0/0 2xEx				5
Chem-Ma-M09	Batteries and Supercapacitors	2/1/0/2/0/0 2xEx				5
Chem-Ma-M10	Colloids and Interfaces	4/1/0/0/0/0 Ex				5
Chem-Ma-M11	Functional Polymers	4/1/0/0/0/0 Ex				5
Chem-Ma-M12	Modern Methods of Electrochemistry	4/0/0/0/0/0 Ex				5
Chem-Ma-M13	Polymer Topologies and Polymer Processing	3/0/0/2/0/0 2xEx				5
Chem-Ma-M14	Radiochemistry			2/0/0/3/0/0 Ex		5
Chem-Ma-M15	Synthetic Two-Dimensional Materials			2/1/0/2/0/0 2xEx		5
Chem-Ma-M16	Advanced Solid State Chemistry			5/0/0/5/0/0 2xEx		10

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Chem-Ma-M17	Mathematical and Numerical Foundations of Theoretical Chemistry		2/0/0/3/0/0 2xEx			5
Chem-Ma-M18	Modern aspects in coordination and main-group chemistry		2/2/0/6/0/0 2xEx			10
Chem-Ma-M19	Modern Topics in Theoretical and Computational Chemistry		2/1/0/2/0/0 2xEx			5
Chem-Ma-M20	Methods of Polymer Synthesis		0/0/0/10/0/0 Ex			10
Focus Area Biologically Oriented Chemistry[3]						
Chem-Ma-M01	Crystal Structure Determination		4/1/0/5/0/0 Ex			10
Chem-Ma-B01	Bioinorganic Chemistry and Pathobiochemistry		4/0/0/0/0/0 Ex			5
Chem-Ma-B02	Water Chemistry and Treatment		4/0/0/1/0/0 2xEx			5
Chem-Ma-B03	Heterocyclic Chemistry and Organometallic Synthesis		4/0/0/0/0/0 Ex			5
Chem-Ma-B04	Medical Biochemistry		3/1/0/0/0/0 2xEx			5
Chem-Ma-B05	Water Constituents and their Analysis		4/0/0/4/0/0 2xEx			10
Chem-Ma-B06	(Bio-)Chemistry of Natural Product Biosynthesis	4/4/0/0/0/0 2xEx				10
Chem-Ma-B07	Food Chemistry	4/0/0/0/0/0 Ex				5
Chem-Ma-B08	Wood and Plant Chemistry	2/0/0/4/0 2xEx				5
Chem-Ma-B09	Organometallic Chemistry			2/2/0/8/0/0 2xEx		10
Chem-Ma-B10	Natural Product Synthesis – Strategies and Synthesis Planning			2/2/0/8/0/0 Ex		10
Chem-Ma-B11	Principles of Medicinal Chemistry	2/2/0/0/0/0 Ex				5
Chem-Ma-B12	Radiopharmaceutical Chemistry	4/0/0/1/0/0 2xEx				5
Chem-Ma-B13	Quantum Chemistry		2/0/0/4/0/0 2xEx			5
Chem-Ma-B14	Practical Concepts of Natural Product Biosynthesis			0/0/0/6/0/0 Ex		5
Cross-Sectional Field[4]						
Chem-Ma-C01	Biofunctional Polymer Materials for Tissue Engineering		2/1/0/2/0/0 Ex			5

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Chem-Ma-C02	Biomimetic Synthesis of Materials		2/1/0/1/0/0 2xEx			5
Chem-Ma-C03	Chemometrics		2/0/2/0/0/0 PA, Ex			5
Chem-Ma-C04	NMR Spectroscopy in Chemistry, Materials and Life Sciences		3/1/0/0/0/0 2xEx			5
Chem-Ma-C05	Concepts of sustainable Chemistry			4/2/0/4/0/0 2xEx		10
Chem-Ma-C06	Electrochemistry	3/1/0/0/0/0 2xEx				5
Chem-Ma-C07	Modern Analytical Methods			3/1/0/4/0/0 2xEx		10
Focus Area Practical Application[5]						
Chem-Ma-M01	Crystal Structure Determination		4/1/0/5/0/0 Ex			10
Chem-Ma-M07	Advanced Functional Materials			2/2/0/6/0/0 2xEx		10
Chem-Ma-M14	Radiochemistry			2/0/0/3/0/0 Ex		5
Chem-Ma-M16	Advanced Solid State Chemistry			5/0/0/5/0/0 2xEx		10
Chem-Ma-M17	Mathematical and Numerical Foundations of Theoretical Chemistry		2/0/0/3/0/0 2xEx			5
Chem-Ma-M18	Modern aspects in coordination and main-group chemistry		2/2/0/6/0/0 2xEx			10
Chem-Ma-M20	Methods of Polymer Synthesis		0/0/0/10/0/0 Ex			10
Chem-Ma-B05	Water Constituents and their Analysis		4/0/0/4/0/0 2xEx			10
Chem-Ma-B08	Wood and Plant Chemistry	2/0/0/4/0 2xEx				5
Chem-Ma-B09	Organometallic Chemistry			2/2/0/8/0/0 2xEx		10
Chem-Ma-B10	Natural Product Synthesis – Strategies and Synthesis Planning			2/2/0/8/0/0 Ex		10
Chem-Ma-B13	Quantum Chemistry		2/0/0/4/0/0 2xEx			5
Chem-Ma-B14	Practical Concepts of Natural Product Biosynthesis		0/0/0/6/0/0 Ex			5
Chem-Ma-C07	Modern Analytical Methods			3/1/0/4/0/0 2xEx		10

Module number	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	L/S/E/P/T/LC	
Focus Area General Education Modules[6]						
Chem-Ma-G01**	General Qualifications in Chemistry	*/*/*/0/*/0 Ex				5
Chem-Ma-G02	Introduction to Professional and Academic Language: Working with Texts and Oral Communication	0/0/0/0/0/4 Ex*				5
Chem-Ma-G03	Introduction to Professional and Academic Language: Applying for a Job and Written Communication	0/0/0/0/0/4 Ex*				5
Chem-Ma-G04	Advanced Professional English		0/0/0/0/0/4 Ex*			5
Chem-Ma-G05	Introduction to Applied Molecular Biology and Biotechnology		2/1/0/0/0/0 Ex			5
Chem-Ma-G06	Basic Cell Biology and Molecular Genetics		3/0/0/0/0/0 Ex			5
Chem-Ma-G07	Basic Microbiology		4/0/0/0/0/0 Ex			5
Chem-Ma-G08***	Mechanical Engineering	*/*/*/*/0/0 Ex*				5
Chem-Ma-G09	Introduction to Business Management		2/0/0/0/1/0 Ex			5
Chem-Ma-G10	Marketing and Sustainability Management			3/0/0/0/0/0 2xEx		5
Chem-Ma-G11	Manufacturing and Logistics				2/0/2/0/0/0 Ex	5
Chem-Ma-G12	Solid-State Physics		4/0/2/0/0/0 Ex			10
Chem-Ma-G13	Atomic and Molecular Physics			4/0/2/0/0/0 Ex		10
Chem-Ma-G14	Quantum Theory - Basic Concepts			4/0/2/0/0/0 Ex		10
CP		**30**	**30**	**30**	**30**	**120**

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T	Tutorial
LC	Language course
PA	preliminary academic work
Ex	Examination(s)