Technische Universität Dresden
Faculty of Chemistry and Food Chemistry

Study Regulations for the consecutive Master's degree program in Biochemistry

as of February 2, 2023
(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.

Contents

§ 1
Scope

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 Biochemistry at Technische Universität Dresden.

§ 2
Objectives of the degree program

(1) Students will posses the required breadth of specialist knowledge including essential interdisciplinary knowledge as well as the corresponding practical competencies and abilities. They will be to identify the specialist relationships within biochemistry and deepen their knowledge, skills and abilities within their selected areas of the field. They will be able to undertake independent research and conduct experiments to acquire knowledge, critically scrutinise, present and discuss the results and findings of others. Students will be able to identify scientific problems as well as design and conduct experiments. They will be able to apply their knowledge, understanding and skills to finding solutions to problems in both new and unusual situations as well as be able to work as part of a team. They will be able to identify the importance of precise scientific documentation and the presentation of results and undertake to use good scientific practices. They will possess knowledge of legislation and regulations that apply to the field. They will be able to professionally assess the hazards associated with handling the materials commonly used in biochemistry, will have an awareness of the ethical issues that arise from the use of modern methods used in biochemistry, and be able to critically look at topics that are currently discussed within society. The students are enabled to act responsibly.

(2) Graduates will acquire the specialist skills, methodical, personal and social competencies, as well as the practical skills and expertise, to enter a career for a doctoral program or to highly qualified jobs, for example, at teaching and research institutions, in industry and in public authorities. They will have the ability to tackle a wide range of problems within the field of biochemistry as well as continuously develop their professional skills.

§ 3
Admission requirements

To be admitted to the degree program, candidates must have completed a first vocational university degree recognized in Germany or a qualification from a state or state-approved vocational academy in chemistry, biology, molecular biotechnology or similar field. Furthermore, this degree program requires English language proficiency at the B2 level according to the Common European Framework of Reference for Languages. If the applicant does not have a certificate of general or subject-specific higher education entrance qualification with a basic or advanced course completed in English or comparable levels, a higher education entrance qualification completed entirely in English or a certificate of a higher education degree completed entirely in English, proof must be demonstrated by an internationally recognized test. Proof of the internationally recognized test is deemed to have been provided if the "Test of English as a Foreign Language" (TOEFL internet-based) has been passed with a total score of at least 75 points overall and at least 18 points in each sub-aspect, the IELTS test has been passed with at least level 6.0 in all sub-aspects or the UNIcert test has been passed with at least Level II.

§ 4
Commencement and duration of studies

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

(2) The standard period of study is four semesters and includes on-site attendance, independent study, and the final examination.

§ 5
Teaching and learning formats

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

(2) The teaching and learning formats according to para. 1 are defined as follows:

1. Lectures introduce the subject areas of the modules, address the central themes and structures of the subject area in a coherent presentation, and provide an overview of the current state of research.
2. Seminars allow for the application of the subject matter in exemplary sub-areas as well as the development of methodical, analytical and communicative competences. Students are enabled to familiarize themselves under supervision in a selected 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 / or to present them in writing.
3. Exercises serve to apply the subject matter in exemplary sub-areas.
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. This also includes the combination of theory and practice with the inclusion of interdisciplinary issues.
5. Tutorials support students in the acquisition of technical and didactic skills. They reflect on issues, approaches to solutions, and results of their self-study with a student tutor and receive individual feedback.
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. Through self-study, students independently consolidate and deepen their knowledge of the course content

§ 6
Structure and organisation 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 and the colloquium. The third semester is particularly suitable for a temporary stay at another university (mobility window).

(2) The degree program comprises six compulsory modules and four to seven elective compulsory modules of the focus areas Technical Biochemistry, Chemistry of Biological Systems and General Education Modules, which allows students to choose their focus. Of these, modules totaling 35 credit points must be selected. Modules with a total of 10 to 25 credit points are to be selected in the focus areas Technical Biochemistry as well as Chemistry of Biological Systems. In addition, modules with a maximum of 10 credit points can be selected in the focus area General Education Modules. The choice is binding. A focus area can be re-selected; the student must submit a written request to the Examination Office stating the module to be replaced and the newly selected module.

(3) Qualification objectives, 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.

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

(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 in the usual manner. The amended study schedule shall apply to all students who have been informed about it in the usual manner at the beginning of their studies. The Examination Board shall decide, upon application by the student, on any exceptions to sentence 3.

(7) If participation in a non-elective course of a compulsory elective module is limited to a certain number of students according to the module description, then participants will be selected at random from those registered. For this purpose, the student must register for the corresponding course. The form and deadline for enrollment will be announced to the students in a timely manner in the usual manner. According to para. 2 sentences 3 the enrollment takes place by election, if necessary. At the end of the enrollment period, the student will be informed in the usual manner whether he or she has been selected as a participant in the corresponding course.

§ 7
Content of the degree program

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

(2) The content of the degree program follows the recommendations of the Society for Biochemistry and Molecular Biology (GBM) and the Gesellschaft Deutsche Chemiker (GDCh) and the Verband der Chemischen Industrie zur Einrichtung von biochemischen Masterstudiengängen. Key topics include protein and enzyme biochemistry the chemistry of metabolic processes with a chemical mechanistic focus, and cellular processes in prokaryotes and eukaryotes with a strong biological component. In addition, the research and understanding of cellular processes, the application of the generated knowledge in the context of enzyme technology, the production of biomolecules as well as the targeted modification of organisms are further topics. Practical and research-oriented activities in these topics also form an essential component of the content. Students deepen their knowledge in the focus areas of Technical Biochemistry, i.e. the application of biochemical principles and processes in industry, and Biological Systems, i.e. the interactions of organisms with their environment from a chemical and biological perspective. Furthermore, the program covers environmental issues and regulations, the guidelines of good scientific practice as well as general qualifications.

§ 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
Student counselling services

(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
Changes 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.

§ 11
Entry into force, publication and interim arrangements

(1) These Study Regulations shall come into force on April 1, 2023 and shall be published in the Official Announcements of TU Dresden.

(2) They apply to all students enrolled in the consecutive Master's program in Biochemistry in the 2023/2024 winter semester or later.

(3) For students who enrolled earlier than in the 2023/2024 winter semester, the version of the Study Regulations for the consecutive Master's degree program in Biochemistry that has been valid for them up until the amendment continues to apply unless they declare their acceptance of the amendment in writing. The form and deadline of this declaration are specified by the Examination Committee and announced as is customary at the faculty. Switching to the new regulations is possible at the earliest on October 1, 2024.

Issued based on the resolution of the Faculty Board of the Faculty of Chemistry and Food Chemistry as of November 23, 2022, and the approval of the University Executive Board as of December 15, 2022.

Dresden, as of February 2, 2023

The Rector
of Technische Universität Dresden
Prof. Dr. Ursula M. Staudinger

Annex 1:
Module descriptions

Module number	**Module name**	**Responsible lecturer**
Chem-Ma-BC01	Fundamentals of Biological Chemistry and Molecular Cell Biology	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
		Other lecturers: Prof. Nils Kröger (nils.kroeger@tu-dresden.de)
Qualification objectives	Students will be able to apply basic and advanced theoretical knowledge of organic chemistry of the reaction mechanisms of selected enzymes from main metabolic pathways to other biologically relevant reactions as well as enzyme reactions. In addition, students will have in-depth knowledge of the molecular structures and functions of subcellular compartments of eukaryotic cells. Students will understand the relevance of biochemical findings for society.	
Content	This module covers the structure and reactivity of biologically relevant organic molecules, the chemistry of enzyme reactions and enzyme reaction mechanisms, e.g. glycolysis, citric acid cycle, fatty acid decomposition and synthesis. In addition, properties and functions of biomembranes, cell nuclei, mitochondria, the endoplasmic reticulum, Golgi complex, and the cytoskeleton, as well as examples of the influence of biochemical findings on society.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of organic chemistry, biochemistry and cell biology at the Bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is a compulsory module in the Master’s degree program Biochemistry. The module is a prerequisite for participation in the modules Enzymes in Processes and Research Lab Class.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a written test lasting 90 minutes.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-BC02	Enzyme Purification and Characterization	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will gain deeper theoretical and practical knowledge of the physical, chemical and biochemical properties of proteins and enzymes and use this knowledge to derive protein purification methods. They will be aware of the possibilities and limitation of separating processes, be able to select appropriate methods, and assess errors. Students will possess general problem solving skills and analytical thinking skills. Students will also understand the theory and practice of biochemical methods for characterizing enzymes and their functions in vitro and in vivo as well as the determination of kinetic enzyme data.	
Content	This module covers fundamental principles of protein purification based on the physical, chemical, biochemical and immunological properties of proteins while maintaining their enzymatic and biological function. The module also includes selected issues of protein purification using a wide range of preparation and analytical methods. The module further examines spectroscopic methods for identifying co-factors, exploring reaction mechanisms as well as characterizing and interpreting kinetic data from enzyme catalyzed reactions.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week), practical training (6 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry at the bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is a compulsory module in the Master’s degree program Biochemistry. 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 written test lasting 90 minutes and a complex assessment equating to 30 hours.	
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 complex assessment one times.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-BC03	Gene Expression and Manipulation	Prof. Nils Kröger (nils.kroeger@tu-dresden.de)
Qualification objectives	Based on their knowledge of primary molecular genetic cell processes, students will be able to identify the regulation mechanisms for the expression of prokaryotic and eukaryotic genes and use genetic engineering methods to both analyze and manipulate them. Students will be familiar with the societal advantages and disadvantages related to gene manipulation and will be able to act responsibly.	
Content	This module covers the primary molecular genetic processes of replication, transcription and translation in prokaryotes and eukaryotes. In addition, it includes the organization and molecular structure of prokaryotic and eukaryotic genes, as well as regulatory principles of gene expression in prokaryotes and eukaryotes. This also includes the basic principles and steps of recombination and cloning, structural and functional investigation of genes by sequencing, gene localization, regulation of gene expression, polymerase chain reaction, and restriction fragment length polymorphism. Techniques for manipulating eukaryotic genomes and their relevance to molecular genetic work are also included in the module.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week, practical training (6 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry and molecular biology at the Bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is a compulsory module in the Master’s degree program Biochemistry. 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 written test lasting 90 minutes and a portfolio equating to 30 hours.	
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 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-BC04	Biochemistry of the Cell	Prof. Nils Kröger (nils.kroeger@tu-dresden.de)
Qualification objectives	Students will be able to identify the biochemical mechanisms of fundamental intercellular and transcellular organizational and transport processes in eukaryotic cells and present the biological mechanisms for regulating these processes.	
Content	This module covers intracellular control of proteins, intracellular vesicle transport, intracellular organization and transport via the cytoskeleton, the cell cycle, intracellular signal transduction as well as cell-cell and cell-matrix interactions.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry and cell biology at the Bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is a compulsory module in the Master’s degree program Biochemistry. 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 written test lasting 90 minutes.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-BC05	Bioanalytics	Prof. Brunner (eike.brunner@chemie.tu-dresden.de)
		Other lecturers: Prof. Michael Schlierf (michael.schlierf@tu-dresden.de)
Qualification objectives	Students will learn about modern methods of bioanalytics. They will gain an overview of the breadth of modern bioanalytics and will be able to select appropriate methods for solving bioanalytical problems. They will gain practical experience in the application of bioanalytical methods. They will be able to assess and critically analyze the value and applicability of these methods in the context of bioanalytic questions. They will also be able to appropriately plan and conduct analytical investigations.	
Content	This module covers the theory and practice of bioanalytical methods such as mass spectrometry, chromatography/electrophoresis, nuclear magnetic resonance spectrometry (NMR), vibrational spectrometry, microscopy, fluorescence spectroscopy, and scanning electron microscopy.	
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	Foundational knowledge of biochemistry and bioanalytics at the Bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is a compulsory module in the Master’s degree program Biochemistry. 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. Starting at a minimum of 10 registered students, the module examination consists of a written test lasting 90 minutes and a complex assessment equating to 30 hours. If there are less than 10 registered students, the written test will be replaced by a non-public oral examination lasting 30 minutes as an individual examination; if necessary, this will be announced to the registered students in writing at the end of the registration period. Both examinations must be passed.	
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 or oral examination is weighted two times, the grade of the complex assessment 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-BC06	Research Lab Class	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will possess in-depth practical skills for planning and realization of new experiments and practical working with complex research topics. They will be able to identify the importance of accurate scientific documentation and presentation of results and will be committed to good scientific practice. They will also be able to critically analyze and present results and knowledge. They will therefore gain the ability to make socially responsible judgements and behavior. In addition, they will gain team working skills and experience in scientific and interdisciplinary communication and discussions regarding research findings within a research group.	
Content	The module covers closely related, relevant and new research topics in biochemistry according to the focus area of the individual student as well as new research results in these areas.	
Teaching and learning methods	The module comprises seminar (1 hour per week), practical training (20 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the modules Fundamentals of Biological Chemistry and Molecular Cell Biology, Enzyme Purification and Characterization, Gene Expression and Manipulation, Biochemistry of the Cell, and Bioanalytics.	
Applicability	This module is a compulsory module in the Master's degree program Biochemistry.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a complex assessment equating to 25 hours.	
Credit points and grades	Participants can earn fifteen credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 450 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-TB01	Concepts of Natural Product Biosynthesis	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will learn about important classes of natural products and biosynthetic pathways, particularly those of biomedically relevant compounds (e.g. polyketides, peptides, terpenes, alkaloids) and will be able to identify the individual biosynthetic elements in the structures of natural products. Students will be able to make predictions about resultant product structures based on the organization of biosynthetic pathways and also suggest biosynthetic pathways for given structures.	
Content	This module includes fundamental principles of enzyme catalysis as well as metabolic crossover points of primary and secondary metabolism. It includes mechanistic analyses of the biosynthetic pathways of medically important classes of natural products as well as methods for understanding biosynthetic pathways and initial basic principles for manipulating biosynthetic processes in vivo and in vitro.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry at the bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master’s degree program Biochemistry, out of which modules comprising 10 to 25 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.	
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-TB02	Practical Concepts of Natural Product Biosynthesis	Prof. Tobias Gulder (tobias.gulder@tu-dresden.de)
Qualification objectives	Students will learn about important classes of natural products and biosynthetic pathways, particularly those of biomedically relevant compounds (e.g. polyketides, peptides) and will be able to identify the individual biosynthetic elements in the structures of natural products. Students will be able to make predictions about resultant product structures based on the organization of biosynthetic pathways and also suggest biosynthetic pathways for given structures. They will be able to identify how the biosynthetic pathways for natural materials can be modified to create new non-natural materials.	
Content	This module includes mechanistic analyses of the biosynthetic pathways of medically important classes of natural products as well as methods for understanding biosynthetic pathways and initial basic principles for manipulating biosynthetic processes in vivo and in vitro. In addition to current examples from the literature on the biosynthesis of natural products, the practical implementation of selected aspects, in particular the aspects of production and application of natural products and biosynthetic enzymes or the recombinant production of natural product molecules, is the content of the module.	
Teaching and learning methods	The module comprises seminar (1 hour per week), practical training (12 hours per week) and self-study.	
Prerequisites for participation	Participants require skills acquired in the module Concepts of Natural Product Biosynthesis. Foundational knowledge of biochemistry at the bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master’s degree program Biochemistry, out of which modules comprising 10 to 25 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 assessment equating to 20 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-TB03	Bioinformatics	Prof. Michael Schroeder (michael.schroeder@tu-dresden.de)
Qualification objectives	Students will possess knowledge of the basic principles of bioinformatics, particularly in the area of sequence comparison and current topics in bioinformatics. Students will have knowledge of algorithms for comparing sequences using dynamic programming, substitution matrices as well as multiple sequence alignments.	
Content	This module covers sequence comparison, substitution matrices, local and global alignment, assessment schemes and progressive alignment.	
Teaching and learning methods	The module comprises lecture (2 hours per week), exercise (2 hours per week) and self-study.	
Prerequisites for participation	Basic skills in computer programming in a language such as Python are required for this module. The textbook “Learning Python” by M. Lutz (O’Reilly) is recommended as preparatory material for this module.	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master’s degree program Biochemistry, out of which modules comprising 10 to 25 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 portfolio equating to 20 hours.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each summer semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-TB04	Protein Biochemistry and Proteomics	Prof. Simon Alberti (Simon.Alberti@tu-dresden.de)
Qualification objectives	Students will understand the principles of protein folding and protein-protein interactions in the context of protein complex formation and supramolecular structures. They will have substantial theoretical knowledge of protein biochemistry and protein biotechnology as well as a good understanding of instrumental protein analytics underpinned by practical experience in experimentation.	
Content	The module covers the fundamentals of protein biochemistry and provides an overview of diseases that are a result of errors in protein folding and proteins that do not function correctly. Also covered are methods for analyzing proteins such as protein mass spectrometry, the characterization of protein-protein interactions and the use of protein databases. The module also includes the fundamentals of protein biotechnology as well as the production of recombinant proteins and their analysis (affinity cleaning, protein binding assays, immunoprecipitation, protein electrophoresis and immunoblotting).	
Teaching and learning methods	The module comprises lecture (3 hours per week), practical training (5 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of molecular biology, biochemistry and cell biology at the bachelor's level is required. Recommend preparatory literature: - Alberts, Johnson, Lewis, Morgan, Raff, Roberts, Walter. Molecular Biology of the Cell, Garland Science Press, - Berg, Tymoczko, Gatto, Stryer. Biochemistry, Palgrave Macmillan. - Introduction to Proteomics (D.C. Leibier, Humana Press).	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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 and a portfolio equating to 30 hours.	
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 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-TB05	Genome Engineering, Genomes and Evolution	Prof. Henrik Bringmann (henrik.bringmann@tu-dresden.de)
Qualification objectives	Students will possess knowledge of the eukaryotic and prokaryotic genomes of organisms and genomes particularly important to genome engineering and understand the cell life cycle. They will be able to apply the tools and techniques of genome engineering. Students will be able to understand the nature of the genome, its architecture, its characteristics and mutability on a new integrative level. They will be able to draw conclusions about the architecture of the genome, the content as well as the mechanisms of mutation through evolution. They will understand how the integrity of the genome is maintained based on the molecular mechanisms of DNA replication and repair as well as recombination. They will be able to see that these processes both stabilize and modify the genome. They will be able to understand the structure of both prokaryotic nucleoids and eukaryotic chromatins. In addition, students will gain foundational knowledge of genetic engineering. Students will have a comprehensive understanding of the genome and genome engineering, which complements knowledge of tissue engineering, bioinformatics and cellular machines. Students will possess an overview of the different techniques used in the various areas of genomics such as DNA recombination in bacteria, site-specific and other types of recombination, recombineering, restriction enzymes, southern blotting method and gel electrophoresis.	
Content	This module looks at the prokaryotic and eukaryotic genomes in relation to the evolution of life as well as the tools and techniques of genome engineering in theory and in practice.	
Teaching and learning methods	The module comprises lecture (3 hours per week), practical training (5 hours per week) and self-study.	
Prerequisites for participation	Knowledge of the composition of DNA, the double helix structure of DNA, nucleic acid metabolism as well as basic knowledge of cell biology at the bachelor's level is required. Recommend preparatory literature: - Berg, Tymoczko, Gatto, Stryer Biochemistry (9th edition) Palgrave Macmillan. - Lewin B., Genes VIII, Pearson 2004, ISBN 0-13-123924-4 - Alberts, Johnson, Lewis, Morgan, Raff, Roberts, Walter (6th edition) Molecular Biology of the Cell Garland Science Press ISBN 4978-0-8153-4524-4	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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 and a portfolio equating to 30 hours.
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 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-TB06	Drug Discovery	Prof. Yixin Zhang (yixin.zhang1@tu-dresden.de)
Qualification objectives	Students will know about the various options for discovering active substances, including screening methods, the targets of active substances and their development. They will understand the advantages and disadvantages of different types of active substances. Students will have a good understanding of important concepts in medicinal chemistry and pharmacology such as pharmacokinetics.	
Content	This module includes fundamental chemistry and the processes of discovering active substances starting with the validation of biological models and target proteins to the various methods of substance screening and other related discovery concepts, through to pre-clinical and clinical trials. This module looks at the following topics: - overview of active substance classification based upon their molecular structure or effect, or based upon the illness they are intended to treat - important examples from the history of active substance discovery - current concepts and developments in cell-based therapy - signal pathways in relation to cancer and autoimmune diseases and - various methods for improving pharmacokinetics.	
Teaching and learning methods	The module comprises lecture (2 hours per week), tutorial (2 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry at the bachelor's level is required. The textbook “Principles of Biochemistry” by D. L. Nelson, M. M. Cox (Worth Publ. Inc.) is recommended as preparatory material for this module.	
Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master’s degree program Biochemistry, out of which modules comprising 10 to 25 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.	
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-TB07	Enzymes in Processes	Prof. Weigand (jan.weigand@tu-dresden.de)
		Other lecturers: Prof. Henle (thomas.henle@tu-dresden.de); Prof. Ansorge-Schumacher (marion.ansorge@tu-dresden.de)
Qualification objectives	Students will be familiar with enzyme technology reaction techniques and process control using examples of industrial application and current research areas. Students will possess an in-depth overview of modern enzyme technology processes and the current state of research. Students will be able to independently work on research topics theoretically and practically and to document and present the results.	
Content	This module focuses on enzymatic functionalization, biocatalysis and immobilization of enzymes. This module looks at the following topics: - enzyme technology, - biocatalysis for the production of fine chemicals and medicines as well as for the production of food and food ingredients, - immobilization of enzymes, - enzymatic functionalization of milk proteins, - brewing technology, - enzymatic process technology, - industrial applications, - implementation in process technology, as well as - enzymes in technical catalysis.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (1 hour per week, practical training (3 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 ten participants only.	
Prerequisites for participation	In addition to foundational knowledge of biochemistry, food chemistry and food and biotechnology at the bachelor's level, participants require skills acquired in the module Fundamentals of Biological Chemistry and Molecular Cell Biology. Recommend preparatory literature: - H. Bisswanger, Enzyme Kinetics - Principles and Methods, Wiley- VCFI, 2008, ISBN: 978-3-527-31957-2, - R.J. Whitehurst, Enzymes in Food Technology, Wiley-VCFI, 2010, ISBN: 978-31-4051-8366-6	

Applicability	This module is one of seven elective compulsory modules in the focus area Technical Biochemistry of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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 complex assessment equating to 30 hours, which must both be passed.
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 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-BS01	Anaerobic Microbial Metabolism	Prof. Michael Rother (michael.rother@tu-dresden.de)
Qualification objectives	Students will understand the role of anaerobic microorganisms in global material cycles and have an understanding of their adaptation to this form of existence. Students will be able to describe the activities of anaerobic microorganisms based upon their structural and physiological properties. They will be able to critically assess the possibilities and limitations of anaerobic microbiology.	
Content	This modules covers the classification of anaerobic microorganisms with the context of geological history and phylogenetics as well as the description of various systems of energy conservation. It includes an overview of the metabolic diversity found in anaerobic microorganisms, their metabolic performance and their influence on the global materials cycle. The module further looks at the unique structural and physiological properties, isolation, characterization and description of anaerobic microorganisms.	
Teaching and learning methods	The module comprises lecture (3 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 in the usual manner.	
Prerequisites for participation	Knowledge of microbial physiology at the bachelor's level is required. The textbook "Brock Mikrobiologie" by Madigan, M.T. and Martinko, J. M H. (ed.) (Pearson Studium) is recommended as preparatory material for this module.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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.	
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-BS02	Medical Biochemistry	Dr. Anke Matura (anke.matura@tu-dresden.de)
		Other lecturers: Prof. Jens Pietzsch (j.pietzsch@hzdr.de)
Qualification objectives	Students will learn the basic principles of medicinal biochemistry and the importance of the subject as a foundation for clinical diagnosis. They will learn the fundamental principles of biochemistry and regulation relationships in the genesis, diagnosis and treatment of diseases and gain knowledge of the principles of biotransformation, the effects of therapeutic agents and enzyme diagnostics. They will know about biochemical changes in selected intracellular and extracellular regulation mechanisms and understand the relationships between these changes and the genesis, manifestation and progression of certain diseases with a high degree of relevance in healthcare policy. Students will also learn about modern analytical and diagnostic methods used in clinical and research settings, particularly about methods of molecular imaging.	
Content	The module includes topics in medical biochemistry. In addition to the definition of the term medical biochemistry or pathobiochemistry, the module covers areas of application, methods and model organisms, biochemical changes in humans as well as new findings in biochemistry and biomedicine concerning the genesis, manifestation and progression of selected diseases that are highly relevant in healthcare policy.	
Teaching and learning methods	The module comprises lecture (4 hours per week) and self-study. The courses are held in German.	
Prerequisites for participation	Knowledge of biochemistry at the bachelor's level is required. The textbook "Löffler/Petrides - Biochemie und Pathobiochemie" (ed. Heinrich, Müller, Graeve) Springer is recommended as preparatory material for this module.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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.	
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-BS03	Cellular Signaling	Prof. Yixin Zhang (yixin.zhang1@tu-dresden.de)
Qualification objectives	Students will have knowledge of the chemical principles of cellular signaling as an important foundation of modern cell biology and understand the entire interdisciplinary context, especially in the field of drug discovery.	
Content	This module looks at different topics in cell signaling as a communication process that guides basic cell activities and coordinates all cell actions. This module looks at the following topics: - the concept of cellular signal transduction, - overview of different posttranslational modifications, - relationships between enzyme catalyzed posttranslational, modifications and the resulting change in the structure and function of the protein, - proteolysis by different proteases, phosphorylations and dephosphorylations by different kinases and phosphatases, - important examples of cell-cell signaling in relation to disease, particularly cancer and autoimmune diseases, - mechanisms of cell signaling, - kinetic and thermodynamic aspects of posttranslational modifications as well as - signal transduction with extracellular matrix, in apoptosis and hemostasis.	
Teaching and learning methods	The module comprises lecture (2 hours per week), seminar (2 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of biochemistry and molecular biology of the cell at the bachelor's level is required. The textbooks Biochemistry. 5th edition, Berg JM, Tymoczko JL, Stryer L. New York: W Fl Freeman; 2002 and Molecular Biology of the Cell. 4th edition. Alberts B, Johnson A, Lewis J, et al. New York: Garland Science; 2002 are recommended as preparatory material for this module.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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.	
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-BS04	Cellular Machines	Prof. Stefan Diez (stefan.diez@tu-dresden.de)
Qualification objectives	Students will be able to bring together the knowledge they have acquired in molecular cell biology, biochemistry, proteomics, biophysics and bionanotechnology and understand the concepts of functional biomolecular units as machines for use in complex technological or medicinal processes as nanoscale functional components. Students will have interdisciplinary research and development skills that will qualify them to work in both science and research and development in biotech companies.	
Content	This module looks at the structure and function of lipid membranes together with membrane proteins, energytransformation, interaction and folding of protein structures, DNA and associated proteins, signal transduction and protein degradation, classification and function of viruses, filament systems of the cytoskeleton, motor proteins in the cytoskeleton, intracellular transport, cellular movement and biomolecular sensor systems.	
Teaching and learning methods	The module comprises lecture (4 hours per week), seminar (4 hours per week) and self-study.	
Prerequisites for participation	Foundational knowledge of molecular biology, biochemistry, physics and knowledge of the chemical importance of single molecule aspects at the bachelor's level is required. The textbooks Molecular Biology of the Cell. 6th edition. Alberts B, Johnson A, Lewis J, et al. New York: Garland Science; 2014 and Mechanics of Motor Proteins and the Cytoskeleto. Jonathon Howard: Sinauer; 2005 are recommended as preparatory material for this module.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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 20 minutes as an individual examination and a public oral examination lasting 30 minutes as an individual examination.	
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 non-public oral examination is weighted seven times, the grade of the public oral examination three times.	
Module frequency	The module will be offered each academic year, beginning in the summer semester.	
Workload	The workload comprises a total of 300 hours.	

Module duration	The module comprises two semesters.

Module number	Module name	Responsible lecturer
Chem-Ma-BS05	Metabolism of Natural Products and Natural Product Biosynthesis	Prof. Jutta Ludwig-Müller (jutta.ludwig-mueller@tu-dresden.de)
		Other lecturers: Dr. Paul D'Agostino (paul.dagostino@tu-dresden.de)
Qualification objectives	Students will gain an insight into the central topic areas, fields of work and fields of applications of the molecular biology of natural materials in plants, be familiar with key specialist terms and describe the interdisciplinary context. Students will know about the most important biosynthetic pathways for secondary metabolites in microorganisms and the possibilities for manipulating these. They will also gain an understanding of the effects that natural products have on other organisms. They will have strengthened their communication competencies through discussion rounds in working groups.	
Content	This module covers the functions of plant natural products and their effect on other living organisms. It looks at the occurrence, biosynthesis and analysis of selected plant and microbial natural products, the possibilities for their biotech production and their function in plants during development and in interaction with other organisms. The module further looks at the effect of plant natural products on humans in relation to interactions with cellular components, metabolism and toxicity, the effect on physiological processes, nutritional physiological and medicinal aspects as well as bioinformatic methods for the prediction of microbial natural products.	
Teaching and learning methods	The module comprises lecture (3 hours per week), seminar (1 hour per week) and self-study.	
Prerequisites for participation	Knowledge of plant physiology and biochemistry at bachelor's level is required. The foundational textbook of phytology or plant physiology is recommended, e.g.: Lüttge, Kluge: Botanik, Wiley.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master's degree program Biochemistry, out of which modules comprising 10 to 25 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 assessment equating to 20 hours.	
Credit points and grades	Participants can earn five credit points for this module. The module grade corresponds to the grade of the examined assessment.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 150 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-BS06	Functional Biological Materials	Prof. Nils Kröger (nils.kroeger@tu-dresden.de)
Qualification objectives	Students will be able to identify the structures and properties of mineralized and and non-mineralized biological materials and bioadhesives, particularly regarding the relationship between (bio)chemical composition, cross-scale structure and function. In addition, students will also be familiar with the fundamental biochemical, cell biological, and biophysical mechanisms of the biosynthesis and mechanisms of assembly of biological materials. Students will be able to use an interdisciplinary, methodological approach to explain and describe the relationships between the structures and properties of functional biological materials.	
Content	This module describes the physical properties, biochemical composition, biogenesis, assembly and biological function of mineralized and non-mineralized biological materials and bioadhesives. The module also covers fundamental physical and chemical theories on crystallization, self-assembly and adhesion, methods of (bio)chemical and (bio)physical analysis of the composition, structure and properties of biological materials and bioadhesives as well as the mechanisms of their biogenesis.	
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 six participants only.	
Prerequisites for participation	Foundational knowledge in the areas of chemistry or biochemistry as well as physics or biophysics at the bachelor's level is required. The book “Biological Materials Science” by Marc André Meyers and Po-Yu Chen is recommended as preparatory material for this module.	
Applicability	This module is one of six elective compulsory modules in the focus area Chemistry of Biological Systems of the Master’s degree program Biochemistry, out of which modules comprising 10 to 25 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 40 hours.	
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 two times, the grade of the portfolio one times.	
Module frequency	The module is offered each winter semester.	
Workload	The workload comprises a total of 300 hours.	
Module duration	The module comprises one semester.	

Module number	Module name	Responsible lecturer
Chem-Ma-AM01	General Studies	Dean of Studies (studiendekan_bc@chemie.tu-dresden.de)
Qualification objectives	Students will further improve their English language skills using topics relevant to society and taking a critical look at these fields. Depending on the student's choice, they will have knowledge in general education topics such as sustainability, democracy, globalization, digitalization, science communication, diversity, internationalization, or social and personal skills such as communication skills, project and time management, cooperation and teamwork skills. They will use their linguistic, social and personal skills and competencies to focus in particular on intercultural discourse and making responsible judgements and taking responsible actions in society.	
Content	This module includes, in English, with interdisciplinary issues chosen by the student that relate to living in a pluralistic society. Depending on the choice, the development and application of scientific findings and methods in international and intercultural fields of work are also considered.	
Teaching and learning methods	The module comprises lecture or seminar totalling 4 hours per week and self-study. The courses are to be chosen from the catalogue General Studies. The catalogue will be announced at the beginning of each semester in the usual manner.	
Prerequisites for participation	There are no specific prerequisites for participation.	
Applicability	This module is one of three electives compulsory modules in the focus area General Education Modules of the Biochemistry Master's degree program, from which modules worth a maximum of ten credit points can be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of an ungraded written test lasting 90 minutes.	
Credit points and grades	Participants can earn five credit points for this module. The module examination will 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-AM02	Advanced Professional English C1	Ute Meyer (ute.meyer@tu-dresden.de)
Qualification objectives	Students will possess advanced communication and intercultural competencies in the English language at level C1/C2 of the Common European Framework of References for languages. Students will be able to flexibly and competently use these skills while studying abroad and in their careers.	
Content	The content of this module is based upon the choice of the students and looks at different aspects of spoken communication in the workplace, international negotiations, professional writing as well as project development and management.	
Teaching and learning methods	The module comprises language course (4 hours per week) and self-study. The courses are to be chosen from the Profile Course catalogue offered by the TU Dresden language training (English C1); this catalogue including the respective required examinations will be announced at the beginning of each semester in the usual manner.	
Prerequisites for participation	General language skills and proficiency in English at level B2 of the Common European Framework of Reference for languages.	
Applicability	This module is one of three electives compulsory modules in the focus area General Education Modules of the Biochemistry Master's degree program, from which modules worth a maximum of ten credit points can be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of examination assessments specified in the Profile Courses catalogue of the language training TU Dresden (English C1).	
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-AM03	Current Topics in Materials Science	Prof. Gianaurelio Cuniberti (gianaurelio.cuniberti@tu-dresden.de)
Qualification objectives	Students will learn about the various aspects of current research in materials science. They will gain relevant key competencies in the foundation of scientific presentation, patent law, technology transfer and leadership skills.	
Content	The module covers modern experimental and theoretical methods for discovering, characterizing, applying and marketing new materials with a focus on changing topic areas such as: - technology transfer: from the lab to the market - intelligent materials for application in energy technology, in health care and information technology - innovative materials for energy technologies: from ideas to market solutions - Nano in Macro: Integrating molecular components into functional macroscopic systems as well as - presentation, publication and securing funding: talks, theses / publications / patents and research applications.	
Teaching and learning methods	The module comprises lecture (1 hour per week), exercise (1 hour per week), practical training (1 hour per week) and self-study.	
Prerequisites for participation	There are no specific prerequisites for participation.	
Applicability	This module is one of three electives compulsory modules in the focus area General Education Modules of the Biochemistry Master's degree program, from which modules worth a maximum of ten credit points can be chosen.	
Requirements for earning credit points	Credit points are earned after passing the module examination. The module examination consists of a public oral examination lasting 30 minutes and will take place as a group examination.	
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.	

Annex 2:
Study plan
with type and scope of courses given in hours per week (hrs/wk)
as well as required work, the type, scope and format of which can be found in the module descriptions

Module no.	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/E/S/P/LC	L/E/S/P/LC	L/S/P/T		
Compulsory Field						
Chem-Ma- BC01	Fundamentals of Biological Chemistry and Molecular Cell Biology	4/0/0/0/0 1x Ex				5
Chem-Ma-BC02	Enzyme Purification and Characterization	2/0/1/6/0 2x Ex				10
Chem-Ma-BC03	Gene Expression and Manipulation	2/0/1/6/0 2x Ex				10
Chem-Ma-BC04	Biochemistry of the Cell		4/0/0/0/0 1x Ex			5
Chem-Ma-BC05	Bioanalytics		2/0/2/6/0 2x Ex			10
Chem-Ma-BC06	Research Lab Class			0/1/20/0 1x Ex		15
					Master's dissertation[1] Colloquium	29 1
Elective Compulsory Field[2]						
Modules on Technical Biochemistry[3]						
Chem-Ma-TB01	Concepts of Natural Product Biosynthesis		4/0/0/0/0 1x Ex			5
Chem-Ma-TB02	Practical Concepts of Natural Product Biosynthesis			0/1/12/0 1x Ex		10
Chem-Ma-TB03	Bioinformatics		2/2/0/0/0 1x Ex			5
Chem-Ma-TB04	Protein Biochemistry and Proteomics			3/0/5/0 2x Ex		10
Chem-Ma-TB05	Genome Engineering, Genomes and Evolution			3/0/5/0 2x Ex		10

Module no.	Module name	1st Semester	2nd Semester	3rd Semester (M)	4th Semester	CP
		L/E/S/P/LC	L/E/S/P/LC	L/S/P/T		
Chem-Ma-TB06	Drug Discovery			2/0/0/2 1x Ex		5
Chem-Ma-TB07	Enzymes in Processes		2/0/1/3/0 2x Ex			5
Modules on Chemistry of Biological Systems[3]						
Chem-Ma-BS01	Anaerobic Microbial Metabolism		3/0/0/0/0 1x Ex			5
Chem-Ma-BS02	Medical Biochemistry			4/0/0/0 1x Ex		5
Chem-Ma-BS03	Cellular Signaling		2/0/2/0/0 1x Ex			5
Chem-Ma-BS04	Cellular Machines		2/0/2/0/0 1x Ex	2/2/0/0 1x Ex		10
Chem-Ma-BS05	Metabolism of Natural Products and Natural Product Biosynthesis			3/1/0/0 1x Ex		5
Chem-Ma-BS06	Functional Biological Materials			2/2/6/0 2x Ex		10
Modules on General Studies[4]						
Chem-Ma-AM01	General Studies	4 hrs/wk[5] 1x Ex				5
Chem-Ma-AM02	Advanced Professional English C1	0/0/0/0/4 Ex[6]				5
Chem-Ma-AM03	Current Topics in Materials Science	1/1/0/1/0 1x Ex				5
CP		**30**	**30**	**32**	**28**	**120**

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

2 Modules totalling 35 credit points must be chosen.

3 Modules totalling 10 to 25 credit points must be chosen.

4 Modules totalling a maximum of 10 credit points can be chosen.

5 This module includes lectures or seminars totalling 4 hrs/wk as chosen by the student according to “General Studies” catalogue.

6 Depending on choice made by the student according to “Profile Courses” catalogue for languages at TU Dresden.

M	Mobility window according to § 6 para. 1 sentence 4
CP	Credit points
L	Lecture
E	Exercises
S	Seminar
P	Practical training
T	Tutorial
LC	Language course
Ex	Examination(s)