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Technische Universität Dresden
Center for Molecular and Cellular Bioengineering

Study Regulations for the consecutive Master's degree program Physics of Life

as of May 24, 2022

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

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§ 1
Scope of application

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

§ 2
Objectives of the degree program

(1) Students will be qualified to conduct independent research in the areas of physics and biology as well as scientific computing on the basis of imparted methods and different scientific perspectives. They will have specialized knowledge guided by current research questions on the basis of in-depth fundamental knowledge. Students will be able to identify scientific connections, communicate on a multidisciplinary level, and solve scientific problems. They will be able to approach complex problems and solve them using scientific methods, even beyond the current limits of knowledge. Students will be empowered to engage in critical self-reflection. They will be able to interact with each other in a team and in interpersonal context, to solve complex problems both independently and in collaboration in a structured way. They will be capable of social commitment and have developed their personality.

(2) Students will use a broad range of modern methods of measurement (e.g. single-molecule measurements), analysis methods (e.g. quantitative image analysis), and theoretical methods (e.g. biological, statistical physics), to gain a sound foundation in physics, biology and materials science from the molecular, cellular and tissue-specific perspective. This will enable them to quantitatively understand the physics of living systems as well as refine and adapt them for technical processes. Students will familiarize themselves with the fundamentals of experimental biophysics, theoretical biophysics and nanobiotechnology. Using experimental and theoretical methods, they will learn to better characterize and understand complex molecular machines as well as cellular and tissue-building processes, and use these to their benefit in technological systems. Students will strengthen their profile in an analytical-technical direction as well as in the theoretical physical description of observations in living systems.

(3) Graduates will be comprehensively trained in modern experimental and theoretical biophysics and have extensive knowledge and experimental experience with biological systems, from biochemistry to molecular cell biology. The program qualifies graduates for both university and non-university fields of work in the area of physics as well as for employment in institutions of applied biophysical research. In particular, graduates will be able to operate in research and development laboratories and in an interdisciplinary environment, as well as to evaluate the business aspects (e.g. experimental design) and relevance of their work.

§ 3
Admission requirements

(1) 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 a scientific field, preferably physics, biophysics or quantitative biology, or an en-

gineering science field, preferably nanotechnology, or in a closely related degree program, in particular advanced mathematics.

(2) Knowledge of English at the advanced B2 level of the Common European Framework of Reference for Language is a prerequisite. Proof should be provided using a relevant certificate or language certificate. This includes a certificate of a general or subject-specific university entrance qualification, a certificate for a university degree completed in English, or a language certificate, preferably IELTS 6.5, online TOEFL 92, or UNIcert II). Applicants whose mother tongue is English are exempt from this obligation to provide proof.

(3) A particular aptitude is required. Proof thereof is provided by the aptitude assessment according to the aptitude test regulations.

§ 4
Start and duration of the degree program

(1) The program can be started each 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 methods

(1) The curriculum is structured in modules. In the individual modules, the course content is taught, consolidated and deepened through lectures, practicals, seminars, internships, tutorials and independent study.

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

1. Lectures introduce the subject matter of the modules.
2. Practicals allow to apply the subject matter in exemplary sub-areas and deepen the course content.
3. Seminars enable students to familiarize themselves under supervision in a selected subject area on the basis of specialist literature or other material, to report on the results of their work, to discuss them within the group and/or to present them in writing and to thus train their presentation skills.
4. Internships serve to apply the subject matter taught and to acquire practical skills in potential areas of employment.
5. Tutorials support students, especially first-year students, in repeating and deepening the course contents.
6. Independent study allows students to acquire, consolidate and deepen their knowledge and skills on their own. It includes the preparation and revision of the contents of the courses.

§ 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 fourth semester is particularly suitable for a temporary stay at another university (mobility window). In addition, as part of the cooperation with KU Leuven (Belgium), students have the option, in accordance with the cooperation agreement, to take up studies with a cooperation partner and to continue and complete them at Technische Universität Dresden after the first year of study.

(2) The degree program comprises one compulsory module and a course of study, which allows students to choose their concentration. Students can choose between the courses of study Biological Physics and Nanoscience and Nanotechnology. Students can only choose the Nanoscience and Nanotechnology course of study if they have also been admitted to the Erasmus Mundus Nanoscience and Nanotechnology program.

1. The course of study Biological Physics comprises seven compulsory modules and a specialization, which allows students to choose their concentration. The specialization comprises two compulsory modules each. The specializations available are experimental biological physics, theoretical biological physics and nanobiotechnology. The selection is binding. A specialization can be re-selected once; the student must submit a written request to the Examination Office stating the specialization to be replaced and the newly selected specialization.
2. According to para. 1 sentence 3, the course of study Nanoscience and Nanotechnology includes a mandatory year abroad at KU Leuven (Belgium). The coursework and examined assessments to be taken correspond to the coursework and assessments to be taken in the Master's program in Nanoscience and Nanotechnology at KU Leuven (Belgium). Moreover, the course of study Nanoscience and Nanotechnology at Technische Universität Dresden includes a specialization, which allows students to choose their concentration. Students can choose between the specializations Biophysics and Nanoelectronics. The specialization Biophysics includes two compulsory modules, the specialization Nanoelectronics includes three compulsory modules. The selection is binding. A specialization can be re-selected once; the student must submit a written request to the Examination Office stating the specialization to be replaced and the newly selected specialization.

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

(4) The courses are held in English.

(5) The appropriate allocation of the modules to the individual semesters, 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 Scientific Council may amend the study schedule. The amended study schedule applies to all students who have been informed about this at the beginning of their studies as is customary at the Center for Molecular and Cellular Bioengineering. The Examination Committee shall decide, upon application by the student, on any exceptions to sentence 2.

§ 7
Content of the degree program

(1) Physics of Life is a research-oriented Master's degree program.

(2) The program comprises an interdisciplinary education in molecular, cellular and tissue-specific biophysics from the particular point of view of an experimental, theoretical and nanotechnological approach. It covers subject topics of the areas of biology, biological physics as well as material sciences. Moreover, the program includes molecular and cellular biophysics and molecular nanostructures and machines in theory and experiment. The program also comprises modern measurement and analysis methods and their practical application. In addition, the program encompasses theoretical methods that are fundamental to both physics and nanobiotechnology. Further contents are experimental methods and theoretical methods as well as experimental biophysics, theoretical biophysics or nanobiotechnology and their respective specializations.

§ 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 credit points and comprises the teaching and learning methods according to type and scope stipulated in the module descriptions, the study achievements and examined assessments, the 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. § 34 of the examination regulations shall remain unaffected.

§ 9
Academic advisory and counseling service

(1) General advice will be provided by the Central Student Information and Counseling Service at TU Dresden. It covers questions regarding study options, enrollment modalities and general student affairs. Subject-specific advice during studies will be provided by the Student and Examination Office of the Center for Molecular Cellular Bioengineering. 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, module descriptions may be changed in a simplified procedure in order to optimize study organization, with the exemption of the fields “Module name”, “Learning goals”, “Teaching and learning methods”, “Requirements for earning credit points”, and “Credit points and grades”.

(2) In a simplified procedure, the Scientific Council will adopt the amendments to the module descriptions upon proposal of the Academic Affairs Committee. The amendments must be published in the form that is customary at the Center for Molecular and Cellular Bioengineering.

§ 11
Entry into force, publication and interim arrangements

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

(2) They apply to all newly enrolled students in the Master's program in Physics of Life in the 2022/2023 winter semester or later.

(3) For students enrolled earlier than the 2022/2023 winter semester, the version of the Study Regulations for the consecutive Master's Nanobiophysics previously valid for them continues to apply.

Issued based on the resolution of the Scientific Council of the Center for Molecular and Cellular Bioengineering of March 16, 2022 and the approval of the University Executive Board as of May 17, 2022.

Dresden, May 24, 2022

The Rector
of Technische Universität Dresden

Prof. Dr. Ursula M. Staudinger