

**Study Regulations of 18 June 2015
for the Study Programme 'Medical Photonics'
Seeking the Degree 'Master of Science'**

Pursuant to § 3 (1) in conjunction with § 34 (3), sentence 1 of the Thuringian Higher Education Act (*Thüringer Hochschulgesetz, ThürHG*) of 21 December 2006 (published in the journal of legal notices of the federal state Thuringia, *GVBl.* p. 601, in German), last amended through Art. 1 of an act adopted by the state parliament on 16 April 2014 (*GVBl.* p. 134), the Friedrich Schiller University Jena issues the following Study Regulations. The Council of the Faculty of Medicine has adopted the Regulations on 10 February 2015, the Council of the Faculty of Chemistry and Earth Sciences on 11 February 2015, and the Council of the Faculty of Physics and Astronomy on 12 February 2015. The Senate of the Friedrich Schiller University Jena has approved the Study Regulations on 16 June 2015. The President of the Friedrich Schiller University has authorized the Regulations on 18 June 2015.

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**§ 1
Scope and Application**

These Study Regulations establish objectives, content, and structure of the consecutive and research-oriented study programme 'Medical Photonics' leading to a Master of Science degree (abbreviation: M.Sc.) which is jointly offered by the Faculty of Medicine, the Faculty of Physics and Astronomy, and the Faculty of Chemistry and Earth Sciences at the Friedrich Schiller University Jena. It is effective in connection with the corresponding Examination Regulations (in the following: Master Examination Regulations, *MPO*) in their applicable version and the study plan and module catalogue adopted by the Councils of the aforementioned faculties.

**§ 2
Admission requirements**

(1) Prerequisite for the admission to the study programme 'Medical Photonics' is proof of the successful completion of a first university degree qualifying the graduate to work in his/her profession (Bachelors, *Diplom*, state examination, etc.) from the Friedrich Schiller University Jena or another university or another institution of higher education of equivalent status in

Germany or abroad in the fields of chemistry, physics, biology, biochemistry/molecular biology, or medicine, that, subject to the provisions of § 2 (4) below, was finished with the overall final grade 'good' (2.5 according to the German grading system) or better.

(2) Graduates of related study programmes are generally granted admission if their degree is equivalent to the above and, subject to the provisions of § 2 (4) below, was finished with the overall final grade 'good' (2.5 according to the German grading system) or better. Equivalence is ascertained by the Selection Committee on a case-by-case basis. For the case-by-case assessment, above all, the content of the respective study programme, the grades received, the duration of the study programme, the personal development of the candidate, and his/her motivation are taken into account. Provisional admission under certain conditions is possible.

(3) If a final grade is not yet available for the first university degree qualifying the applicant to work in his/her profession, the applicant may be provisionally admitted to the study programme on the basis of his/her performance and achievements documented at the time of application.

(4) Applicants whose final overall grade is less than 'good' (2.5 according to the German grading system) but who meet all other admission requirements may be admitted to the study programme if their application illustrates particular aptitude for the Masters programme in medical photonics. The decision will be taken by the Selection Committee. In cases of doubt, selection interviews may be held.

(5) Because all courses of this study programme are exclusively offered in English, proficiency in English is essential to the study programme.

(6) The application for admission together with the following application documents – if requested in authenticated copy – has to be submitted by the stipulated deadline:

- a) Proof of completion of a first university degree qualifying the applicant to work in his/her profession, or proof of their achievements and performance at the time of the application (including proof to have earned at least 140 credit points in the study programme qualifying the applicant for the present Masters programme or equivalent qualifications);
- b) a letter of application (typed, max. 500 words) in which the applicant explains his/her motivation for choosing this study programme and illustrates any relevant competencies qualifying his/her to take up this study programme (letter of motivation);
- c) where applicable, proof of academic achievements (e.g. academic or scientific papers, publications, research work, research and study periods spent abroad);
- d) where applicable, proof of any relevant work experience (e.g. biological, chemical, or medical technical assistant, professional experience in the industry)

§ 3

Duration of Study

The standard duration of study is 4 semesters.

§ 4

Beginning of Study Programme

This Masters programme begins in the winter semester.

§ 5

Objectives of the Study Programme

(1) The objective of the Masters programme leading to a second degree qualifying graduates to work in the field of medical photonics is to prepare students for science-based and research-oriented careers in medical optics and photonics, and to provide the foundation for further training programmes within and outside of academia through specialized academic training.

(2) Students broaden and improve their knowledge in the theories, methodologies, and systematics in subfields of biology, medicine, mathematics, chemistry, and physics, they acquire the necessary experimental and theoretical skills and competencies required for scientific work in medical photonics, and they undergo special training in selected areas of microscopy, spectroscopy, and diagnostics, as well as current clinically relevant uses of photonic technologies.

(3) Upon successful completion of the study programme, graduates will have acquired the specialist and interdisciplinary soft skills and qualifications (e.g. social skills, ability to work in a team) required for research-oriented and science-based careers. They will have learned to develop and implement subject-specific research concepts. They prove to be able to critically evaluate scientific data, to think and act interdisciplinarily, and to analyse complex questions also across disciplines, to interpret findings correctly, and to find solutions.

§ 6

Structure of the Study Programme

(1) The study programme is composed of modules. Each module may comprise different forms of instruction and learning, including but not limited to lectures, seminars, practical exercises, independent study periods, as well as examinations. Each module is a learning and examination unit, the results (grades) of which will be documented on the Grade Certificate. Generally, one single module takes one semester, or at maximum one full year.

(2) The study programme is divided into

- the module blocks 'Adjustment' (24 credit points [ECTS]) and 'Fundamentals' (16 ECTS) teaching the basics of academic and scientific work in the field of medical photonics;
- required elective modules from various subfields of medical photonics (specialization modules, 20 ECTS);
- modules focussing on practical training (practical courses + research lab work, 30 ECTS); and
- the Master thesis and its defence (30 ECTS together).

(3) In the 'Adjustment' modules, courses concentrate on the various basic requirements so that the following modules can build on a shared basic knowledge of all students in mathematics, optics, physical chemistry, and human biology.

(4) In the 'Fundamentals' modules, students are taught programming techniques and skills as well as the fundamentals of statistics, biomedical image processing, and microscopy, all of which are vital for successfully completing the following modules, particularly the required elective modules.

(5) For the 'Specialization' modules, students can individually choose modules according to their own inclinations and preferences. The options to choose from include introductory courses to optical methods and techniques, advanced courses on microscopic methods, spectroscopic and diagnosis techniques, as well as the clinical use of photonic technologies.

(6) All modules in the Masters programme do not only teach specialist knowledge in the field of study, but also teach scientific and academic key qualifications and working techniques. All modules teach the skills of scientific research, the critical analysis of one's own data as well as data from third parties, and train students for the presentation of scientific findings. Social skills and the ability to work in a team are also enhanced.

(7) The study programme concludes with a Master thesis. By writing and defending the Master thesis, students prove to be able to independently work on a problem or question from a subfield of medical photonics using scientific methods and within a given time frame.

§ 7

Scope and Content of the Study Programme

(1) To successfully complete the study programme, students must acquire a total of 120 credit points according to the European Credit Transfer and Accumulation System (ECTS). Per semester, a total of 30 ECTS has to be earned. Pursuant to the stipulations of the European Credit Transfer System, a workload of a total of 30 hours of in-class and independent studying is assumed for every one credit point.

(2) The modules of the first year of study are designed to ensure that all students have the same level of knowledge and skills, and to teach basic knowledge and skills in medical photonics.

(3) Tailored to the educational background of new students, the modules of the module range 'Adjustment' (24 ECTS) in the first and second semester teach basic knowledge in mathematics, optics and photonics, physical chemistry, spectroscopy, and human anatomy and physiology.

(4) The modules in the module range 'Fundamentals' (16 ECTS) will, in the first and second semester, lay the foundations for the successful completion of all following modules, particularly the required elective modules. This includes teaching basic knowledge and skills in statistics and an introduction to programming techniques and image processing. In addition, students will study the basics of medical imaging.

(5) In the second semester, students attend required elective modules in the module range 'Specialization' (8 ECTS to be earned) introducing optical methods and techniques.

(6) In practical courses (12 ECTS), students broaden and improve acquired knowledge. In the first two semesters, students are offered experimental courses in the fields of optics, physical chemistry, and physiology.

(7) In the second year of study, acquired knowledge and skills are complemented by advanced required elective modules. In the third year of study, students choose from the modules offered in the fields of microscopy, spectroscopy/diagnostics, and clinical uses of photonics. Students have to earn a total of 12 ECTS in these modules and should attend modules from at least two of fields mentioned above.

(8) In the third semester, students work in a laboratory of a working group involved in the present Masters programme and complete a research internship designed to acquire and improve the knowledge and skills that students will need to write their Master thesis.

(9) The study programme concludes with writing and defending a Master thesis in the fourth semester.

(10) Description of the module ranges and the individual modules can be found in the applicable version of the module catalogue. Module descriptions provide information about the person responsible for the module, the prerequisites for participation, what earned credits may be counted towards, the status of the module, the different forms of learning and working, the work load and the credit points to be earned, the content and qualification objectives of the module, as well as the type of performance assessment and their respective weight for the final grade of the module. In addition, the module descriptions provide information on how often the module is offered and the duration.

§ 8

International Mobility of Students

If students wish to spend some time abroad during the course of their studies, a Learning Agreement signed with the home university prior to the stay abroad will guarantee recognition of academic achievements produced abroad.

§ 9

Assessed and Non-Assessed Coursework and Examinations

The type and scope of assessed and non-assessed coursework as well as examinations are defined in the Examination Regulations. The types of examination in the individual modules and the weighting of partial examinations are specified in the module descriptions in the module catalogue. Examination dates and other details of what needs to be done to produce the required assessed coursework or examination are announced at the beginning of each module.

§ 10

Admission to the Stages of Study and to Individual Modules

(1) Admission to modules of more advanced semesters generally requires the successful completion of modules from previous semesters. Prerequisites for the admission to individual modules are specified in the respective module descriptions in the module catalogue.

(2) For individual required elective modules, the number of participants may be limited for factual reasons, particularly for reasons of available space or equipment.

§ 11

Subject-Specific Academic Advisory Service

(1) The Office of the Dean of Student Affairs at the Faculty of Medicine advises students in subject-specific questions related to their studies, in particular with regard to the content of the study programme, specialization options, selection and participation in courses,

recognition of previous academic achievements if the field or place of study was changed, so that students can organize their studies in a target-oriented way and complete it in the standard duration of study.

(2) Advising students in subject-specific questions and concerns is also the responsibility of all teaching staff. Students may choose a person of trust from among all teaching staff as their mentor and may consult them in case of questions during the course of their studies regardless of whether or not they attend their courses.

(3) Questions related to the Study or Examination Regulations will be responded to by the chairperson of the Examinations Committee, his/her deputy, or another person appointed by the Examinations Committee.

(4) Non subject-specific questions and concerns can be discussed with staff at the Central Academic Advisory Service of the Friedrich Schiller University Jena.

§ 12

Evaluation of Courses Offered and Quality Control

(1) The faculties involved in the present study programme are committed to constantly modernizing and improving the courses offered. The Examinations Committee regularly evaluates the study plan and the range of modules offered in due consideration of the developments in the specific field and of professional requirements.

(2) The Examinations Committee documents and analyses teaching performance and success in the various courses offered, and biannually reports to the Joint Conference on the study programme (*Studienkonferenz*) regarding performance developments and the organizational set-up of the programme.

(3) In addition, it evaluates the experiences with the Masters programme, particularly with regard to its approval and reception by the students and professionals in the field, to study conditions, and the range of specialist and interdisciplinary qualification options, and discusses them with the concerned teaching staff. The resulting teacher and teaching evaluation is reported back to the Joint Conference on the study programme on a yearly basis.

(4) The Joint Conference on the study programme integrates the qualitative and quantitative analyses of where to adapt the range of courses offered to developments in the specific field, the performance and achievements of students and graduates, and the results of teacher and teaching evaluations, and decides on measures necessary to improve and optimize study conditions and the study programme.

(5) Modifications in the module catalogue are announced in sufficient time before the beginning of every academic year. As a matter of principle, these modifications must be approved by all faculties involved, in particular if they touch on the course sequence or programme structure or the qualification objectives. If changes are only made to the description of content or the different forms of instruction and learning laid out for the module, the faculty responsible for the module may approve the changes on its own. The other faculties involved must be informed.

English translation from the German. The translation is for information only; legally binding is only the German original in its currently applicable version published in the journal of legal notices of the Friedrich Schiller University, the *Verkündungsblatt*.

§ 13
Equal Opportunity Clause

All titles and functions in (the German version of) these Regulations equally refer to men and women.

§ 14
Coming into Effect

These Study Regulations come into effect on the first day of the month following their announcement in the journal of legal notices of the Friedrich Schiller University (*Verkündungsblatt der Friedrich Schiller Universität*).

Jena, 18 June 2015

Prof. Dr Walter Rosenthal
President of the Friedrich Schiller University Jena