



Academic and Examination Regulations for the Master's Degree Program Radiation Biology at the Technical University of Munich

This document is a translation of the German “Fachprüfungs- und Studienordnung für den Masterstudiengang Radiation Biology an der Technischen Universität München vom 13. August 2015 in der Fassung der zweiten Änderungssatzung vom 12. April 2017”. Only the officially promulgated German version is legally valid

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§ 34

Applicability, Academic Degree

- 1) The academic and examination regulations for the Master's degree program "Radiation Biology" (FPSO) supplements the General academic and examination regulations for Bachelor's and Master's degree programs at the Technical University of Munich (APSO) from March 18th, 2011 in the corresponding legally binding version. The APSO shall prevail.
- 2) Having passed the final examination, students will be awarded the academic degree "Master of Science" ("M.Sc."). This academic degree can be kept with the addition of "TUM".

§ 35

Commencement of Studies, Standard Duration of Study, ECTS

- 1) Commencement of studies for the Master's degree program "Radiation Biology" at the Technical University of Munich is the winter semester.
- 2) 90 credits from mandatory and elective courses have to be gained within 3 semesters to acquire the Master's degree. In addition 6 months at the maximum are spent to perform the Master's Thesis according to § 46 as well as the Master's colloquium. In total 120 credits have to be gained according to the Academic and Examination Regulations for the Master's Degree Program Radiation Biology at the Technical University of Munich, Annex 1. The standard duration of study for completing the master's program is four semesters.

§ 36

General admission requirements

- 1) Qualification for the master's program are proven by
 1. a Bachelor's degree in the field of natural science or a pass in the state examination in medicine or veterinary medicine or an equivalent qualification in a similar study program.
 2. Adequate knowledge of the English language; applicants whose mother tongue or language of the first education is not English have to proof their language skills by having passed the "Test of English as a Foreign Language" (TOEFL) with at least 88 points or the "International English Language Testing System (IELTS) with at least 6.5 points or the "Cambridge Main Suite of English Examination" or any other language test accepted by the Student Service Desk of the Technical University of Munich; alternatively a

good grade in English (minimum of 10 points on average) in your school leaving certificate in Germany (Abitur or vocational diploma) is sufficient; 10 ECTS points in English speaking examination modules in previous studies are also proof of adequate knowledge of the English language.

3. a pass of the aptitude assessment according to Annex 2.
- 2) An equivalent qualification in a study program according to §36 (1) is a degree, which essentially is not different from the Bachelor's degree offered at the Technical University of Munich or a comparable university through which the applicants have acquired the minimum knowledge to pursue the Master's degree.
- 3) Associated with the first step of the aptitude assessment the module catalogues of the corresponding bachelor degrees will be considered for assessing the qualification of the applicant.
- 4) The commission of the aptitude assessment decides on the qualification of the corresponding bachelor degrees as well as on special qualifications of degrees from foreign universities.

§ 37

Modular Structure, Module examinations, Courses, Area of Specialization, Language

- 1) General regulations concerning modules and courses are recorded in §§ 6 and 8 APSO.
- 2) The study plan containing all mandatory and elective courses is listed in Annex 1. If no German language skills can be proven by the time of application, at least one module has to be taken where integrative German language skills are acquired. The examination board will inform about these courses. Voluntarily performed Language courses offered by the language center will be acknowledged as well.
- 3) The language of the Master's program is English.

§ 37a

Research practicals

- 1) Two research practicals of six weeks (12 Credits) have to be completed. Students will be assigned to a radiobiological researcher in Munich. Successful participation is proven by the facility and by a written report from the student. For further information consult the description of the module as well as the practical guidelines.
- 2) All research practicals are supervised by a competent examiner according to the APSO.
- 3) The examination board decides on the acknowledgement of a successful participation.

§ 38

Examination Deadlines, Progress Monitoring, Failure to Meet Deadlines

Examination deadlines, progress monitoring and failure to meet deadlines are regulated in §10 APSO.

§ 39

Examination Committee

The examination board for the Master's program Radiation Biology of the TUM School of Medicine is responsible for the decisions concerning the examinations corresponding to §29 APSO.

§ 40

Recognition of Periods of Study, Coursework and Examination Results

The recognition of periods of study, coursework and examination results is regulated in § 16 APSO.

§ 41

Examination procedure, Examination Types

- 1) Besides written and oral examinations, reports, presentations and scientific elaborations are possible examination forms according to §§12 and 13 APSO.
 - a) A written examination is a work done under supervision with the aim to recognize and find solutions for a given problem. The duration is regulated in §12 APSO.
 - b) A report is a written elaboration and summary of a learning process with the aim to reproduce what was learned in a well-structured way and to analyze the results in context with the contents of the modules. The report should show that basic aspects were understood and can be reproduced in written form. The written report can be supplemented by an oral presentation in order to promote communicative competences of the student in front of an audience.
 - c) The scientific elaboration is a written work in which a demanding scientific or applied-scientific task is independently elaborated by means of scientific methods according to the given topic. It shall be proven that a given topic according to the learning objectives of the respective module can be elaborated entirely with respect to the guidelines for scientific elaborations – from the analysis to the concept to its implementation. Thesis paper, abstract, essay or reports are possible forms, which are different in their

levels. The written scientific elaboration can be supplemented by an oral presentation or colloquium to examine the communicative competences of the student in front of an audience. The essential components of the respective written scientific elaboration and the competences are regulated in the description of the modules.

- d) A presentation is a systematic, structured and visually supported (beamer, transparencies, poster, videos) oral performance, where specific topics or results compressed to the essential statements are summarized and presented. By means of the oral presentation the student shall prove his or her ability to acquire knowledge in a given time about a given topic and to present it in a clear and structured way. Additionally the student shall prove his or her ability to professionally respond to questions, suggestions and discussion from the audience. The presentation can be complemented by a short written elaboration. The presentation can be done individually or in a group. Individual parts in a group presentation need to be distinguishable in order to assess each student individually. This also holds for the individual participation during the group work.
 - e) An oral examination is a time-limited examination conversation about specific topics, which have to be specifically answered. During the oral examination it shall be proven that the goals defined in the module description were reached as well as that the student is able to recognize relationships between the subject of the examination and specific issues of the examination. The oral examination can be conducted individually or in a group. The duration of the oral examination is regulated in § 13 APSO.
- 2) Module examinations are conducted concomitant to the studies. Form and duration of the examination can be seen in Annex 1. Assessments of the examinations are regulated in § 17 APSO.

§ 42

Registration and Admission for Examinations

- 1) With the immatriculation to the Master's program Radiation Biology students are admitted to the module examinations. If admission to specific modules requires a pass of other modules it can be seen in Annex 1.
- 2) Students are admitted to all concomitant examinations in mandatory as well as elective modules of the Master's program Radiation Biology related to the designated modules of the respective semester. In case of nonattendance without any reasonable explanation the examination has been taken and failed according to § 10 APSO.
- 3) Registration for a repeat examination in a failed mandatory module is regulated in § 15 APSO.

§ 43

Scope of the Master's examinations

- 1) The scope of the Master's examinations is:
 1. examinations in the corresponding modules,
 2. Master's Thesis according to § 46 including the Master's colloquium according to § 46a.
- 2) The module examinations are listed in Annex 1. 42 Credits of mandatory courses and 48 Credits in elective courses have to be proven. By the choice of modules § 8 APSO should be considered.

§ 44

Repeat Examinations, Failure of Examinations

- 1) Repeat examinations are regulated in § 24 ASPO. Repeat examinations of a failed module examination at the end of the lecture period has to be taken until the end of the first week of the lecture period of the following semester.
- 2) Failure of examinations is regulated in § 23 APSO.

§ 45

Coursework

In the Master's program Radiation Biology no additional coursework needs to be proven.

§ 45a

Multiple Choice Test

Conduction of Multiple-Choice-Procedure is regulated in § 12 APSO.

§ 46

Master's Thesis

- 1) According to § 18 APSO students have to write a Master's Thesis. The Master's Thesis has to be administered and supervised by a competent examiner from the Tum School of Medicine. The examination board appoints the competent examiners.
- 2) Start of the Master's Thesis should be immediately after taking all module examinations, whereby the elective modules have to be passed.
- 3) The time between the date of issue and submission of the thesis shall not exceed six months. If the thesis is not submitted in time without convincing reasons the thesis is failed. The thesis shall be written in English.
- 4) Completion of the Master's Thesis module is achieved by the submission of a scientific elaboration as well as an oral Master's colloquium according to § 46a. 30 Credits will be granted for the module.

- 5) The score of the Master's Thesis must at least be 4.0 ("satisfactory"), otherwise the Master's Thesis can be repeated once with another topic. At least six weeks after receiving the first result the thesis needs to be registered again.

§ 46a

Master's Colloquium

- 1) Students are granted admission to the Master's Thesis module included Master's colloquium if they have passed modules of the Master's program amounting to 90 Credits and if they have completed the Master's Thesis. The oral examination shall take place at the latest two months after the appointed deadline.
- 2) The Master's Colloquium is conducted by the supervisor of the Master's Thesis and an competent observer.
- 3) Duration of the Master's Colloquium is 60 minutes. The students are allowed to present their work within 30 minutes. Afterwards a disputation will follow, which covers the further topic of expertise starting from the Master's Thesis topic.

§ 47

Passing and Grading of Master's Examination

- 1) The Master's examination is passed if all examinations according to the Master's examination § 43 are passed and 120 Credits points are obtained.
- 2) The module score is calculated according to § 17 APSO. The total score of the Master's examination is the weighted mean of all module scores according to § 43 (2) and of the Master's Thesis including the Master's Colloquium. The weighting of the individual module scores correspond to the assigned credits. The total score will be expressed by the designation according to § 17 APSO.

§ 48

Certificate, Diploma and Diploma Supplement

If the Master's Examination has been passed, according to § 25 (1) and § 26 APSO a certificate, a diploma as well as a diploma supplement with a transcript of records will be issued. The date of the certificate is the date on which all module examinations and academic achievements were provided.

§ 49¹
Entry into Force

- 1) The German version of this constitution shall enter into force after its disclosure. It shall apply to all students who enroll for the Master's degree program as of 2015/16 winter term at the Technical University of Munich.
- 2) The regulation of the aptitude assessment shall apply in 2016/17 winter term for the first time.
- 3) Deviating from the deadlines in the Aptitude Assessment evidence according to § 36 for the procedure in the 2015/16 winter term can be handed in at the latest during the immatriculation.

¹ This provision concerns the entry into force of the Regulations in the original version of 18 March 2011. The entry into force of any amendments is provided for in the Amending Statutes.

ANNEX 1: Examination Modules

Nr.	Module Title	Teaching Method	AR	Sem.	SWS	Credits	Type	Duration of Examination in min	Weighting Factor	Language
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Mandatory Modules

MEMA-STRB001	Human Biology	L S		1	4L + 1S	6	Exam	90		E
MEMA-STRB002	Radiation Protection and Medical Applications	L S		1	4L + 1S	6	Exam	120		E
MEMA-STRB003	Molecular Biology of the Cell	L P S		1	2L + 1S + 2P	6	Exam	90		E
MEMA-STRB004	Radiation Physics and Dosimetry	L S P E	Module STRB001, STRB002, STRB003	2	1L + 1S + 2P + 1E	6	Oral Exam	20		E
MEMA-STRB005	Radiation Effects on Cells and Tissues	L S P	Module STRB001, STRB002, STRB003	2	2L + 3P + 1E	6	Exam	90		E
MEMA-STRB006	Molecular Radiation Biology	L P	Module STRB001, STRB002, STRB003	2	5	6	Exam	90		E
MEMA-STRB007	Research Management	Project	*	3	1E + 5P	6	Written scientific paper			E
	Total:					42				E

*The elective modules must be passed successfully

MEMA-STRB008	Master's Thesis					30				E
	Master's Thesis			4			Written scientific paper		9:1	E
	Master's Colloquium			4			Presentation	60		E

Elective Modules: Students can choose two of the three modules to get 24 Credits:

MEMA-STRB009	Clinical and experimental Radiooncology	L S E	Module STRB004, STRB005, STRB006	3	5L + 2S + 1E	12	Exam	120		E
MEMA-STRB010	Advanced Molecular Radiation Biology	L S	Module STRB004, STRB005, STRB006	3	4L + 4P	12	Oral Exam	30		E
MEMA-STRB011	Advanced Radiation Protection Research	L S E	Module STRB004, STRB005, STRB006	3	5L + 3S + 2E	12	Exam	120		E

Elective Modules Research practical: Students can choose two of the four modules to get 24 Credits:

MEMA-STRB012	Research Practical: Cell Biology	P		1 or 2	10	10	Report			E
MEMA-STRB013	Research Practical: Radiation	P		1 or 2	10	10	Report			E
MEMA-STRB014	Research Practical: Clinical	P		1 or 2	10	12	Report			E
MEMA-STRB015	Research Practical: Medical Physics	P	Module STRB001, STRB002, STRB003	2	10	12	Report			E

Explanations:

Sem. = Semester; SWS = Credit hours; L = Lecture; E = Exercise; P = Practical;

S = Seminar

AR = Admission Requirement (see § 43, 1)

Annex 2: Aptitude Assessment

1. Aim of the Aptitude Test

The qualification for the Master Study Program “Radiation Biology” requires proof of eligibility according to the following rules. The qualifications and competences of the applicant should meet the requirements for a career in radiation biology research, in particular:

- 1.1 The ability to work according to international standards of scientific, basic or translational research.
- 1.2 Relevant scientific expertise acquired in undergraduate studies in natural sciences or life sciences or medicine.
- 1.3 The ability to communicate basic problems of environmental protection issues.
- 1.4 Interest in the field of radiation biology.

2. Aptitude Assessment Procedure

- 2.1 The aptitude assessment will be conducted once a year by the TUM School of Medicine.
- 2.2 The application has to be submitted online in *TUMonline* together with all required documents not later than 31st of May. Documents, which cannot be submitted by the deadline can be handed in until the 15th of August. The diploma documenting the award of the degree (bachelor or equivalent) has to be handed in at the latest 5 weeks after the start of the study. Otherwise a start of the program is not possible.
- 2.3 The following documents have to be included in the online application:
 - 2.3.1 a Transcript of Records showing modules accounting to 140 ECTS or a certificate and the grade of the first and second *Staatsexamen* in the fields of medicine or veterinary medicine.
 - 2.3.2 a CV in tabular form
 - 2.3.3 a motivation letter of up to 2 pages in which the applicant should explain the choice of the study program “Radiation Biology” and what specific knowledge and which specific skills enable the applicant to the field of this master study. Internships, professional training, studies abroad or other subject-related further education additional to the bachelor’s studies need to be proven by official documents.
 - 2.3.4 a signed statement that the letter of motivation was entirely written by the applicant without any help from others.

3. The Aptitude Assessment Commission

- 3.2 A commission consisting of the Dean of the TUM School of Medicine, two professors responsible as well as one academic staff. A student from the second year might advise the commission
- 3.3 The members of the Aptitude Assessment Commission are appointed by the Department Council in cooperation with the Dean of the TUM School of Medicine.

4. Admission to the Aptitude Assessment

- 4.1. Admission to the Aptitude Assessment requires complete submission of all documents by the deadline.
- 4.2. Whoever fulfills these requirements is admitted to the aptitude assessment.
- 4.3. Whoever is rejected receives a letter, which explains the reasons for rejection and informs about possibilities to raise an objection.

5. Conduction of the Aptitude Assessment

5.1. First step of the Aptitude Assessment

5.1.1 The commission evaluates the submitted documents and assesses whether the applicant is suitable for the study program. The commission gives a score based on the submitted documents between 0 and 100, with 0 being the worst, 100 the best possible score.

The criteria for scoring are:

a) **Subject-specific qualifications**

A) Bachelor degrees of natural science: mathematics, physics, chemistry
physical chemistry

or

B) Bachelor degrees with biochemical/biotechnological background:
biochemistry, microbiology, genetics, molecular biology, physiology,
immunology

or

C) Medicine or veterinary medicine

If it has been determined that there are no significant differences concerning the acquired competences a maximum of 40 points will be given. Missing competences reduces the score accordingly. Negative points are not given.

b) **Final mark of diploma**

The maximum score amounts to 30 points. For every 0.1 mark better than 4.0 determined from 140 Credits of the bachelor's study or medicine or veterinary medicine *Staatsexamen* 1 point is given. Marks from non-German university diplomas are converted according to the formula recommended by the Bavarian Ministry of Education.

If the Transcript of Records indicates more than 140 Credits, the best marks accounting to 140 Credits will be considered for scoring.

c) **Letter of Motivation**

Two members of the Commission will assess the Letter of motivation giving scores between 0 and 30 points. Criteria are:

- i. the applicant is able to convincingly formulate the reason for application
- ii. the applicant is able to explain in a well-structured way the relation between the personal interests and the contents taught in the master's program, which should be reasoned by advantageous examples such as internships, stays abroad or academic training.
- iii. the applicant is able to formulate all this in adequate English language.

The members of the commission assess each of the criteria individually. The final score is the result of the mean of each single assessment.

5.1.2 The score from the first step of the Aptitude Assessment is the result from all single scores.

5.1.3 Those applicants receiving 70 points or more receive a letter of acceptance to the Master's program.

5.1.4 Those applicants receiving less than 50 points receive a letter of rejection from the Master's program.

5.2. Second Step of the Aptitude Assessment

5.2.1 The remaining applicants are invited to an interview. During the second step of the Aptitude Assessment the result from the first step of the Aptitude Assessment as well as the acquired qualifications from the previous study are assessed and equally weighted

The date of the interview will be communicated one week in advance at the latest. The given date and time has to be met by the applicant. If the date of the interview cannot be met by the applicant another date may be granted at the latest two weeks before the start of the master's program.

5.2.2 The interviews are conducted with each applicant individually. The interview should last at least 20 minutes and 30 minutes at the longest. Contents of the interview are:

- Eligibility: basic questions from natural science and medicine; ability to orally explain and discuss problems concerning environment protection, how to evaluate and solve these problems and their resulting social consequences.
- English communication skills.

Knowledge of facts and concepts only taught as part of the master's program are not taken into account for the result of the interview. If the applicant agrees, a MSc student of the second year may sit in the interview as an observer.

5.2.3 The interview will be held by at least two members of the commission. The members assess the interview by giving scores between 0 and 50 points. The final score is the result of the mean from both single assessments.

5.2.4 The total score of the second part of the Aptitude Assessment is the sum of all scores from 5.2.3 as well as 5.1.1 a) and 5.2.2 b). Those applicants who received 70 points or more are accepted to the master's program.

5.2.5 The result of the Aptitude Assessment is communicated in written form and has to be signed by the President of TUM or a delegate. The decision of rejection has to be justified and possibilities to raise an objection need to be added.

5.2.6 The acceptance to the master's program "Radiation Biology" automatically applied to all subsequent applications within this study.

6. Record

The aptitude assessment needs to be documented in written form including the date, duration and the place of the aptitude assessment, the names of the members of the commission, the names of the applicants and the scores from each individual member of the commission as well as the total score. The record should also include the basic contents of the interviews; notes are allowed.

7. Repetition

Those applicants receiving a letter of rejection are allowed to apply again once.