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## **Subject Examination and Study Regulations for the Master's Degree Program in Biology at the Technical University of Munich**

**From 22 April 2021**

On the basis of Article 13, Paragraph 1, Sentence 2 in conjunction with Article 58, Paragraph 1, Sentence 1, Article 61, Paragraph 2, Sentence 1 and Article 43, Paragraph 5 of the Bavarian University Act (BayHSchG), the Technische Universität München enacts the following statutes:

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### **§ 34**

#### **Scope, academic degree**

- (1) The Subject Examination and Study Regulations for the Master's Program in Biology (FPSO) supplement the General Examination and Study Regulations for Bachelor's and Master's Programs at the Technical University of Munich (APSO) of March 18, 2011, as amended. The APSO has priority.
- (2) On the basis of the successful completion of the Master's examination, the academic degree "Master of Science" ("M.Sc.") is awarded. This academic degree may be awarded with the university suffix "(TUM)".

### **§ 35**

#### **Start of studies, standard period of study, ECTS**

- (1) Admission to the Master's program in Biology at the Technical University of Munich is possible in the winter semester as well as in the summer semester.
- (2) The scope of the credits required for obtaining the Master's degree in the compulsory and elective areas is 90 (75 semester hours), distributed over three semesters. In addition, there is a maximum of six months for the completion of the Master's thesis in accordance with § 46. The scope of the study and examination achievements in the compulsory and elective areas in accordance with Appendix 1 in the Master's degree program in Biology is thus at least 120 credits. The standard period of study for the Master's program is four semesters in total.

### **§ 36**

#### **Qualification requirements**

- (1) The qualification for the master's degree in biology is demonstrated by
  1. a qualified bachelor's degree of at least six semesters obtained at a domestic or foreign university or a degree of at least equivalent value in the fields of biology, molecular biotechnology or comparable courses of study,
  2. Sufficient German language skills according to § 7 para. 3 no. 8 of the statutes of Technische Universität München on enrollment, re-registration, leave of absence and exmatriculation (ImmatS) dated January 9, 2014, as amended. January 2014, as amended, or adequate knowledge of the English language; for this purpose, students whose language of education is not English must provide proof by means of a recognized language test such as the "Test of English as a Foreign Language" (TOEFL) (at least 88 points), the "International English Language Testing System" (IELTS) (at least 6.5 points) or the "Cambridge Main Suite of English Examinations"; if examinations amounting to 30 credits in English-language examination modules were taken in the undergraduate degree program or if the final thesis was written in English, adequate knowledge of the English language is also demonstrated herewith,
  3. passing the suitability procedure according to Annex 2.

- (2) A qualified university degree within the meaning of Paragraph 1 No. 1 exists if there are no significant differences with regard to the competencies (learning outcomes) acquired in the aforementioned bachelor's degree program at TUM.
- (3) The compulsory modules of the bachelor's degree program in life science biology are used for the determination according to Para. 2. If examination results are missing for this determination, the commission for the aptitude test according to Annex 2 No. 3 can demand that these examinations be taken as additional basic examinations according to Annex 2 No. 5.1.3 as proof of the qualification according to Para. 1. The applicants shall be informed of this after the documents have been reviewed as part of the first stage of the aptitude test.
- (4) The determination according to par. 1 no. 1 and par. 1 no. 3 shall be made by the commission on the suitability procedure.
- (5) Departing from para. 1 no. 1, students who are enrolled in a bachelor's degree program named in para. 1 no. 1 may be admitted to the master's degree program upon justified application. The application may only be submitted if, in the case of a six-semester bachelor's degree program, module examinations amounting to at least 130 credits, in the case of a seven-semester bachelor's degree program, module examinations amounting to at least 160 credits, and in the case of an eight-semester bachelor's degree program, module examinations amounting to at least 190 credits are proven at the time the application is submitted. Proof of having passed the bachelor's degree must be provided within one year of commencing the master's degree program.

### § 37

#### **Modularization, module examination, courses, fields of study, language of instruction**

- (1) General regulations on modules and courses are set out in §§ 6 and 8 APSO. In the event of deviations from module specifications, § 12 Para. 8 APSO shall apply.
- (2) The study plan with the modules in the compulsory and elective areas is listed in Appendix 1.
- (3) In the master's degree program in biology, the following majors can be selected:
  - Biochemistry and cell biology
  - Genetics
  - Medical Biology
  - Microbiology
  - Ecology
  - Plant Sciences
  - Animal Science

The composition of the modules and the choice of the main areas of study are governed by § 43 Para. 2 and Para. 3.

- (4) In addition to the German-language modules, sufficient modules are offered in English. It is therefore possible to study the Master's program exclusively in English. If students have not demonstrated German language skills in their application, the admission will include the requirement that at least one module in which integrative German language skills are acquired must be successfully completed by the end of the second semester. The offer will be announced by the Examination Committee in accordance with local

practice. *Voluntary* extracurricular offerings such as German courses of the TUM Language Center will also be recognized. The language of the respective elective modules is marked in Annex 1.

### § 38

#### Examination deadlines, study progress monitoring, missed deadlines

- (1) Examination deadlines, study progress monitoring and missed deadlines are regulated in § 10 APSO.
- (2) At least one of the module examinations listed in Appendix 1 must be successfully completed by the end of the second semester. If the deadline is exceeded, § 10 para. 5 APSO shall apply.

### § 39 Examination board

The body responsible for decisions in examination matters according to § 29 APSO is the Master Examination Board for Biology of the TUM School of Life Sciences.

### 40 Crediting of periods of study, study and examination achievements

The crediting of study periods, study and examination achievements is regulated by § 16 APSO.

### § 41

#### Course-related examination procedure, forms of examination

- (1) Possible forms of examination according to §§ 12 and 13 APSO are, in addition to written examinations and oral examinations in this degree program, in particular laboratory performances, exercise performances (if applicable, tests), reports, project work, presentations, learning portfolios, scientific papers and the examination course. The concrete components of the respective module examination and the competences to be examined are listed in the module description. The examination can be conducted as an individual or group examination if the topic is suitable; § 18 para. 2 sentences 2 and 3 APSO apply accordingly.
  - a) An **examination** is written work under supervision with the aim of identifying problems in a limited time using the specified methods and defined aids and finding ways of solving them and, if necessary, being able to apply them. The duration of written examinations is regulated in § 12 Para. 7 APSO.
  - b) A **laboratory service** includes, depending on the discipline, experiments, measurements, work in the field, field exercises, etc. with the aim of carrying out, evaluating and gaining knowledge. Components can be e.g.: the description of the processes and the respective theoretical basis incl. literature study, the preparation and practical execution, if necessary necessary calculations, their documentation and evaluation as well as the interpretation of the results with regard to the knowledge to be gained. The laboratory performance can be supplemented by a presentation in order to test the communicative competence in presenting scientific topics to an audience.

- c) The **exercise performance** is the processing of given tasks (e.g. mathematical problems, programming tasks, modeling, designs, etc.) with the aim of applying theoretical content to solve application-related problems. It serves the verification of factual and detailed knowledge as well as its application. The exercise performance can be carried out in writing, orally or electronically, among others. Possible forms are, for example, homework, exercise sheets, programming exercises, (e-)tests, design tasks, posters, tasks in the context of university internships, test certificates, etc.
- d) A **report** is a written review and summary of a learning process with the aim of reproducing what has been learned in a structured manner and analyzing the results in the context of a module. The report should prove that the essential aspects have been recorded and can be reproduced in writing. Possible report forms are, for example, field trip reports, internship reports, work reports, etc. The written report can be supplemented by a presentation in order to test the communicative competence in presenting the contents to an audience.
- e) In the context of a **project work**, a project assignment is to be achieved as a defined goal in a defined time and with the use of suitable instruments in several phases (initiation, problem definition, role allocation, idea generation, criteria development, decision, implementation, presentation, written evaluation). In addition, a presentation or a technical discussion can be part of the project work in order to test the communicative competence in presenting scientific topics in front of an audience. Project work may also include design drafts, drawings, plan representations, models, objects, simulations and documentation.
- f) The **scientific paper** is a written performance in which a challenging scientific or scientific-application-oriented question is independently processed using the scientific methods of the respective discipline. It should be demonstrated that a question corresponding to the learning outcomes of the respective module can be completely processed in compliance with the guidelines for scientific work - from analysis to conception to implementation. Possible forms, which differ in their respective level of demand, are e.g. thesis paper, abstract, essay, study paper, seminar paper, etc. The scientific elaboration can be accompanied by a presentation and, if necessary, a colloquium in order to test the communicative competence of presenting scientific topics in front of an audience.
- g) A **presentation** is a systematic, structured and visually supported oral presentation using suitable media (such as beamers, transparencies, posters, videos), in which specific topics or results are illustrated and summarized and complex issues are reduced to their essential core. The presentation is intended to demonstrate the ability to work on a specific topic in a given time in such a way that it can be presented to an audience in a clear, concise and comprehensible manner. In addition, it should be demonstrated that questions, suggestions or discussion points of the audience can be dealt with in an informed manner in relation to the respective subject area. The presentation can be supplemented by a short written preparation.
- h) An **oral examination** is a time-limited examination discussion on specific topics and concrete questions to be answered. In oral examinations it should be demonstrated that the interrelationships of the examination area have been recognized and that special questions can be placed in these interrelationships. The duration of the examination is governed by Section 13 (2) APSO.
- i) A **learning portfolio** is a presentation of one's own work selected according to previously defined criteria, with which learning progress and performance status at a

certain point in time and in relation to a defined content are to be demonstrated. The selection of the work, its relation to one's own learning progress and its significance for the achievement of the learning outcomes must be justified. The learning portfolio should demonstrate that responsibility has been taken for the learning process. Depending on the module description, the components of successful self-learning checks of the learning portfolio may include, in particular, work with application relevance, Internet pages, weblogs, bibliographies, analyses, thesis papers and graphical presentations of an issue or a question. On the basis of the learning portfolio, a summary discussion can take place for verbal reflection.

- j) In the context of an **examination course**, several examination elements are to be completed within one examination performance. In contrast to a partial module examination, the examination performance is examined in an organizationally (spatially and temporally) coherent manner. Examination elements are several different examination formats which in their entirety cover the complete competence profile of the module. In particular, examination elements can also be examination formats according to letters g) and h) in combination with a practical performance. The total duration of the examination shall be specified in the module catalog.
- (2) The module examinations are usually taken during the course of study. The type and duration of a module examination are specified in Annex 1. In the event of deviations from these stipulations, § 12 Para. 8 APSO must be observed. For the evaluation of the module examination, § 17 APSO shall apply. The grade weights of partial module examinations correspond to the weighting factors assigned to them in Annex 1.
- (3) If Appendix 1 specifies for a module examination that it is written or oral, the examiner shall announce the binding type of examination to the students in an appropriate manner no later than the beginning of the lecture.

## § 42

### Admission and registration for the Master's examination

- (1) Upon enrollment in the Master's degree program in Biology, students are considered admitted to the module examinations of the Master's examination. Students who still have to take examinations within the framework of the previous bachelor's degree program are also considered admitted to individual module examinations.
- (2) Registration for a module examination in the compulsory, compulsory elective and elective areas is governed by § 15 para. 1 APSO. Registration for a corresponding repeat examination in a failed compulsory/elective module/elective module is governed by § 15 para. 2 APSO.

## § 43

### Scope of the Master's examination

- (1) The master's examination includes:
1. the module examinations in the corresponding modules according to par. 2,
  2. the module Master's Thesis according to § 46 in the amount of 30 credits and § 46a the module "Scientific Project Planning in the amount of 5 credits.
- (2) The module examinations are listed in Appendix 1. Eighty-five credits in the compulsory and elective modules must be demonstrated. Of these, 82 credits in the elective modules

of the main areas of study and at least 3 credits from elective modules of the "Interdisciplinary Qualification" must be demonstrated. At least three of the seven areas of specialization named in § 37 Para. 3 must be selected. In each major field of study, at least 20 credits must be earned in elective modules according to Appendix 1. For each chosen specialization, at least 10 credits must be taken from the theory-oriented modules. The remaining credits can be earned from the areas of the theory-oriented and/or practice-oriented modules. In addition, there is the possibility to choose a fourth major or to deepen one of the three majors chosen according to paragraph 2 sentence 2 according to paragraph 3 (qualifying major).

- (3) A study focus is considered a qualification focus according to Para. 2, if at least 70 credits, of which at least 15 credits from the theory-oriented modules, are proven in this study focus, as well as the topic of the Master's Thesis to the extent of 30 credits and the module "Scientific Project Planning" originate from this focus. Insofar as examination modules are marked with \* in Annex 1, individual modules are compulsory in certain qualification focuses. There is no legal claim to the choice of module that leads to the qualification focus. When choosing the modules, § 8 para. 2 APSO must be observed."

#### **§ 44**

#### **Repetition, failure of examinations**

- (1) The repetition of examinations is regulated in § 24 APSO.
- (2) The failure of examinations is regulated by § 23 APSO.

#### **§ 45**

#### **Study achievements**

Instead of the examinations to be taken in elective modules in accordance with § 43 Para. 2 Sentence 2, the completion of coursework may also be required in elective modules. The number of credits to be earned in elective modules according to § 43 para. 2 sentence 2 is reduced accordingly in these cases.

### **§ 45 a** **Multiple choice**

The implementation of multiple-choice procedures is regulated in § 12 a APSO.

### **§ 46** **Master's Thesis**

- (1) According to § 18 APSO, students have to prepare a thesis as part of the Master's examination in the Master's Thesis module.
- (2) The completion of the Master's Thesis module should normally represent the last examination performance. Students may be admitted to the Master's Thesis module early upon application if the goal of the thesis as defined in § 18 Para. 2 APSO can be achieved in consideration of the previous course of study.
- (3) The time from issue to delivery of the thesis may not exceed six months. The thesis shall be deemed to have been taken and not passed if it is not delivered on time without good cause recognized in accordance with § 10 Para. 7 APSO. The thesis may be written in German or English.
- (4) The completion of the Master's Thesis module consists of a scientific paper and a presentation on its content. The presentation does not count towards the grade. 330 credits are awarded for the Master's Thesis module.
- (5) If the Master's Thesis module has not been evaluated with at least "sufficient" (4.0), it can be repeated once with a new topic. The topic of the Master's Thesis must be registered again no later than six weeks after the notification of the result.

### **§ 46 a** **Scientific project planning**

- (1) A student is considered to be registered for the module "Scientific Project Planning" if he/she has achieved at least 70 credits in the Master's program. The examination must have been successfully taken before the start of the Master's Thesis.
- (2) The module "Scientific Project Planning" has to be carried out by the prospective topic writer of the Master's Thesis (according to § 46 Abs. 1) and another university lecturer of the Technical University of Munich, who is not from the same working group. 2Expert examiners are defined according to § 46 para. 1.
- (3) The module "Scientific Project Planning" can be held in German or English.
- (4) The duration of the examination for the module "Scientific Project Planning" is usually 60 minutes. The student has approx. 20 minutes to present the anticipated topic and project plan of his/her thesis. This is followed by a disputation which, starting from the anticipated topic of the Master's thesis, covers the main field of study to which the Master's thesis belongs and related fields of knowledge.
- (5) The module "Scientific Project Planning" is successfully passed if it is assessed with at least "sufficient" (4.0). If the module "Scientific Project Planning" has not been passed, § 24 para. 7 APSO shall apply accordingly.



- (6) 5 credits are awarded for the module "Scientific Project Planning".

#### **§ 47**

#### **Passing and evaluation of the Master's examination**

- (1) The master's examination is passed if all examinations to be taken within the framework of the master's examination according to § 43 Para. 1 have been passed and a point account balance of at least 120 credits has been achieved.
- (2) The module grade is calculated according to § 17 APSO. The overall grade of the Master's examination is calculated as the weighted grade average of the modules according to § 43 paragraph 2 and the module Master's Thesis as well as the module "Scientific Project Planning". The grade weights of the individual modules correspond to the assigned credits. The overall grade is expressed by the predicate according to § 17 APSO.

#### **§ 48**

#### **Certificate, Diploma Supplement**

If the Master's examination has been passed, a certificate, a diploma and a diploma supplement with a transcript of records shall be issued in accordance with § 25 para. 1 and § 26 APSO.

#### **§ 49**

#### **Entry into force**

- (1) These statutes shall come into force with effect from April 1, 2021. It applies to all students who begin their studies at the Technical University of Munich from the winter semester 2021/2022.
- (2) The subject examination regulations for the master's degree program in biology at the Technical University of Munich dated March 6, 2009, as last amended by No. 3 of the collective amendment statutes for the appointment of commission members in the aptitude procedure for master's degree programs at the TUM School of Life Sciences at the Technical University of Munich dated February 1, 2021, shall expire at the same time. Students who have already commenced their studies at the Technische Universität before the winter semester 2021/2022 shall complete their studies in accordance with the statutes pursuant to sentence 1.

**APPENDIX 1: Examination modules**

No.	Module name	Teaching form SWS	ZV	Sem.	SWS	Credits	Exam-art	Exam duration	Weight-factor	Under-richts-language
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**Mandatory modules**

WZ2590	Master's Thesis					30	Scientific elaboration			D/E
WZ2591	Scientific project planning					5	Oral examination	60		D/E

**Electives:** In the elective area, elective modules amounting to 82 credits are to be taken from the following (non-exhaustive) list: The examination board continuously updates the catalog of elective modules. Changes will be announced on the School of Life Sciences website at the beginning of the semester at the latest.

No.	Module name	Teaching form SWS	Module-category	Sem.	SWS	Credits	Exam-art	Exam duration	Weight-factor	Under-richts-language
Biochemistry and cell biology										
WZ2441	Research Practical Chemistry of Biopolymers/ Research Project Biopolymer Chemistry	PR	P	WiSe, SoSe	10	10	Laboratory performance			D/E
WZ2138	Kompaktkurs Membranes und Membrane Proteins/ Membranes and Membrane Proteins, Exercises	PR	P	SoSe	3	3	Laboratory performance			D/E
WZ2621	Modelling Biological Macromolecules/ Modelling of Biological Macromolecules INF O : Not 2019W. Info on 2020S i.L.d.y.	V 2 + PR 3	T	WiSe	5	6	Oral examination	30		D/E
WZ2549	Peptide/Protein Synthesis and Peptides in Biomedicine and Protein Misfolding Diseases/ Peptide/Protein Synthesis and Peptides in Biomedicine and Protein Misfolding	V 1 + S 2	T	WiSe, SoSe	3	4	Exam, Presentation	60, 45	1:1	D/E

	Diseases (2019S incl.).									
WZ2016	Proteins: Structure, Function, and Engineering/ Proteins: Structure, Function, and Engineering	V	T	WiSe	2	3	Written exam	90		D
WZ2580	Protein Engineering	V 2 + V 1	T	SoSe	3	5	Written exam	90		D
WZ2439	Proteomics: Analytical Basics and Biomedical Applications/ Proteomics: Analytical Basics and Biomedical Applications	V 2 + Ü 3	T	WiSe, SoSe	5	6	Written exam, laboratory performance	90	3:2	D/E
WZ2388	Techniken der Zellbiologie/ Techniques in Cell Biology	V 2 + S 1	T	SoSe	3	5	Written exam	90		D/E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E
	Genetics									
WZ0630	Analysis of Epigenomic Data / Analysis of Epigenomic Data	PR	P	WiSe, SoSe	10	10	Report			E
WZ2759	Blutbildende Stammzellen als Modell für somatische Stammzellen/ Blood-forming stem cells as a model for somatic stem cells	V 1 + S 0.5	T	WiSe, SoSe	1,5	5	Presentation, term paper	30	2:3	D
WZ1588	Evolutionary Genetics of Plant and Microorganisms/ Evolutionary Genetics of Plant and Microorganisms	V 2 + Ü 2	T	WiSe	4	5	Oral examination	30		E
WZ2620	Applications of Evolutionary Theory in Agriculture: Population Genomics of Crop Pathogens and Disease Management / Applications of Evolutionary Theory in Agriculture	V 2 + Ü 2	T	SoSe	4	5	Oral examination	30		E

WZ0005	Fluorescence Lifetime Imaging - Theory and Function/ Fluorescence Lifetime Imaging - Theory and Function	Ü 1	T	WiSe, SoSe	1	1	Oral examination	45		D/E
WZ2525	Forschungspraktikum Experimental Genetics der Säugetiere/ Research Project Experimental Genetics of Mammals	PR	P	WiSe, SoSe	10	10	Laboratory performance	45	3:1	D/E
WZme2670	Innovative Ansätze in der viralen Gentechnologie/ Innovative approaches in viral gene technology	S 2	T	WiSe, SoSe	2	5	Presentation, term paper	30	2:1	E
WZ2420	Molecular Genetics/ Molecular Genetics	V 2	T	SoSe	2	3	Written exam	60		D/E
WZ2490	Neurogenetics : The Pathoetiology of the Neurological and Psychiatric Diseases	V 4	T	WiSe + SoSe °	4	6	Written exam	60		D/E
WZ2581	Plant Biotechnology	V 2 + S 1	T	WiSe, SoSe	3	5	Written exam	90		E
WZ1185	Plant Epigenetics and Epigenomics/ Plant Epigenetics and Epigenomics	V 2 + PR 1 + S 1	T	WiSe, SoSe	4	5	Presen- tation	30		E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E
WZ2763	Transcriptional and Posttranscriptional Regulation in Eukaryotes/ Transcriptional and Posttranscriptional Regulation in Eukaryotes	V 3 + S 2	T	WiSe	5	5	Written exam, presentation	60, 30	3:2	E

Medical Biology											
WZ2759	Blutbildende Stammzellen als Modell für somatische Stammzellen/ Blood-forming stem cells as a model for somatic stem cells	V 1 + S 0,5	T	WiSe, SoSe	1,5	5	Presentation , term paper	30	2:3	D	
WZ2656 (2)	Entwicklung von vaccstoffen gegen infectious diseases/ Development of vaccines against infectious diseases	S 2	T	WiSe, SoSe	2	5	Presentation , Term paper	40	1:1	D	
WZ2697	Forschungspraktikum Analyse von Hochdurchsatz-Daten in der biomedical Forschung/ Research Project Analysis of High-Throuput Data in Biomedical Research	PR	P	WiSe, SoSe	10	10	Laboratory performance			D/E	
WZme2 677	Forschungspraktikum blutbildender Stammzellen/ Research Project blood-forming stem cells	PR	P	WiSe, SoSe	10	10	Laboratory performance	30	7:3	D/E	
WZ2411	Immunologie 2/ Immunology 2	V 2 + PR 9	P	WiSe	11	10	Written exam, laboratory performance	60, 10	1:2	D/E	
WZme2 670	Innovative Ansätze in der viralen Gentechnologie/ Innovative approaches in viral gene technology	S 2	T	WiSe, SoSe	2	5	Presentation , Term paper	30	2:1	E	
WZ2649	Molekulare Onkologie 2/ Molecular Oncology	S 2	T	WiSe, SoSe	2	5	Exercise performance			D	
WZ2648	Molekulare Onkologie/ Molecular Oncology	V 2	T	WiSe, SoSe	2	5	Written exam	90		D/E	
WZ2453	Molecular Pathology and organ-specific Carcinogenesis/ Molecular Pathology and organ-specific Carcinogenesis.	V 4	T	WiSe, SoSe	4	6	Written exam	120		D/E	

WZ2427	Molecular Cell Biology of Tumorigenesis	V 4 + Ü 1	T	WiSe + SoSe °	5	6	Written exam, presentation	60, 20	2:1	D/E
WZ2413	Pharmakologie und Toxikologie für Studenten der Biowissenschaften/ Pharmacology and Toxicology for Students of Life Sciences	V 2 + S 2	T	SoSe	4	5	Written exam	75		D
WZme2 672	Research Project in Radiation Biology/ Research Project in Radiation Biology	PR	P	WiSe, SoSe	10	10	Laboratory performance			E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E
	Microbiology									
WZ2626	Angewandte Mikrobiologie/ Applied Microbiology	V 2 + V 1	T	SoSe	3	5	Written exam	60		D
WZ2451	Einführung in die Mykopathologie/ Introduction to Mycopathology	V 2	T	WiSe	2	3	Written exam	60		D
WZ2487	Entwicklung von Starter Cultures/ Development of Starter Cultures	V 2 + Ü 3	T	WiSe + SoSe °	5	6	Written or oral exam	120, 20		D/E
WZ2375	Evolution of Pathogens/ Evolution of Pathogens	V 2 + Ü 1	T	SoSe	3	5	Written exam	60		D
WZ2377	Research Internship Molecular Food Hygiene/ Research Project on Food Hygiene	PR	P	WiSe, SoSe	10	10	Laboratory performance			D/E
WZ2488	Food Biotechnology	V 2 + S 3	T	SoSe	5	6	Written or oral exam	120, 20		D
WZ2372	Microorganisms as pathogens/ Pathogenic Microorganisms	V 2 + V 1	T	WiSe	3	5	Written exam	90		D
WZ2691	Mikroorganismen in Lebensmitteln/ Microorganisms in Food	V 2 + V 1	T	SoSe	3	5	Written exam	60		D

WZ2556	Moderne Methoden der mikrobiellen Ökologie/ Modern Methods in Microbial Ecology	V 2 + S 3 + PR 5	T	WiSe + SoSe °	10	10	Written exam, laboratory performance	60	1:1	D/E
WZ2452	Moderne Methoden mikrobiologischer Diagnostik/ Modern Methods in Microbiological Diagnostics	V 2	T	SoSe	2	3	Written exam	60		D
WZ1174	Molekulare Biologie biotechnologisch relevanter Pilze/ Molecular Biology of Biotechnological Relevant Fungi	V 2 + S/Ü 2	T	WiSe	4	5	Written exam	60		E
WZ1818	Fungal Genetics Exercise/ Fungal Genetics Exercise	PR	P	WiSe, SoSe	5	5	Laboratory performance			D/E
WZ2539	Proseminar Mikrobielle Wirkstoffe/ Seminar on Microbial Effectors	S 2	T	WiSe	2	2	Oral examination	30		D/E
WZ2625	Special Microbiology (*) / Advanced Microbiology	V 4	T	WiSe	4	6	Written exam	60		D/E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E
	Ecology									
WZ1647	Remediation of Contaminated Sites	V 2 + Ü 2	T	SoSe	4	5	Written exam	120		D
WZ1172	Applied River Restoration	V 2 + Ü 3	T	SoSe	4	5	Written exam	90		D
WZ6415	Angewandte Limnologie/ Applied Limnology	V 1 + Ü 3	P	SoSe	4	5	Oral examination	30		D/E
WZ2047	Soil Protection	V 2 + S 2	T	WiSe	4	5	Oral examination presentation	20, 15	2:1	D/E
WZ2633	Fokus Ökologie (*) / Focus Ecology (*)	S 2 + Ü 4	T	WiSe + SoSe °	6	6	Written exam	60		D/E

WZ1171	Klimabedingte Herausforderungen für Abwasserbiologie und Ingenieurökologie/ Climate Change Related Challenges in Sewage Treatment Biology and Engineering Ecology	V 2 + Ex 1 + S 1	T	SoSe	4	4	Written exam	60		D
WZ2469	Limnologie der Fließgewässer/ Limnology of Running Waters	V 1 + Ü 3	P	SoSe	4	5	Oral examination	30		D
WZ6340	Advances Ecological Field Course : Habitat Dynamics, Vegetation and Arthropod Fauna of Alpine Rivers/ Advances Ecological Field Course: : Habitat Dynamics, Vegetation and Arthropods of Alpine Rivers.	Ü 6	P	SoSe	6	5	Report			D
WZ4027	Ökophysiologie der Pflanzen: Forschung an der Schnittstelle zwischen Pflanze und Umwelt/ Plant-ecophysiology: research at the plant-environment interface.	S 2 + PR 3	P	SoSe	5	5	Laboratory performance			D/E
WZ6300	Ökosystem Management und angewandte Renaturierungsökologie/ Ecosystem Management and Applied Restoration Ecology	S 4	T	WiSe	4	5	Presentation, report	20	3:7	D/E
WZ4020	Pflanzenfunktionen im Klimawandel/ Plant Functioning under Climate Change	S 1.25 + V 3.75	T	WiSe	5	5	Oral examination	20		D/E
WZ2433	Populations Biology and Nature Conservation/ Population Biology and Nature Conservation	V 2 + S 2	T	WiSe	4	5	Oral examination	20		D/E



WZ2573	Special Issues in Conservation/Advanced Conservation Science.	V 2 + S 1	T	WiSe	3	5	Written exam	60		D
WZ1888	Special Topics in Philosophy of Nature and the Landscape: Aesthetic Theory, Environmental Ethics, Philosophy of Ecology/Philosophy of Nature and the Landscape - Advanced Level: Environmental Aesthetic, Environmental Ethic, Philosophy of Ecology.	S 2 + PA 1	T	SoSe	3	5	Project work			D
MA9613	Statistical Computing and Data Analysis/Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E
WZ6122	Übungen zur Vegetation der Erde/Vegetation of the Earth	Ü 5	P	WiSe, SoSe	5	5	Report			D
WZ6121	Vegetation der Erde/Vegetation of the Earth	V 5	T	WiSe	5	5	Oral examination	20		D
WZ2572	Experimental Design (Advanced Course) / Experimental Design (Advanced Course)	V/S 2 + Ü 4	P	WiSe, SoSe	6	5	Written exam	180		D/E
Plant Sciences										
WZ2384	Research Practical 2 Molekularbiologie der Pflanzen/ Research Project 2 on Plant Molecular Biology	PR	P	WiSe	10	10	Laboratory performance			D/E
WZ2594	Forschungspraktikum Sekundäre Pflanzeninhaltsstoffe / Research Project Secondary Plant Metabolites	PR	P	WiSe, SoSe	16	10	Laboratory performance			E
WZ1075	Herbicides und Plant Physiology/ Herbicides and Plant Physiology	V 2 + Ü 2	T	SoSe	4	5	Written exam	90		D/E

WZ1035	Host-Parasite Interaction/ Host-Parasite Interaction	V 1 + S 2 + Ü 2	T	WiSe	5	5	Written exam	90		E
WZ1589	Marker-Assisted Selection/ Marker-Assisted Selection	V 2 + Ü 2	T	WiSe	4	5	Oral examination	30		E
WZ2385	Molekulare Pflanzenphysiologie - Wasserhaushalt und Stoffwechsel / Molecular Plant Physiology - Plant Water Relations and Metabolism	V 2 + S 2	T	SoSe	4	5	Written exam, presentation	60, 45	1:1	D/E
WZ2371	Molekulare Pflanzenphysiologie - abiotische Stressfaktoren / Molecular Plant Physiology - Responses to Abiotic Stress/ Molecular Plant Physiology 2	V 2 + S 2	T	WiSe	4	5	Written exam, presentation	60, 45	1:2	
WZ2581	Plant Biotechnology	V 2 + S 1	T	WiSe, SoSe	3	5	Written exam	90		E
WZ2381	Pflanzensystembiologie/ Plant Systems Biology (Lecture and Seminar)	V 2 + S 2	T	WiSe, SoSe	4	5	Report, Presentation	30	7:3	D/E
WZ1584	Quantitative Genetics and Selection/ Quantitative Genetics and Selection	V 2 + Ü 2	T	WiSe	4	5	Written exam	90		E
WZ2689	Redox-Biochemistry of Plants/ Plant Redox-Biochemistry	V 1 + PR 2	T	WiSe, SoSe	3	3	Laboratory performance			D
WZ1663	Secondary Plant Metabolites and Human Health ( Engl.: Bioaktive Pflanzeninhaltsstoffe ) / Secondary Plant Metabolites and Human Health	V 5	T	WiSe, SoSe	4	5	Written exam, laboratory performance	180	9:1	E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E

Animal Science										
WZ2460	Aktuelle Themen der Neurobiologie/ Current Topics in Neurobiology	S 4	T	WiSe + SoSe °	4	5	Pre- sen- ta- tion	30		E
WZ3097	Basics in Chronobiology/ Basics in Chronobiology	V 2 + S 2	T	WiSe + SoSe°	4	5	Written exam, presentation	90, 45	7:3	E
WZ4218	Apiology	S 3 + PR/Ex	T	SoSe	2	3	Written exam, project work	60	7:3	D
WZ2664	Animal Biotechnology 1/ Animal Biotechnology 1	V 2 + PR 2	T	WiSe	4	5	Written exam, Oral exam	90, 20	3:2	D/E
WZ2753	Block practical course: Neurobiology of Intact Animals/ Course block: Neurobiology of Intact Animals	PR	P	WiSe, SoSe	5	5	Laboratory performance			D/E
WZ2759	Blutbildende Stammzellen als Modell für somatische Stammzellen/ Blood-forming stem cells as a model for somatic stem cells	V 1 + S 0,5	T	WiSe, SoSe	1,5	5	Pre- sen- ta- tion , term paper	30	2:3	D
WZ2693	Cognitive Neuroscience/ Cognitive Neuroscience.	V 2	T	SoSe	2	3	Written exam	60		E
WZ2404	Einführung in die Kultivierung von Säugetierzellen/ Introduction to Mammalian Cell Culture	S 2 + PR 3	P	WiSe, SoSe	5	5	Written exam, presentation	150, 40	1:1	D/E
WZ2687	Forschungspraktikum Neuronale Netzwerke und Verhalten/ Research project Mapping neural circuits underpinning behavior	PR	P	WiSe, SoSe	10	10	Laboratory performance			D/E
WZ2457	Neurobiologie/ Neurobiology	V 2	T	WiSe	2	3	Written exam	90		D
WZ2405	Phylogeny and Zoology of Vertebrates/ Phylogeny and Zoology of Vertebrates	V 2 + S 2	T	WiSe	4	5	Written exam	90		D

WZ0033	Physiologie des Wachstums, der Reproduktion und der Laktation/ Physiology of Growth, Reproduction and Lactation	V 2 + VI 2	T	WiSe	4	5	Oral examination	30		D/E
WZ2682	Sensory and Behavioral Neurogenetics/ Neurogenetics of Neural Processing and Behavior.	V 3 + Ü 2	T	SoSe	5	5	Written exam	90		E
MA9613	Statistical Computing and Data Analysis/ Statistical Computing and Data Analysis	V 2 + Ü 1	T	WiSe, SoSe	3	5	Written exam	60		E

Explanations:

Sem. = semester; SWS = semester hours per week; V = lecture; Ü = exercise; VI = lecture with integrated exercise; PR = practical course, S = seminar;

ZV = admission requirement (see § 43 para. 1)

K = written exam; LL = lab performance; LP = learning portfolio, B = report; M = oral exam; W = scientific paper; Pr = presentation; PA = project work, T = theory oriented; P = practice-oriented; WiSe = winter semester; SoSe = summer semester

In the column Examination Duration, the examination duration in minutes is listed for written and oral examinations.

° These modules with the associated module sub-examinations extend over at least two semesters.

\* These modules are mandatory to take if the qualification focus is chosen.

## **ANNEX 2: Suitability procedure**

### **Qualification procedure for the Master's degree in Biology at the Technical University of Munich**

#### **1. purpose of the procedure**

In addition to the requirements of § 36 para. 1 nos. 1 (and 2), qualification for the master's degree program in biology requires proof of suitability in accordance with § 36 para. 1 no. 3 in accordance with the following regulations. The special qualifications and abilities of the applicants should correspond to the professional field of biology. Individual suitability parameters are:

- 1.1 The ability to work in a scientific or basic and method-oriented manner,
- 1.2 Existing expertise in the field of biological sciences from undergraduate studies,
- 1.3 Ability to solve complex and difficult problems,
- 1.4 Ability to link scientific knowledge with practical application.
- 1.5 Analytical Observational Skills.

#### **2. Suitability testing procedure**

- 2.1 The eligibility review process is conducted semi-annually by the TUM School of Life Sciences.
- 2.2 Applications for admission to the procedure together with the documents according to 2.3.1 up to and including 2.3.5 as well as § 36 para. 1 no. 2 for the summer semester or winter semester must be submitted to the Technische Universität München in the online application procedure by January 15 or May 31 (cut-off deadline).
- 2.3 The application must be accompanied by:
  - 2.3.1 proof of study and examination achievements in the first degree program (transcript of records/performance record) with modules amounting to at least 130 credits; the transcript of records must have been issued by the responsible examination authority or the responsible study secretariat,
  - 2.3.2 a curricular analysis derived from the Transcript of Records is to be completed as part of the online application process; especially for modules that cannot be clearly assigned to the two subject groups (see 5.1.1 a)) based on their title, it is recommended to upload the corresponding contents (e.g. module descriptions).
  - 2.3.3 a complete curriculum vitae in tabular form,

- 2.3.4 a written statement (in German or English) of no more than one to two DIN-A4 pages explaining the reasons for the choice of the Biology program at the Technical University of Munich, in which the applicants explain the special motivation on the basis of which they consider themselves to be particularly suitable for the Master's program in Biology at the Technical University of Munich; the special willingness to perform is to be substantiated, for example, by explanations of professional training specific to the course of study, internships, stays abroad or further education in a subject-related manner during the Bachelor's course of study as well as outstanding professional achievements (awards, prizes or scientific publications) that go beyond attendance times and compulsory courses; this is to be substantiated, if applicable, by attachments. to be substantiated by attachments, if applicable,
- 2.3.5 an assurance that the justification for the choice of the course of study was prepared independently and without outside help and that the thoughts taken from outside sources are marked as such.

### **3. commission on the suitability procedure**

- 3.1 The suitability procedure is carried out by a commission, which usually consists of the study program director responsible for the master's program in biology, at least two university professors and at least one research assistant. At least half of the committee members must be university professors. A student representative shall participate in the commission in an advisory capacity.
- 3.2 The appointment of the members shall be made by the Dean in consultation with the Associate Dean for Academic Affairs. At least one university lecturer is appointed as a deputy member of the commission. The Study Program Director usually chairs the commission. Article 41 of the BayHSchG, as amended from time to time, shall apply to the course of business.
- 3.3 If the commission acts in accordance with these statutes, the revocable assignment of certain tasks to individual commission members is permissible. If, pursuant to sentence 1, only one commission member is active in the performance of certain tasks, this member must be a university lecturer. If, pursuant to sentence 1, two or more members of the commission are active in the performance of certain tasks, at least half of them must be university professors. The commission shall ensure an appropriate allocation of responsibilities. If there is room for maneuver in the evaluation of an assessment criterion of the suitability procedure and at least two commission members are active in the evaluation of this criterion, the commission members shall evaluate independently according to the weighting specified, unless otherwise regulated. The score shall be the arithmetic mean of the individual assessments, rounded up to whole numbers of points.

### **4. admission to the qualification procedure**

- 4.1 Admission to the qualification procedure requires that the documents specified in No. 2.2 are submitted in due form and time and in full.
- 4.2 1Whoever fulfills the necessary requirements according to No. 4.1 will be examined in the suitability procedure according to No. 5. 2If this is not the case, a rejection notice will be issued stating the reasons and stating the right of appeal.

### **5. Implementation of the suitability procedure**

#### **5.1 First stage of the suitability procedure**

- 5.1.1 On the basis of the written application documents required according to No. 2.3, the commission shall assess whether the applicants have the suitability for the study program according to No. 1 (first stage of the implementation of the suitability procedure). The commission shall assess the submitted documents on a scale of 0 to 100 points, whereby 0 is the worst and 100 the best result to be achieved:

The following evaluation criteria are included:

a) **Professional qualification**

The curricular analysis is not carried out by schematic comparison of the modules, but on the basis of competencies. It is based on the elementary subject knowledge groups of the Bachelor's degree program in Biology or Life Sciences Biology at the Technical University of Munich. Existing subject knowledge from the first degree in biology or related courses of study to the extent of at least 115 credits is required, which achieves a maximum fit through the following CP objectives:

Subject group	Credits TUM
Natural science basics (without life sciences)	30
Biosciences (lectures, seminars, exercises, practical courses)	85

If it has been determined that there are no significant differences to the corresponding courses of study at TUM, applicants or candidates will receive a maximum of 45 points. The score is calculated by dividing the total number of credits of the modules from the applicant's first degree program that fall under the two subject knowledge groups by the quotient of **115/45**, where 45 is the highest possible score to be achieved. If this value is not an integer, it will be rounded up to the next highest number in favor of the applicant.

b) **Grade**

The modules taken into account for the professional qualification according to 5.1.1. by the Qualification Committee are used to form a credit-weighted average grade as follows:

$$\frac{\sum (\text{Note} * \text{Credits})}{\sum \text{Credits}}$$

If the number of verified credits exceeds the minimum required in the respective subject group, the last module required to achieve this number of credits shall be added. In determining the grade, one digit after the decimal point is taken into account; all other digits are deleted without rounding. For each tenth mark that the average calculated over these examination performances (from subject knowledge groups) is better than 4.0, the applicant receives one and a third points. The maximum number of points is 40. Negative points are not awarded. In the case of foreign degrees, the grade converted in accordance with the specifications of the APSO of the TU Munich and rounded to one decimal place is used.

### c) **Justification letter**

The written statement of reasons is evaluated independently by two commission members on a scale of 0 to 15 points. The content of the letter of justification is evaluated and points weighted according to the following criteria:

- (1) special willingness to perform for the bioscientific studies at TUM, this can be justified, for example, by a structured explanation of the connections between personal interests and the contents of the study program (maximum 3 points),
- (2) plausible presentation of special suitability for the master's program by means of arguments and meaningful examples (maximum 3 points),
- (3) Interest in life science knowledge and derivative applications (maximum 3 points),
- (4) professional training specific to the study program, such as a completed BTA or MTA training, or outstanding professional achievements (awards, prizes, scientific publications) of the applicant that indicate a special research and learning performance (maximum 3 points).
- (5) Examples from previous study of own improvements, observations, initiatives (Analytical Observation) (maximum 3 points).

The score is the arithmetic mean of the individual scores, rounded up to whole numbers of points.

5.1.2 The total score for the first stage is the sum of the individual scores. Digits that do not disappear are to be rounded up.

5.1.3 Whoever has achieved at least 75 points has passed the qualification procedure. In cases where it has been determined that the 115 subject-related CP have not been achieved, participation in stage 2 is not possible. If a maximum of 30 of the subject-related credits required under 5.1.1 a) are missing, the commission for the aptitude test requires modules from the bachelor's degree program in life sciences biology to be taken to the extent of the missing 30, so that a total of 115 credits are achieved. These requirements must be successfully completed in the first year of study. Module requirements that have not been passed may only be repeated once within this period on the next examination date. The examination board may make admission to individual module examinations dependent on passing the requirements.

5.1.4 Whoever has achieved less than 65 points has not passed the suitability procedure.

### 5.2 Second stage of the suitability procedure

5.2.1 The remaining applicants shall be invited to an aptitude interview. In the second stage of the aptitude test, the qualification acquired in the first degree program and the result of the aptitude test are evaluated, whereby the qualification acquired in the first degree program is to be given at least equal consideration.

The date for the aptitude interview shall be announced at least one week in advance. Time slots for any suitability interviews to be held must be set before the application deadline. The date set for the interview must be observed by the applicants. If the request is justified and approved by the Commission, an aptitude interview by video conference is possible. The applicant bears the risk in the event of any technical problems, unless the Technische Universität München is responsible for them.

Whoever is prevented from attending the aptitude interview for reasons beyond his or her control may, upon justified application, be given a subsequent appointment no later than two weeks before the start of lectures.

5.2.2 The aptitude interview is to be conducted individually for the applicants. The interview shall last a minimum of 20 minutes and a maximum of 30 minutes per applicant and shall be held in German or English. The content of the interview shall cover the following main topics:



1. Interest in the master's degree program in biology (15 points). Criteria may include, for example, critical reflection on one's own talents and competencies and how they relate to the goals and content of the intended master's degree program,
2. Ability to solve subject-related problems (25 points); this can be demonstrated, for example, by the effortless understanding of subject-specific tasks and the proposal of solution strategies within the framework of the competencies acquired so far,
3. Interest in application problems (20 points), measurable, for example, by the ability to name problems that can be derived from theoretical knowledge and practical experience and to be able to point out and critically question possible solutions for practical application,
4. personal impression (25 points), this results, for example, from the ability to present statements convincingly through arguments and meaningful examples and to respond appropriately to questions posed.

The subject matter can also be the documents submitted according to 2.3. Subject-specific knowledge that is only to be taught in the master's degree program in biology is not decisive. With the consent of the applicants, a member of the student group may be admitted to the audience.

- 5.2.3 The aptitude interview is conducted by two members of the commission. The commission members independently evaluate each of the four focal points, with the four focal points weighted as indicated above. Each of the members shall record the result of the aptitude interview on the point scale from 0 to 85, where 0 is the worst result to be achieved and 85 is the best result to be achieved. The score is the arithmetic mean of the individual scores. Non-vanishing decimal places shall be rounded up.
- 5.2.4 The qualifications achieved within the framework of the first aptitude stage will be assessed on an equal footing with the selection interview with a maximum of 85 points. This score results from the sum of the scores determined within the framework of the first stage under No. 5.1.1 a (professional qualification) and 5.1.1 b (grade).
- 5.2.5 The total score for the second stage is the arithmetic mean of the individual scores from No. 5.2.2 and the score from 5.2.4. Non-vanishing decimal places are to be rounded up. Whoever has achieved 65 or more points has passed the aptitude test. Applicants with an overall score of less than 65 points have not passed the suitability procedure.

### 5.3 Announcement of the result

The established result of the suitability procedure shall be announced by means of a notice, if necessary taking into account the conditions already specified in stage 1 in accordance with No. 5.1.3. If there is no room for maneuver in the assessment of the individual criteria or in the determination of the overall results of the first and second stages, the Commission need not pass a resolution. Rejection notices shall state the reasons and be accompanied by instructions on how to appeal.

5.4 The determined eligibility applies to all subsequent applications for this degree program.

## 6. Documentation

The course of the suitability procedure must be documented; in particular, the names of the commission members involved, the assessment of the first and second stages and the overall result must be evident from this. A transcript of the aptitude interview shall be prepared showing the date, duration and place of the assessment, the names of the commission members involved, the names of the applicants and the main topics of the interview.

## 7. repetition

Those who have not passed the qualifying procedure may re-apply for the qualifying procedure once.

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Issued on the basis of the resolution of the Academic Senate of the Technical University of Munich of March 24, 2021, as well as the emergency decision of the President of the Technical University of Munich of April 20, 2021, and the approval by the President of the Technical University of Munich of April 22, 2021.

Munich, April 22, 2021

Munich University of Technology

Thomas F. Hofmann  
President

These bylaws were filed at the college on April 22, 2021; notice of the filing was posted at the college on April 22, 2021. The date of announcement is therefore April 22, 2021.