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**Academic and Examination Regulations
for the Master's Degree Program Agricultural Biosciences
at the Technical University of Munich**

Dated 11 February 2020

Engrossed version

as amended by the Fifth Amending Statute of 20 December 2023

In accordance with Art. 13(1) Sentence 2 in conjunction with Art. 58(1) Sentence 1, Art. 61(2) Sentence 1 and Art. 43(5) of the Bavarian Higher Education Act [*Bayerisches Hochschulgesetz (BayHSchG)*] the Technical University of Munich issues the following Regulations:

Table of Contents:

§ 34	Applicability, Academic Titles
§ 35	Commencement of Study, Standard Duration of Study, ECTS
§ 36	Eligibility Requirements
§ 37	Modular Structure, Module Examination, Courses, Areas of Specialization, Language of Instruction
§ 38	Examination Deadlines, Academic Progress Checks, Failure to Meet Deadlines
§ 39	Examination Board
§ 40	Recognition of Periods of Study, Coursework and Examination Results
§ 41	Continuous Assessment Procedure, Types of Assessment
§ 42	Registration for and Admission to the Master's Examination
§ 43	Scope of the Master's Examination
§ 44	Repeat Examinations, Failed Examinations
§ 45	Coursework
§ 45 a	Multiple Choice Test
§ 46	Master's Thesis
§ 46 a	Master's Colloquium
§ 47	Passing and Assessment of the Master's Examination
§ 48	Degree Certificate, Diploma, Diploma Supplement
§ 49	Entry into Force
Appendix 1:	Examination Modules
Appendix 2 a:	Aptitude Assessment for Applicants with Higher Education Entrance Qualifications within the area of applicability of the Lisbon Convention
Appendix 2 b:	Aptitude Assessment for Applicants with Higher Education Entrance Qualifications outside the area of applicability of the Lisbon Convention
Appendix 3:	TUM Test Agricultural Biosciences

§ 34

Applicability, Academic Titles

- (1) ¹The Academic and Examination Regulations for the Master's Degree Program Agricultural Biosciences (FPSO) complement the General Academic and Examination Regulations for Bachelor's and Master's programs at the Technical University of Munich (APSO) dated 18 March 2011 as amended. ²The APSO has precedence.
- (2) ¹Upon successful completion of the Master's examination the degree "Master of Science" ("M.Sc.") is awarded. ²The academic title may also be used with the name of the university "(TUM)".

§ 35

Commencement of Study, Standard Duration of Study, ECTS

- (1) The Master's Degree Program Agricultural Biosciences at the Technical University of Munich commences, as a rule, in the winter semester.
- (2) ¹The number of classes in required and elective subjects needed to obtain the master's degree is 90 credits (70-75 weekly hours per semester) spread over three semesters. ²Students will have a maximum of six months to complete their master's thesis in accordance with § 46, as well as the Master's Colloquium according to § 46a (30 credits in total). ³The number of coursework units and examinations in required and elective subjects to be completed in the Master's Degree Program Agricultural Biosciences according to Appendix 1 is a minimum of 120 credits. ⁴The standard duration of study for the master's program is a total of four semesters.

§ 36

Eligibility Requirements

- (1) Eligibility for the Master's Degree Program Agricultural Biosciences is demonstrated by:
 1. a qualified bachelor's degree obtained after a program of at least six semesters from a domestic or foreign institution of higher education, or at least an equivalent degree in a Life Sciences degree program, i.e. the degree programs Agricultural and Horticultural Sciences, Life Sciences Biology and Molecular Biotechnology, or comparable degree programs,
 2. adequate knowledge of the English language; students whose native language or language of instruction is not English must demonstrate proficiency through an acknowledged language test such as the Test of English as a Foreign Language (TOEFL) (with a minimum of 88 points), the International English Language Testing System (IELTS) (with a minimum of 6.5 points), or the Cambridge Main Suite of English Examinations; if, in the undergraduate program, 30 credits were obtained for examinations administered in English-language examination modules or if the final thesis was written in English (at least 12 credits), adequate proficiency in the English language is deemed proven.
 3. applicants who have acquired their undergraduate degree or equivalent degree within the meaning of Art. 90(1) Sentence 1 Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] within the area of applicability of the Convention on the Recognition of Qualifications concerning Higher Education in the European Region (Lisbon Convention) by passing the aptitude test according to Appendix 2 a,
 4. applicants who have acquired their undergraduate degree or equivalent degree within the meaning of Art. 90(1) Sentence 1 Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] outside the area of applicability of the Lisbon Convention by passing the aptitude test according to Appendix 2 b.

- (2) A degree is considered to be qualified within the meaning of (1)¹ if there are no significant differences with regard to the competencies (learning outcomes) acquired during the first professional qualifying degree program in the fundamental subject groups listed in Appendix 2 a No. 5.1.1 a).
- (3) As an exception to § 36(2), for applicants who have acquired their undergraduate degree or equivalent degree within the meaning of Art. 90(1) Sentence 1 Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] outside the area of applicability of the Lisbon Convention, the result of the TUM Test Agricultural Biosciences according to Appendix 3 will be used to determine aptitude according to (2); those who have achieved at least 41 points in the test will be assessed in the aptitude process according to Appendix 2b.
- (4) ¹As an exception to (1)¹, students enrolled in a bachelor's program specified in (1)¹ may be admitted to the master's program in justified cases. ²An application to the master's program by students enrolled in a bachelor's program may only be submitted if it can be verified that, in the case of a six-semester bachelor's program, module examinations amounting to at least 120 credits; in the case of a seven-semester bachelor's program, module examinations amounting to at least 150 credits; and, in the case of an eight-semester bachelor's program, module examinations amounting to at least 180 credits have been completed at the time of submission of the application. ³Verification of the awarding of the bachelor's degree must be provided within one year of commencement of the master's program.

§ 37

Modular Structure, Module Examination, Courses, Areas of Specialization, Language of Instruction

- (1) ¹General provisions concerning modules and courses are set out in §§ 6 and 8 of the APSO. ²For any changes to the stipulated module provisions, § 12(8) of the APSO applies.
- (2) The curriculum listing the required and elective modules is included in Appendix 1.
- (3) ¹The language of instruction in the Master's Degree Program Agricultural Biosciences is English. ²Students who have not verified their knowledge of German in the application process will be conditionally admitted with the stipulation that they complete at least one module in which they acquire integrative knowledge of German by the end of the second semester of enrollment in the degree program. ³The offer will be announced by the Examination Board accordingly. ⁴Optional credits completed in extracurricular courses, e.g. German courses offered by the Language Center, will also be recognized.

§ 38

Examination Deadlines, Academic Progress Checks, Failure to Meet Deadlines

- (1) Examination deadlines, academic progress checks, and failure to meet deadlines are governed by § 10 of the APSO.
- (2) ¹At least one of the module examinations from the Introductory Modules listed in Appendix 1 must be successfully completed by the end of the second semester. ²In the event of failure to comply with this deadline § 10(5) of the APSO applies.

§ 39

Examination Board

In accordance with § 29 of the APSO, the board responsible for all decisions concerning examination matters is the Examination Board of the Master's Degree Program Agricultural Biosciences at the Technical University of Munich.

§ 40

Recognition of Periods of Study, Coursework and Examination Results

The recognition of periods of study, coursework, and examination results is governed by § 16 of the APSO.

§ 41

Continuous Assessment Procedure, Types of Assessment

- (1) In addition to written and oral examinations, types of assessment in accordance with § 12 and § 13 of the APSO may include (but are not limited to) laboratory assignments, exercises (tests, where applicable), reports, project work, presentations, learning portfolios, research papers, or parcours examinations.
- a) ¹A **written examination** is a supervised examination, in which students are expected to demonstrate, within a limited amount of time and using predefined methods and resources, their ability to identify problems, find solution strategies and, if required, implement them. ²The duration of written examinations is regulated in § 12(7) of the APSO.
- b) ¹Depending on the discipline, **laboratory assignments** may include experiments, measurements, field work, field exercises, etc., with the goal of students conducting such work, evaluating results, and gaining knowledge. ²These may consist of, for example, process descriptions and the underlying theoretical principles including studying the relevant literature; preparation and practical implementation; calculations, if required, and documentation, evaluation, and interpretation of the results in the context of the knowledge to be gained. ³Laboratory assignments may be complemented by presentations designed to demonstrate a student's communication competency in presenting scholarly work to an audience. ⁴Details of each laboratory assignment and the competencies to be assessed in each examination are set out in the module descriptions.
- c) ¹**Practical credit requirements (tests where applicable)** involve students completing assigned tasks (for example, solving mathematical problems, writing computer programs, preparing models etc.) using theoretical knowledge to solve application-oriented problems. ²Exercises are designed to assess a student's factual and detailed knowledge and its application. ³Practical exercises may be administered in writing, orally, or electronically. ⁴They may be in the form of homework assignments, practice sheets, programming exercises, (e-)tests, tasks assigned within a university internship program, etc. ⁵Details of each practical credit requirement and the related competencies to be examined are set out in the module descriptions.
- d) ¹A **report** is a written record and summary of a learning process for the purpose of presenting the acquired knowledge in a structured way and analyzing the results in the context of a module. ²Students are expected to demonstrate that they have understood all essential aspects and are able to present them in writing. ³Reports may include excursion reports, internship reports, work reports, etc. ⁴The written report may be complemented by a presentation for the purpose of assessing the student's communication competency in presenting scholarly work to an audience.

- e) **Project work** is designed to reach, in several phases (initiation, problem definition, role assignment, idea generation, criteria development, decision, implementation, presentation, written evaluation), the defined objective of a project assignment within a given period of time and using suitable instruments. ²In addition, project work may include a presentation in order to assess a student's communication competency in presenting scholarly work to an audience. ³Details of the respective project work and the competencies to be assessed in each examination are set out in the module descriptions. ⁴Project work may be group work. ⁵The aim is to demonstrate that tasks can successfully be solved as part of a team. ⁶The contribution to be assessed as part of the examination has to be clearly recognizable and assessable for each individual. ⁷This also applies to the individual contribution to the group's result.
- f) **research paper** is a written assignment in which students work independently on solving complex scholarly or scholarly/application-oriented problems, using the scientific methods of the related discipline. ²Students are expected to demonstrate that they are able to solve problems corresponding to the learning results of the module in question in compliance with the guidelines for scholarly work – from analysis and conception to implementation. ³Research papers, differing in their requirement standards, may take the form of a conceptual framework/theory paper, abstract, term paper, seminar paper, etc. ⁴The research paper may be complemented by a presentation and/or a colloquium for the purpose of assessing the student's communication competency in presenting scholarly work to an audience. ⁵Details of each research paper and the related competencies to be examined are set out in the module descriptions.
- g) **presentation** is a systematic and structured oral performance supported by suitable audio-visual equipment (such as projector, slides, posters, videos) for the purpose of demonstrating and summarizing specific issues or results and paring complex problems down to their essential core. ²For the presentation, the student is expected to demonstrate that he or she is capable of preparing a certain topic within a given time frame in such a way as to present or report it in a clear and comprehensible manner to an audience. ³In addition, the student is expected to demonstrate that he or she is able to respond competently to any questions, suggestions, or discussions brought by the audience and relating to his or her subject area. ⁴The presentation may be complemented by a brief written precis. ⁵The presentation can be held either as an individual or group examination. ⁶The contribution to be assessed as part of the examination has to be clearly recognizable and assessable for each individual. ⁷This also applies to the individual contribution to the group's result.
- h) **oral examination** is a timed, graded discussion on relevant topics and specific questions to be answered. ²In oral examinations students are expected to demonstrate that they have achieved the qualification objectives documented in the module descriptions and have understood the central concepts of the subject matter covered by the exam and are able to apply them to specific problems. ³The oral exam can be held either as an individual or group examination. ⁴The duration of the examination is regulated in § 13(2) of the APSO.
- i) **learning portfolio** is a written account of completed work compiled by the student according to predefined criteria that exhibits the student's progress and achievements in defined content areas at a given time. ²Students are required to explain why they chose the work they have and its relevance for their learning progress and for reaching the qualification objectives. ³With the learning portfolio, students are expected to demonstrate that they have taken active responsibility for their learning process and that the qualification objectives documented in the module description have been met. ⁴Depending on the module description, types of independent study assessment in a learning portfolio may include, in particular, application-oriented assignments, web pages, weblogs, bibliographies, analyses, conceptual framework/theory papers, as well as the graphic representation of facts or problems. ⁵Details of the respective learning portfolio and the competencies to be assessed in each examination are set out in the module descriptions.

- j) ¹The **parcours examination** is made up of several components. ²Unlike a module examination component, parcours exam components are administered in sequence and completed in a specific time frame and location. ³Parcours components entail various types of examination, which together evaluate the competency profile of the module as a whole. ⁴Possible types of examination in parcours components may include those listed in a) to i). ⁵The total duration of the parcours examination with all its components is to be indicated in the module catalog, the type of examination and the duration of the individual parcours elements are to be specified in the module description.
- (2) ¹As a rule, module examinations are taken concurrently with the program. ²The type and duration of module examinations is stipulated in Appendix 1. ³For any changes to the stipulated module provisions § 12(8) of the APSO applies. ⁴The assessment of the module examination is governed by § 17 of the APSO. ⁵The grade weights of module examination components correspond to the weighting factors assigned to them in Appendix 1.
- (3) Where Appendix 1 provides that a module examination is either in written or oral form, the examiner will inform the students officially and in appropriate form, no later than the first day of classes, of the type of examination to be held.

§ 42

Registration for and Admission to the Master's Examination

- (1) ¹Students who are enrolled in the Master's Degree Program Agricultural Biosciences are deemed admitted to the module examinations of the master's examination. ²Also considered admitted to individual module examinations are those students who take additional examinations within the scope of the Bachelor's Degree Program Agricultural and Horticultural Sciences at the Technical University of Munich, according to § 46 of the Academic and Examination Regulations for the aforementioned bachelor's degree program at the Technical University of Munich dated 4 June 2019. ³If, according to Appendix 2 No. 5.1.3, students are required to pass fundamentals exams as part of their conditional admission to the master's degree program, the Examination Board must inform the students in writing for which module examinations (in deviation from Sentence 1) proof of passing the specified fundamentals exams is required for admission to the module examination. ⁴Where admission to individual modules requires the passing of modules, this is highlighted in Appendix 1 accordingly.
- (2) ¹Registration requirements for required and elective module examinations are stipulated in § 15(1) of the APSO. ²The registration requirements for repeat examinations for failed required/elective modules are stipulated in § 15(2) of the APSO.

§ 43

Scope of the Master's Examination

- (1) The master's examination consists of:
1. the module examinations in the corresponding modules according to § 43(2),
 2. the master's thesis according to § 46,
 3. the Master's Colloquium according to § 46 a,
 4. and the coursework listed in § 45.

- (2) ¹The module examinations are listed in Appendix 1. ²Students must complete 25 credits in the required modules, and at least 65 credits in elective modules. ³Of these, at least two elective modules amounting to at least 10 credits are required in the area Research Tools and elective modules amounting to at least 5 credits are required in the area Lab Courses. ⁴The selection of modules must comply with § 8(2) of the APSO.

§ 44

Repeat Examinations, Failed Examinations

- (1) The repetition of examinations is governed by § 24 of the APSO.
- (2) Failure of examinations is governed by § 23 of the APSO.

§ 45

Coursework (Pass/Fail Credit Requirements)

¹Instead of the examinations to be taken in elective modules in accordance with § 43(2) Sentence 2, some elective modules may also require the completion of coursework. ²In these cases, the number of credits to be earned in the electives according to § 43(2) Sentence 2 will be reduced accordingly.

§ 45 a

Multiple Choice Tests

The conduct of multiple choice tests is governed by § 12 a of the APSO.

§ 46

Master's Thesis

- (1) ¹As part of the master's examination, each student must write a master's thesis in accordance with § 18 of the APSO. ²The master's thesis may be assigned and supervised by expert examiners (Themensteller) of the TUM School of Life Sciences at the Technical University of Munich. ³The expert examiners are appointed by the Examination Board for the Master's Degree Program Agricultural Biosciences.
- (2) ¹Completion of the Master's Thesis module, as a rule, is the final examination requirement. ²Upon request students may be granted early approval to commence work on the master's thesis if the objective of the thesis in the sense of § 18(2) APSO can be fulfilled under consideration of the progression of studies to date.
- (3) ¹The period between topic assignment and submission of the completed master's thesis must not exceed six months. ²The master's thesis is considered presented and not passed if the student fails to submit it on time without valid reasons as specified in § 10(7) of the APSO.
- (4) ¹The master's thesis must be written in English. ²The completion of the master's thesis consists of a written composition and the Master's Colloquium according to § 46 a. ³30 credits are awarded for the Master's Thesis module.
- (5) ¹If the master's thesis was not graded with at least "sufficient" (4.0), it may be repeated once with a new topic. ²Students must renew their application to prepare the Master's Thesis module within six weeks of receipt of the grade.

§ 46 a **Master's Colloquium**

- (1) ¹In the Master's Thesis module, students are deemed registered for the Master's Colloquium if they have achieved a credit account of at least 75 credits and have successfully completed the master's thesis. ²The examination is to take place no later than two months after the registration date in accordance with Sentence 1.
- (2) The Master's Colloquium is to be carried out by the master's thesis supervisor and a test supervisor.
- (3) The Master's Colloquium is to be held in English.
- (4) ¹As a rule, the duration of examination in the Master's Colloquium is 60 minutes. ²The students have about 25 minutes to present their master's thesis. ³This is followed by an oral defense, which starts from the thesis topic and extends to the wider subject area of the Master's Thesis.

§ 47 **Passing and Assessment of the Master's Examination**

- (1) The master's examination is deemed passed when all examinations required for the master's examination in accordance with § 43(1) have been passed and a plus credits account of at least 120 credits has been achieved.
- (2) ¹The module grade will be determined according to § 17 of the APSO. ²The overall grade for the master's examination will be calculated as the weighted grade average of the modules according to § 43(2) and the master's thesis. ³The grade weights of the individual modules correspond to the credits assigned to each module. ⁴The overall assessment is expressed by the designation according to § 17 of the APSO.

§ 48 **Degree Certificate, Diploma, Diploma Supplement**

¹If the master's examination was passed, a degree certificate, a diploma, and a diploma supplement including a transcript of records are to be issued in compliance with § 25(1) and § 26 of the APSO. ²The date of the diploma is the date on which all examinations and coursework has been completed.

§ 49 **Entry into Force**

¹These regulations will enter into force on 1 April 2020. ²They apply to all students who commence their studies at the Technical University of Munich as of the winter semester 2020/2021.

*) This provision concerns the entry into force of these regulations in the original version from 11 February 2020. The date of entry into force of the amendments is specified in the Amending Statute.

APPENDIX 1: Examination Modules

1. Required Modules

Module Number	Module Name	Type of instruction SWS	ZV	Sem.	SWS	Credits	Type of Examination	Duration of Examination (min) ¹⁾	Weighting Factor	Language of Instruction
WZ0626	Genetics and Genomics	V + S		2. Sem.	2 + 2	5	Written exam + presentation	60	3 : 2	EN
WZ0625	Immunology: Crop and Livestock Health and Disease	V + S		1. Sem.	2 + 2	5	Written exam	90		EN
WZ0623	Physiology	V		2. Sem.	4	5	Written exam	120		EN
WZ0624	Plant and Animal Cell Biology	V + S		1. Sem.	2 + 2	5	Written exam	90		EN
MA9613	Statistical Computing and Data Analysis	V + Ü		1. Sem.	2 + 1	5	Written exam	60		EN
	Total					25				

2. Elective Modules

A minimum of 65 credits must be earned from the following three lists:

Examinations taken at another university as part of a master's degree program (e.g. semester abroad) may be credited and considered as electives in the Master's Examination in accordance with Appendix 1 No. 2 of the Master's Examination. The Examination Board for the Master's Degree Program Agricultural Biosciences decides on the recognition of these modules.

The three lists of elective modules will be regularly updated by the Examination Board. Any changes will be communicated no later than the beginning of the semester on the web pages of the Examination Board.

1. Lab Courses

At least 5 credits are required from the following list.

Module Number	Module Name	Type of instruction SWS	ZV	Sem.	SWS	Credits	Type of Examination	Duration of Examination (min) ¹⁾	Weighting Factor	Language of Instruction
WZ0628	Lab Course Immunology	Ü		WiSe	4	5	Written exam	90		EN
WZ0636	Lab Course Introduction to Mammalian Cell Culture	Ü + S		WiSe, SoSe	3 + 2	5	Written exam	90		EN
WZ0637	Lab Course Methods for Analysis of Next Generation Sequencing	Ü		SoSe	4	5	Report			EN
WZ0627	Lab Course Physiology	Ü		WiSe	4	5	Laboratory assignment (coursework) + Oral examination	30		EN

2. Research Tools

At least 2 modules and at least 10 credits are required from the following list.

Module Number	Module Name	Type of Instruction SWS	ZV	Sem.	SWS	Credits	Type of Examination	Duration of Examination (min) ¹⁾	Weighting Factor	Language of Instruction
WZ0630	Analysis of Epigenomic Data	FP		WiSe, SoSe	10	10	Report			EN
WZ6428	Analytical Methods in Horticulture, Agriculture and Plant Biotechnology	Ü		WiSe	4	6	Laboratory assignment			EN
WZ6429	Biotechnology in Horticulture	Ü		SoSe	4	5	Lab assignment			EN
WZ0631	Data Processing and Visualization in R	Ü		SoSe	4	5	Research paper	60		EN
WZ2400	Practical Course: Computing for Hightthroughput Biology	FP		WiSe, SoSe	10	10	Research paper			DE/EN
WZ1578	Project Management in Molecular Plant Biotechnology	S		WiSe, SoSe	4	5	Presentatio n			EN
WZ0632	Research Internship "Plant Immunology"	FP + Ü		WiSe, SoSe	7 + 3	10	Report			EN
WZ1577	Research Project "Biotechnology of Horticultural Crops"	FP		WiSe, SoSe	10	10	Report			EN
WZ1575	Research Project "Chemical Genetics"	FP		WiSe, SoSe	10	10	Report			EN
WZ1697	Research Project "Metabolite Analyses in Crops"	FP		WiSe, SoSe	10	10	Report			EN
WZ2401	Research Project "Molecular Plant Breeding"	FP		WiSe, SoSe	10	10	Report			DE/EN
WZ2481	Research Project "Plant Developmental Genetics 2"	FP		WiSe, SoSe	10	10	Presentatio n			DE/EN
WZ1576	Research Project "Plant Growth Regulation"	FP		WiSe, SoSe	10	10	Report			EN
WZ2380	Research Project "Plant Systems Biology"	FP		WiSe, SoSe	10	10	Report			DE/EN

3. Elective Modules Agricultural Biosciences

Alternatively to this list, you can select modules from all of the courses offered by the Technical University of Munich amounting to up to 15 credits as long as the requirements for the modules correspond with those for the modules in the Master's Degree Program Agricultural Biosciences. The Examination Board for the Master's Degree Program Agricultural Biosciences is responsible for checking this.

Module Number	Module Name	Type of Instruction SWS	ZV	Sem.	SWS	Credits	Type of Examination	Duration of Examination (min) ¹⁾	Weighting Factor	Language of Instruction
WZ2620	Applications of Evolutionary Theory in Agriculture: Pathogen Population Genomics and Disease Management	VI + S		SoSe	3.3 + 0.7	5	Oral examination	30		EN
WZ1720	Crop Breeding	VI		WiSe	4	6	Written exam	120		EN
WZ1696	Crop Genomics	V + Ü		SoSe	3 + 1	5	Written exam	90		EN
WZ1037	Crop Physiology – Ertragsphysiologie	V + Ü		WiSe	2 + 2	5	Oral examination	30		DE/EN
WZ1588	Evolutionary Genetics of Plant and Microorganisms	V + Ü		WiSe	2 + 2	5	Oral examination	30 ²⁾		EN
WZ0634	General Education			WiSe / SoSe		3 - 5 ³⁾	tba ³⁾	tba ³⁾		
WZ0635	Genetic Engineering of Livestock	V + S + Ü		WiSe	2 + 1 + 1	5	Oral examination	20		EN
WZ0629	Genomics of Livestock Populations	V + Ü		SoSe	2 + 2	6	Written exam	120		EN
WZ1589	Marker-assisted Selection	V + Ü		WiSe	3 + 1	5	Oral examination	30		EN
WZ1033	Molecular Genetics of Crop Plants	V + Ü		SoSe	3 + 1	5	Oral examination	30		EN
WZ2581	Plant Biotechnology	V + S		WiSe, SoSe	2 + 2	5	Written exam	90		EN
WZ2480	Plant Developmental Genetics 2	V + S		SoSe	2 + 2	4	Oral examination	30		EN
WZ1185	Plant Epigenetics and Epigenomics	V + PR		WiSe, SoSe	3 + 2	5	presentation			EN
WZ0047	Plant Stress Physiology	V + Ü + S		SoSe	2 + 2 + 1	5	Written exam	90		EN
WZ1584	Quantitative Genetics and Selection	V + Ü		SoSe	2 + 2	5	Oral examination	30		EN
WZ1044	Reproductive Biotechnology and Basic Molecular Developmental Biology	V + S + Ü		SoSe	2 + 1 + 1	5	Oral examination	20		EN
WZ0638	Research Internship Agricultural Biosciences	PR		WiSe, SoSe	8	5	Report (coursework)			EN
WZ2763	Transcriptional and Posttranscriptional Regulation in Eukaryotes	V + S		WiSe	2 + 2	5	Written exam + presentation	60	3 : 2	EN

III Master's Thesis

Module Number	Module Name	Type of instruction SWS	ZV	Sem.	SWS	Credits	Type of Examination	Duration of Examination	Weighting Factor	Language of Instruction
WZ0633	Master's Thesis					30				
	Master's Thesis					27	Research paper			EN
	Master's colloquium					3	Colloquium	60		EN

Explanation:

S	= seminar	V	= Vorlesung/lecture
Sem.	= semester	VI	= Vorlesung mit integrierter Übung/lecture with exercise
SWS	= Semesterwochenstunden/weekly hours per semester	SoSe	= summer semester
FP	= Forschungspraktikum/research internship	WiSe	= winter semester
PR	= Praktikum/internship	DE	= German
Ü	= Übung/exercise	EN	= English

¹⁾ For written exams, the column Examination Duration indicates the examination duration in minutes.

²⁾ 30-minute preparation and 30 minutes oral examination

³⁾ The students can choose from the courses offered at the TUM Language Center, the Carl von Linde-Akademie and the Center for Innovation and Business Creation at TUM. The type and duration of examination for the chosen module is as announced by the respective institution.

Credit Total per Semester:

Semester	Credits required modules	Credits elective modules	Credits Master's Thesis	Total Credits	Number of examinations
1	15	15		30	6
2	10	20		30	6
3		30		30	6
4			30	30	2

Appendix 2 a: Aptitude Assessment for Applicants with Higher Education Entrance Qualifications within the area of applicability of the Lisbon Convention

Aptitude Assessment for the Master's Degree Program Agricultural Biosciences at the Technical University of Munich

1. Purpose of the Process

¹Eligibility for the Master's Degree Program Agricultural Biosciences, in addition to the requirements pursuant to § 36(1) Nos. 1 (and 2), requires proof of aptitude pursuant to § 6(1) No. 3 in accordance with the following provisions. ²The special qualifications and skills of the candidates should correspond to the field of Agricultural Biosciences. ³Individual aptitude parameters are:

- 1.1 Ability to do scholarly work and basic, methodologically sound research
- 1.2 Specialist knowledge from a bachelor's degree program in the field of
 - natural sciences with a focus on life sciences fundamentals and methods
 - applied plant and animal sciences with a focus on biotechnology and/or modern breeding methods
 - statistics and data science
- 1.3 Knowledge of agricultural and life science issues.
- 1.4 Knowledge of the technical terminology in English.

2. Aptitude Assessment Process

- 2.1 ¹Aptitude Assessment is conducted annually. ²The TUM Enrollment, Student Fees Payment, Leave of Absence and Disenrollment Regulations (ImmatS) of 6 February 2023 as amended, in particular § 6, apply to the Aptitude Assessment process.
- 2.2 ¹Applications for admission to the aptitude assessment process in accordance with § 6 of the ImmatS must be submitted to the Technical University of Munich together with the documents listed in 2.3 and in § 36(1)2 no later than 31 May (absolute deadline) using the online application procedure.
- 2.3 The application must include:
 - 2.3.1 Transcript of Records with modules of at least 120 credits for a six-semester bachelor's program, at least 150 credits for a seven-semester bachelor's program, and at least 180 credits for an eight-semester bachelor's program; the Transcript of Records must be issued by the relevant examination authority or the relevant academic programs office,
 - 2.3.1 Complete (without time gaps) curriculum vitae in English,
 - 2.3.2 a Curricular analysis based on the Transcript of Records must be completed as part of the online application and uploaded with the application documents.
 - 2.3.3 Optional, to serve as the basis for a potential aptitude assessment interview: a written statement (max. 1 A4 page) of the reasons for choosing the Master's Degree Program Agricultural Biosciences at the Technical University of Munich, in which the candidate explains his/her exceptional motivation that makes him/her particularly qualified for the Master's Degree Program Agricultural Biosciences at the Technical University of Munich; a candidate's exceptional motivation is to be demonstrated by providing details on program-related vocational training, internships, stays abroad, or program-related further education beyond the attendance and course requirements of the bachelor's program. Appropriate documentation should be provided if necessary.
 - 2.3.4 If a written statement is submitted according to 2.3.4, the applicant must submit a declaration

that the written statement is the applicant's own work and that the applicant has clearly identified any ideas taken from outside sources.

3. Aptitude Assessment Commission, Selection Committees

3.1 ¹Aptitude assessment is administered by the Aptitude Assessment Commission and the Selection Committees. ²Aptitude Assessment Commission is responsible for preparing the aptitude assessment process, organizing it and ensuring a structured and standardized process for determining aptitude within the framework of these Regulations; it bears responsibility, insofar as no other body is specified by these regulations or through delegation of its authority to another body. ³Selection Committees are to conduct the assessment process in accordance with No. 5 below, subject to No. 3.2 Sentence 11

3.2 ¹The Aptitude Assessment Commission consists of five members, one of whom is the Academic Program Director. ²The other four members of the Commission are appointed by the Dean, in consultation with the Vice Dean of Academic and Student Affairs, from among the authorized examiners of the TUM School of Life Sciences; a deputy is to be appointed for each member of the Commission. ³At least three Commission members must be university educators within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. ⁴The departmental student council has the right to name a student representative to serve on the Commission in an advisory capacity. ⁵The Commission is chaired by the Academic Program Director. ⁶The Commission elects a deputy chairperson from among its members. ⁷Procedures are governed by the paragraph on the procedural provisions of the TUM Charter as amended. ⁸The term in office of Commission members is 2 years. ⁹Extensions of the term of office and reappointments are possible. ¹⁰Urgent decisions that cannot be postponed can be made by the Academic Program Director on behalf of the Commission; he/she must inform the Commission of such decisions without delay. ¹¹The Campus Office supports the Commission and the Selection Committee; the Commission may delegate to the Office the task of assessing formal admissions requirements in accordance with Nr. 4, as well as the determination of points to be awarded based on defined criteria for which there is no freedom of discretion involved. This includes, in particular, the conversion of grades and the calculation of the overall points earned by the applicant. The Office may also be involved in choosing the members of the Selection Committee from among the commissioners and assigning them to applicants.

3.3 ¹Each Selection Committee consists of two members of the TUM School of Life Sciences, who are authorized to conduct examinations in the degree program according to Art. 85(1) Sentence 1 of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] in conjunction with the act governing examiners at institutions of higher education [Hochschulprüferverordnung]. ²At least one member must be a university educator within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. ³It is permissible to serve concurrently on both the Aptitude Assessment Commission and the Selection Committee. ⁴Members of the Committee are appointed by the Commission for a term of 1 year; No. 3.2 Sentence 9 applies accordingly. ⁵Different Selection Committees may be assigned to individual criteria and stages of the assessment process.

4. Admission to the Aptitude Assessment Process

4.1 Admission to the aptitude assessment process requires that all documentation specified in No. 2.2 has been submitted in a timely and complete fashion.

4.2 ¹Applicants who have fulfilled the requirements according to No. 4.1 will be assessed according to No. 5. ²Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

5. The Aptitude Assessment Process

5.1 First Stage

- 5.1.1 ¹It will be assessed, on the basis of the written application documents required under no. 2.3, whether or not an applicant is suitable for a program as set out in no. 1 (First stage of the aptitude assessment process). ²The candidate's application documents will be evaluated on a scale ranging from 0 to 90 points, 0 being the worst and 90 the best possible result:

The following criteria will be applied to the evaluation:

a) Discipline-Specific Skills and Qualifications

¹The curricular analysis is conducted on the basis of competencies, rather than a schematic comparison of modules. ²The analysis is based on the fundamental subject groups listed in the following table.

Subject Group	Maximum possible credits
Statistics	5
Data Science, Bioinformatics	5
Chemistry	5
Life Sciences Fundamentals (e.g. cell biology, genetics, microbiology, physiology)	15
Life Sciences Methods (e.g. laboratory courses, methods of biotechnology)	15
Applied Plant and Animal Sciences	15
TOTAL	60

³If it is established that there are no significant differences in the competencies acquired (learning outcomes), a maximum of 60 points will be awarded. ⁴One credit is equal to one point. ⁵Modules amounting to at least 5 credits are required for all subject groups. ⁶If that is not the case, 0 points will be assigned in the respective subject group.

b) Grade

¹The applicant will be awarded one point for each tenth that the average calculated from examinations in the amount of 120 credits is better than 4.0. ²The maximum number of points is 30. ³Negative points will not be awarded. ⁴In the case of international degrees or if the grade system does not correspond with the TUM system, the grade converted using the Bavarian formula will be applied. ⁵If the candidate has submitted a degree certificate containing more than 120 credits with the application, the assessment will be made on the basis of the best graded modules in the amount of 120 credits. ⁶The applicant needs to submit a list of the results together with the application and confirm its accuracy in writing. ⁷Insofar as this is done, the average is calculated from the best graded module examinations totaling 120 credits. ⁸The average is calculated as a weighted grade average for the modules. ⁹The grade weights of the individual modules correspond to the credits assigned to each module. ¹⁰If no list is submitted, the overall average of grades submitted by the candidate will be used to calculate the average.

- 5.1.2 The points total in the first stage will be calculated as the sum of the individual evaluations, with decimal places rounded up.
- 5.1.3 ¹Applicants with at least 65 points will be deemed suitable.
- 5.1.4 Applicants who have achieved less than 41 points fail the aptitude assessment.

5.2 Second Stage

- 5.2.1 ¹The remaining applicants will be invited to an assessment interview. ²In the second stage of the aptitude assessment, the qualifications acquired in the bachelor's degree program and the result of the assessment interview are evaluated, whereby the qualification acquired in the bachelor's is to be weighted equally. ³Interview appointments will be announced at least one

week in advance. ⁴Time slots for interviews must be scheduled before expiration of the application deadline. ⁵The interview appointment must be kept by the applicant. ⁶If the applicant is unable to attend an aptitude assessment interview due to reasons beyond his/her control, a later appointment may be scheduled upon a student's well-grounded request, but no later than two weeks before the beginning of classes. ⁷As a rule, the interview is conducted by video conference. ⁸If the video or audio transmission is disrupted, the interview can be continued after the disruption has been resolved or a follow-up appointment can be scheduled. ⁹In the event of repeated disruption, the aptitude assessment interview may be scheduled as a face-to-face meeting in exception to Sentence 7. ¹⁰Sentences 8 and 9 do not apply if it can be proven that the applicant is responsible for the disruption. ¹¹In this case, the aptitude assessment interview will be assessed.

5.2.2 ¹The aptitude assessment interview is to be held individually for each applicant. ²The interview will be held in English and last at least 20 but not more than 30 minutes for each applicant. ³The interview will focus on the following topics:

1. Fundamentals and application-related questions on
 - life sciences fundamentals
 - applied plant and animal sciences
 - statistics and data science
2. practical laboratory experience and/or other experience with methods relevant to the degree program
3. assessment and discussion of research methods for finding answers to agricultural bioscience questions
4. scientific thesis: the theoretical background and main results of the thesis or a comparable academic paper can be presented.

⁴The above topics may cover the documentation submitted according to 2.3. ⁵Any subject-specific academic knowledge that is to be taught in the Master's Degree Program Agricultural Biosciences will not affect the decision. ⁶With the applicant's approval, a representative of the student body may sit in on the interview.

5.2.3 ¹ Each Committee member independently assesses each of the four areas with equal weighting. ²Each member of the Committee will grade the result of the interview on a scale from 0 to 60, 0 being the worst and 60 being the best possible result. ³The points total will be calculated as the arithmetic mean of the individual evaluations. ⁴Non-vanishing decimal places must be rounded up.

5.2.4 ¹The total number of points awarded in stage 2 is the sum of the points from 5.2.3 (aptitude assessment interview) and the points from 5.1.1.a) (subject-specific qualification) and 5.1.1.b) (grade). ²Applicants with 90 or more points will be deemed suitable. ³Applicants with a total score of less than 90 points have failed the aptitude assessment.

5.3 Determination and Notification of Results

¹Applicants will be informed of the results of the aptitude assessment through official notification. ²Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

5.4 Candidate's suitability for the program, once determined in the aptitude assessment, applies to all subsequent applications for this program.

6. Documentation

¹The aptitude assessment process must be documented, in particular the names of the participating members of the Selection Committee, the applicant's name, the evaluation of the first and second stages, as well as the overall results. ²A record is to be kept about the aptitude assessment interview, including the date, duration and location of the assessment, the names of the participating Selection Committee members, the applicant's name, and a list of main topics

of discussion in bullet points.

7. Repeat Aptitude Assessments

Applicants who have failed an aptitude assessment may apply once to repeat the aptitude assessment process.

Appendix 2 b: Aptitude Assessment for Applicants with Higher Education Entrance Qualifications outside the area of applicability of the Lisbon Convention

Aptitude Assessment for the Master's Degree Program Agricultural Biosciences at the Technical University of Munich

1. Purpose of the Process

¹Eligibility for the Master's Degree Program Agricultural Biosciences, in addition to the requirements pursuant to § 36(1) No. 1, requires proof of aptitude pursuant to § 36(1) No. 4 in accordance with the following provisions. ²The special qualifications and skills of the candidates should correspond to the field of Agricultural Biosciences. ³Individual aptitude parameters are:

- 1.1 ability to do scholarly work and/or basic and methodologically sound research;
- 1.2 specialist knowledge gained in undergraduate degrees in the field of
 - natural sciences with a focus on life sciences fundamentals and methods
 - applied plant and animal sciences with a focus on biotechnology and/or modern breeding methods
 - statistics and data science
- 1.3 knowledge of agricultural and life science issues
- 1.4 knowledge of the technical terminology in English

2. Aptitude Assessment Process

- 2.1 ¹Aptitude Assessment is conducted annually. ²The TUM Enrollment, Student Fees Payment, Leave of Absence and Disenrollment Regulations (ImmatS) of 6 February 2023 as amended, in particular § 6, apply to the Aptitude Assessment process.
- 2.2 ¹Applications for admission to the aptitude assessment process in accordance with § 6 of the ImmatS must be submitted to the Technical University of Munich together with the documents listed in 2.3 and in § 36(1)2 no later than 31 May (absolute deadline) using the online application procedure.
- 2.3 The application must include:
 - 2.3.1 Transcript of Records with modules of at least 120 credits for a six-semester bachelor's program, at least 150 credits for a seven-semester bachelor's program, and at least 180 credits for an eight-semester bachelor's program; the Transcript of Records must be issued by the relevant examination authority or the relevant academic programs office,
 - 2.3.2 Complete (without time gaps) curriculum vitae in English,
 - 2.3.3 Proof of passing the TUM Test Agricultural Biosciences according to Appendix 3 with a score of at least 41 points.
 - 2.3.4 Optional, to serve as the basis for a potential aptitude assessment interview: a written statement (max. 1 A4 page) of the reasons for choosing the Master's Degree Program Agricultural Biosciences at the Technical University of Munich, in which the candidate explains his/her exceptional motivation that makes him/her particularly qualified for the Master's Degree Program Agricultural Biosciences at the Technical University of Munich; a candidate's exceptional motivation is to be demonstrated by providing details on program-related vocational training, internships, stays abroad, or program-related further education beyond the attendance and course requirements of the bachelor's program. Appropriate documentation should be provided if necessary.
 - 2.3.5 If a written statement is submitted according to 2.3.4, the applicant must submit a declaration

that the written statement is the applicant's own work and that the applicant has clearly identified any ideas taken from outside sources.

3. Aptitude Assessment Commission, Selection Committees

3.1 ¹Aptitude assessment is administered by the Aptitude Assessment Commission and the Selection Committees. ²Aptitude Assessment Commission is responsible for preparing the aptitude assessment process, organizing it and ensuring a structured and standardized process for determining aptitude within the framework of these Regulations; it bears responsibility, insofar as no other body is specified by these regulations or through delegation of its authority to another body. ³Selection Committees are to conduct the assessment process in accordance with No. 5 below, subject to No. 3.2 Sentence 11

3.2 ¹The Aptitude Assessment Commission consists of five members, one of whom is the Academic Program Director. ²The other four members of the Commission are appointed by the Dean, in consultation with the Vice Dean of Academic and Student Affairs, from among the authorized examiners of the TUM School of Life Sciences; a deputy is to be appointed for each member of the Commission. ³At least three Commission members must be university educators within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. ⁴The departmental student council has the right to name a student representative to serve on the Commission in an advisory capacity. ⁵The Commission is chaired by the Academic Program Director. ⁶The Commission elects a deputy chairperson from among its members. ⁷Procedures are governed by the paragraph on the procedural provisions of the TUM Charter as amended. ⁸The term in office of Commission members is 2 years. ⁹Extensions of the term of office and reappointments are possible. ¹⁰Urgent decisions that cannot be postponed can be made by the Academic Program Director on behalf of the Commission; he/she must inform the Commission of such decisions without delay. ¹¹The Campus Office supports the Commission and the Selection Committee; the Commission may delegate to the Office the task of assessing formal admissions requirements in accordance with Nr. 4, as well as the determination of points to be awarded based on defined criteria for which there is no freedom of discretion involved. This includes, in particular, the conversion of grades and the calculation of the overall points earned by the applicant. The Office may also be involved in choosing the members of the Selection Committee from among the commissioners and assigning them to applicants.

3.3 ¹Each Selection Committee consists of two members of the TUM School of Life Sciences, who are authorized to conduct examinations in the degree program according to Art. 85(1) Sentence 1 of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)] in conjunction with the act governing examiners at institutions of higher education [Hochschulprüferverordnung]. ²At least one member must be a university educator within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)]. ³It is permissible to serve concurrently on both the Aptitude Assessment Commission and the Selection Committee. ⁴Members of the Committee are appointed by the Commission for a term of 1 year; No. 3.2 Sentence 9 applies accordingly. ⁵Different Selection Committees may be assigned to individual criteria and stages of the assessment process.

4. Admission to the Aptitude Assessment Process

4.1 Admission to the aptitude assessment process requires that all documentation specified in No. 2.2 has been submitted in a timely and complete fashion.

4.2 ¹Applicants who have fulfilled the requirements according to No. 4.1 will be assessed according to No. 5. ²Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

5. The Aptitude Assessment Process

5.1 First Stage

- 5.1.1 ¹It will be assessed, on the basis of the results of the TUM Agricultural Biosciences, whether an applicant is suitable for the program according to No. 1 (first stage of the aptitude assessment process). ²Relevant, here, is the points total in accordance with Appendix 3 No. 2 Sentence 15.
- 5.1.2 ¹The points total in the first stage will be calculated based on the results of the test, rounded to a whole number.
- 5.1.3 ¹Applicants with at least 65 points will be deemed suitable.
- 5.1.4 Applicants who have achieved less than 41 points fail the aptitude assessment.

5.2 Second Stage

- 5.2.1 ¹The remaining applicants will be invited to an assessment interview. ²In the second stage of the aptitude assessment, the qualifications acquired in the bachelor's degree program (test) and the result of the assessment interview are evaluated, whereby the qualification acquired in the bachelor's is to be weighted equally. ³Interview appointments will be announced at least one week in advance. ⁴Time slots for interviews must be scheduled before expiration of the application deadline. ⁵The interview appointment must be kept by the applicant. ⁶If the applicant is unable to attend an aptitude assessment interview due to reasons beyond his/her control, a later appointment may be scheduled upon a student's well-grounded request, but no later than two weeks before the beginning of classes. ⁷As a rule, the interview is conducted by video conference. ⁸If the video or audio transmission is disrupted, the interview can be continued after the disruption has been resolved or a follow-up appointment can be scheduled. ⁹In the event of repeated disruption, the aptitude assessment interview may be scheduled as a face-to-face meeting in exception to Sentence 7. ¹⁰Sentences 8 and 9 do not apply if it can be proven that the applicant is responsible for the disruption. ¹¹In this case, the aptitude assessment interview will be assessed.
- 5.2.2 ¹The aptitude assessment interview is to be held individually for each applicant. ²The interview will be held in English and last at least 20 but not more than 30 minutes for each applicant. ³The interview will focus on the following topics:
1. Fundamentals and application-related questions on
 - life sciences fundamentals
 - applied plant and animal sciences
 - statistics and data science
 2. practical laboratory experience and/or other experience with methods relevant to the degree program
 3. assessment and discussion of research methods for finding answers to agricultural bioscience questions
 4. scientific thesis: the theoretical background and main results of the thesis or a comparable academic paper can be presented.
- ⁴The above topics may cover the documentation submitted according to 2.3. ⁵Any subject-specific academic knowledge that is to be taught in the Master's Degree Program Agricultural Biosciences will not affect the decision. ⁶With the applicant's approval, a representative of the student body may sit in on the interview.
- 5.2.3 ¹ Each Committee member independently assesses each of the four areas with equal weighting. ²Each member of the Committee will grade the result of the interview on a scale from 0 to 60, 0 being the worst and 60 being the best possible result. ³The points total will be calculated as the arithmetic mean of the individual evaluations. ⁴Non-vanishing decimal places must be rounded up.

5.2. 4 ¹The total number of points awarded in stage 2 is the sum of the points from 5.2.3 (points from interview) and the points from 5.1.2 (test). ²Applicants with 90 or more points will be deemed suitable. ³Applicants with a total score of less than 90 points have failed the aptitude assessment.

5.3 Determination and Notification of Results

¹Applicants will be informed of the results of the aptitude assessment through official notification.

²Applicants not suited for the program will receive a letter of rejection stating the grounds for rejection and informing them of legal remedies.

5.4 Candidate's suitability for the program, once determined in aptitude assessment, applies to all subsequent applications for this program.

6. Documentation

¹The aptitude assessment process must be documented, in particular the names of the participating members of the Selection Committee, the evaluation of the first and second stages, as well as the overall results. ²A record is to be kept about the aptitude assessment interview, including the date, duration and location of the assessment, the names of the participating Selection Committee members, the applicant's name, and a list of main topics of discussion in bullet points.

7. Repeat Aptitude Assessments

Applicants who have failed an aptitude assessment may apply once to repeat the aptitude assessment process.

APPENDIX 3: TUM Test Agricultural Biosciences

1. Purpose of the Test

The TUM Test is intended to provide evidence that the competencies acquired in the first degree according to § 36(1) No. 1 meet the subject-related requirements of the Master's Degree Program Agricultural Biosciences and that the applicant can be expected to achieve the goal of the degree program independently and responsibly in a scholarly manner.

2. Conduct and Assessment

¹The TUM Test Agricultural Biosciences is conducted by the TUM School of Life Sciences once per admissions period before the application deadline. ²The TUM Test is an online, written test comprising approximately 10-15 questions requiring approximately 30 minutes to complete. ³The applicant bears the risk in the event of any technical problems, unless these are attributable to the Technical University of Munich.

⁴The TUM School of Life Sciences will announce further details, in particular the date and time of the TUM Test, for the application phase for the winter semester on the School's website no later than six weeks before the date set for the TUM Test. ⁵Test results are valid for a maximum of 24 months.

⁶Repeated participation in the TUM Test is possible over subsequent years. ⁷The applicant will receive confirmation of participation in the Test Agricultural Biosciences with place and date as well as the achieved score, which will serve as proof in the application process.

⁸The TUM Test covers the following categories in the indicated points distribution:

Cat.	Competencies acquired in the undergraduate degree program	Max. points P_{max}
A	Statistics, Data Science, Bioinformatics, Chemistry	15
B	Life Sciences Fundamentals	15
C	Life Sciences Methods	15
D	Applied Plant and Animal Sciences	15
E	Problem-solving Skills	30
	Total	90

⁹Any subject-specific academic knowledge that is to be taught in the Master's Degree Program Agricultural Biosciences will not affect the decision. ¹⁰Applicants must demonstrate in the test that they are suitable for the degree program. ¹¹Questions are selected by two members of the Commission in accordance with Appendix 7 b No. 3.2. At least one member must be a university educator within the meaning of the Bavarian Higher Education Innovation Act [Hochschulinnovationsgesetzes (BayHIG)].

¹²The test is a multiple choice test. ¹³For each correct response, the number of points specified in the test for the respective question will be awarded. ¹⁴The maximum possible number of points in the TUM Test is 90. ¹⁵The total number of points earned, which is used to assess aptitude in the first stage of the aptitude assessment process in Appendix 2 b No. 5.1.1 Sentence 2, is the sum of the individual points awarded.

3. Documentation

A record is to be kept about the conduct of the test (date, place, beginning and end of the test, the names of those present, the names of the applicants, as well as any unusual occurrences).