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Subject examination and study regulations for the Master's program in Pharmaceutical Bioprocess Engineering at the Technical University of Munich

From 13 August 2018

Readable version
in the version of the 6th ÄS of March 4, 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:

Table of Contents:

§ 34
Scope, academic degree

(1) [1]The Subject Examination and Study Regulations (FPSO) for the Master's degree program in Pharmaceutical Bioprocess Engineering supplement the General Examination and Study Regulations for Bachelor's and Master's degree programs at the Technical University of Munich (APSO) as amended. [2]The APSO has priority.

(2) [1]On the basis of the successful completion of the Master's examination, the academic degree "Master of Science" ("M.Sc.") is awarded. [2]This academic degree can be used with the university suffix "(TUM)".

§ 35
Start of study, standard period of study, ECTS

(1) The Master's program in Pharmaceutical Bioprocess Engineering at the Technical University of Munich generally begins in the winter semester.

(2) [1]The scope of the courses required for obtaining the Master's degree in the compulsory and elective areas is 90 credits (57 SWS). [2]In addition, 30 credits are required for the preparation of the Master's thesis in accordance with § 46. [3]The scope of the compulsory and elective courses and examinations in the Master's program in Pharmaceutical Bioprocess Engineering thus amounts to at least 120 credits in accordance with Annex 1. [4]The standard period of study for the Master's program is four semesters in total.

§ 36
Qualification requirements, professional internship

(1) The qualification for the master's degree in pharmaceutical bioprocess engineering is demonstrated by

1. A qualified bachelor's degree of at least six semesters' duration obtained at a domestic or foreign university or a degree of at least equivalent level in the courses of study Technology and Biotechnology of Food, Bioprocess Technology, Brewing and Beverage Technology or comparable courses of study,

2. Passing the suitability procedure according to Annex 2,

3. Proof of at least 18 weeks of relevant professional internship prior to commencement of the Master's program; proof of this must be submitted to the Campus Office of the TUM School of Life Sciences prior to commencement of the program; in deviation from this, applicants may be admitted to the Master's program if they have provided proof of at least 12 weeks of professional internship by the aforementioned deadline; the proof of the remaining professional internship has to be provided within one year after the beginning of the study program; those who start their study program in the winter semester 2020/21 can, in deviation from the aforementioned regulations, provide proof of the completion of an 18-week professionally relevant professional internship until September 30, 2021 at the latest. The examination board decides on the recognition of successfully completed vocational training or an equivalent achievement as vocational training;

if vocational training has already been completed as part of a relevant undergraduate degree program, this will generally be recognized.

(2) A qualified university degree within the meaning of Paragraph 1 exists if there are no significant differences with regard to the competencies (learning outcomes) acquired in the scientifically oriented relevant bachelor's degree program in bioprocess technology at TUM or with a comparable degree and these correspond to the technical requirements of the master's degree program.

(3) [1]The module catalog of the bachelor's degree program in bioprocess technology is used for the determination according to Par. 2. [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 are to be taken as additional basic examinations according to Annex 2 No. 5.1.3 as proof of the qualification according to Para. 1. [3]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 commission for the aptitude procedure decides on the comparability of the study program, on the determination of the special aptitude as well as on the crediting of competences in the examination of university degrees acquired at foreign universities under the consideration of Art. 63 Bavarian University Act.

(5) [1]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. [2]The application may only be submitted if, in the case of a six-semester bachelor's degree program, module examinations amounting to at least 120 credits, in the case of a seven-semester bachelor's degree program, module examinations amounting to at least 150 credits, and in the case of an eight-semester bachelor's degree program, module examinations amounting to at least 180 credits are proven at the time the application is submitted. [3]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, language of instruction

(1) [1]General regulations on modules and courses are set out in §§ 6 and 8 APSO. [2]In the event of deviations from module specifications, § 12 Para. 8 APSO shall apply.

(2) The study plan with a listing of the modules to be taken in the compulsory and elective areas is listed in Appendix 1.

(3) [1]As a rule, the language of instruction in the Master's program in Pharmaceutical Bioprocess Engineering is German. [2]If individual modules are held wholly or partly in English, this is indicated in Annex 1. If it is indicated in Annex 1 that a module will be held in English or German, the examiner shall announce the language of instruction in a suitable and binding manner no later than at the beginning of the lecture.

§ 38
Examination deadlines, study progress monitoring, missed deadlines

(1) Examination deadlines, study progress monitoring and missed deadlines are regulated in § 10 APSO.

(2) [1]At least two of the module examinations listed in Appendix 1 from the first two semesters must be successfully completed by the end of the second semester. [2]If the deadline is exceeded, § 10 para. 5 APSO shall apply accordingly.

§ 39
Audit Committee

The body responsible for decisions in examination matters according to § 29 APSO is the Examination Board Food Technology and Bioprocess Engineering.

§ 40
Crediting of periods of study, academic achievements and examination results

The crediting of periods of study, coursework and examinations is governed 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.

a) [1]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. 2The duration of written examinations is regulated in § 12 Para. 7 APSO.

b) [1]Laboratory services include, depending on the discipline, experiments, measurements, work in the field, field exercises, etc. with the aim of carrying out, evaluating and gaining knowledge. [2]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. 3The laboratory performance can be supplemented by a presentation in order to test the communicative competence in presenting scientific topics to an audience. [4]The specific components of the respective laboratory performance and the competencies to be tested with it are listed in the module description.

c) [1]The **exercise performance (if applicable, tests)** is the processing of given tasks (e.g. mathematical problems, programming tasks, modeling, etc.) with the aim of applying theoretical content to solve application-related problems. [2]It serves the verification of factual and detailed knowledge as well as its application. [3]The exercise performance can be carried out, among other things, in writing, orally or electronically.

[4]Possible forms are, for example, homework, exercise sheets, programming exercises, (e-)tests, tasks in the context of university internships, etc. [5]The concrete components of the respective exercise performance and the competencies to be tested are listed in the module description.

d) [1]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. [2]The report should prove that the essential aspects have been recorded and can be reproduced in writing. [3]Possible report forms are, for example, field trip reports, internship reports, work reports, etc. [4]The written report can be supplemented by a presentation in order to test the communicative competence in presenting the contents to an audience.

e) [1]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). [2]In addition, a presentation can be part of the project work in order to test the communicative competence in presenting scientific topics to an audience. [3]The concrete components of the respective project work and the competencies to be tested with it are listed in the module description. [4]The project work is also possible in the form of group work. [5]In this case, it should be demonstrated that tasks can be solved in a team. [6]The contribution to be assessed as examination performance must be clearly recognizable and assessable individually. [7]This also applies to the individual contribution to the group result.

f) [1]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. [2]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. [3]Possible forms, which differ in their respective level of demand, are e.g. thesis paper, abstract, essay, study paper, seminar paper, etc. [4]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. [5]The concrete components of the respective scientific elaboration and the competences to be examined with it are listed in the module description.

g) [1]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. [2]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. [3]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. [4]The presentation may be supplemented by a short written preparation. [5]The presentation may be given individually or in groups. [6]The contribution to be assessed as an examination performance must be clearly recognizable and assessable individually. [7]This also applies to the individual contribution to the group result.

h) [1]An **oral examination** is a time-limited examination discussion on specific topics and concrete questions to be answered. [2]In oral examinations, it should be demonstrated that the qualification objectives documented in the module descriptions have been

achieved and that the interrelationships of the examination area have been recognized and special questions can be placed in these interrelationships. [3]The oral examination can be conducted as an individual examination or as a group examination. [4]The duration of the examination is regulated in § 13 Para. 2 APSO.

i) [1]A **learning portfolio** is a written 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. [2]The selection of the work, its relation to the student's own learning progress and its significance for the achievement of the qualification goals must be justified. [3]The learning portfolio should demonstrate that responsibility has been taken for the learning process and that the qualification objectives documented in the module description have been achieved. [4]Depending on the module description, the components of successful self-learning checks of the learning portfolio may include, in particular, work with application relevance, websites, weblogs, bibliographies, analyses, thesis papers as well as graphic presentations of an issue or a question. [5]The concrete components of the respective learning portfolio and the competencies to be tested with it are listed in the module description.

j) [1]In the context of an **examination course,** several examination elements are to be completed within one examination performance. 2In contrast to a partial module examination, the examination performance is examined in an organizationally (spatially or temporally) coherent manner. [3]Examination elements are several different examination formats which in their entirety cover the complete competence profile of the module. [4]Examination elements can in particular also be examination formats according to letters a) to i). [5]The total duration of the examination shall be specified in the module catalog; the examination form and duration of the individual examination elements shall be specified in the module description.

(2) [1]The module examinations are usually taken during the course of study. [2]The type and duration of a module examination are specified in Annex 1. [3]In the event of deviations from these stipulations, § 12 Para. 8 APSO must be observed. [4]For the evaluation of the module examination, § 17 APSO shall apply. [5]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.

(4) At the request of the student and with the approval of the examiners, examinations in German-language modules can be taken in English/a foreign language.

§ 42
Registration and admission to the Master's examination

(1) [1]Upon enrollment in the Master's degree program in Pharmaceutical Bioprocess Engineering, students are considered admitted to the module examinations of the Master's examination. [2]In addition, students are considered admitted to individual module examinations which they take as voluntary additional examinations within the framework of a Bachelor's degree program offered in the Department of Brewing and Food Technology at the Technical University of Munich in accordance with § 49a of the FPSO of the corresponding degree program.

(2) [1]Registration for a module examination in the compulsory and elective areas is governed by § 15 Para. 1 APSO. 2Registration for a corresponding repeat examination in a failed compulsory or 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 Master's Thesis according to § 46 as well as
3. The study achievements mentioned in § 45.

(2) [1]The module examinations are listed in Appendix 1. [2]Evidence of 50 credits in the compulsory modules and at least 34 credits in elective modules must be provided. [3]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

In addition to the examinations mentioned in § 43 Para. 1, the successful completion of study achievements amounting to 6 credits in the modules according to Annex 1 must be proven.

§ 45 a
Multiple choice method

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

§ 46
Master's Thesis

(1) [1]Pursuant to § 18 APSO, students must prepare a Master's thesis as part of the Master's examination. [2]The Master's thesis can be issued and supervised by expert examiners from the Technical University of Munich (topic setter). [3]The expert examiners according to sentence 2 are appointed by the examination board.

(2) [1]The completion of the Master's Thesis module should normally represent the last examination performance. [2]Students may be admitted to the Master's Thesis prematurely 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) [1]The time from issuance to delivery of the Master's Thesis may not exceed six months. [2]For the passed Master's Thesis 30 credits are awarded.

(4) [1]The completion of the Master's Thesis consists of a written paper and a presentation on its content. [2]The presentation does not count towards the grade.

(5) [1]If the Master's Thesis has not been evaluated with at least "sufficient" (4.0), it can be repeated once with a new topic. [2]It must be re-registered no later than six weeks after the notification of the result.

§ 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) [1]The module grade is calculated according to § 17 APSO. [2]The overall grade of the Master's examination is calculated as the weighted grade average of the modules according to § 43 para. 2 and the Master's Thesis. [3]The grade weights of the individual modules correspond to the assigned credits. [4]The overall grade is expressed by the predicate according to § 17 APSO.

§ 48
Certificate, Diploma Supplement

[1]If the Master's examination is passed, a certificate, a certificate and a Diploma Supplement with a Transcript of Records shall be issued in accordance with § 25 Para. 1 and § 26 APSO. [2]The date of the certificate shall be the date on which all examination and study achievements have been completed.

§ 49
Entry into force*)

(1) [1]These statutes shall enter into force on April 1, 2019. [2]It applies to all students who begin their specialized studies at the Technical University of Munich as of the winter semester 2019/20.

(2) [1]The subject examination regulations for the master's degree program in Pharmaceutical Bioprocess Engineering at the Technical University of Munich dated April 12, 2010, last amended by the collective amendment statute on the commission in the aptitude procedure for master's degree programs at the Technical University of Munich dated April 25, 2018, shall expire at the same time. [2]Students who have already commenced their subject studies at the Technische Universität before the winter semester 2019/20 shall complete their studies in accordance with the statutes pursuant to sentence 1.

*) This provision concerns the entry into force of the Articles of Association in the original version of August 13, 2018. The date of entry into force of the amendments is specified in the amending Articles of Association.

Appendix 1: Examination modules

No.	Module name	Language	SWS				Credits	Semester	Testing	
			V	Ü	P	Total			Type	Duration

A Compulsory modules: Examination achievements

MW0019	Bioreactors and bioreaction technology	D	2	1		**3**	**5**	1	S	90
WZ5400	Good Manufacturing Practice	D	2			**2**	**5**	1	S	60
WZ2016	Proteins: structure, function and engineering	D	2			**2**	**5**	1	S	90
WZ5012	Hygienic Processing 2 - Aseptic and Sterile Process Technology	D	2			**2**	**5**	2	S	90
WZ5326	Pharmaceutical technology 2	D	2			**2**	**5**	2	S	60
MW0437	Process and plant engineering	D	2	1		**3**	**5**	2	S	90
CH6000	Physical chemistry	D	4	2		**6**	**5**	2+3	S	150
MW0236	Practical course bioprocess engineering	D			4	**4**	**5**	2	L	-
WZ5401	Seminar Bioprocess Technology	D	3			**3**	**5**	3	W+PS (1:1)	-
WZ5452	Scientific and technical computing	D	2	1		**3**	**5**	3	S	90
WZ5907	Master's Thesis	D					**30**	4	W	-

B Study achievements

	Internships *(from the offer of the study faculty)*				12	**12**	**6**	1 – 4	-	-

C Elective modules: Examination achievements

A total of at least 34 credits from the elective modules must be completed as part of the master's program. This catalog includes interdisciplinary courses. The credits can also be earned in modules from other faculties or universities. The examination board continuously updates the catalog of elective modules. Changes are announced on the Examination Committee's website at the beginning of the semester at the latest.

No.	Module name	Language	SWS				Credits	Semester	Testing	
			V	Ü	P	Total			Type	Duration

General education subject (4 credits)

-	*Modules worth at least 4 credits must be selected from the TUM's range of modules*						**4**	-	-	-

The study concept is based on qualification goals. These include subject-specific and interdisciplinary aspects, in particular scientific or artistic ability, ability to take up qualified gainful employment, ability to engage in civil society and personal development.

No.	Module name	Language	SWS				Credits	Semester	Testing	
			V	Ü	P	Total			Type	Duration

Bioprocess Engineering and Biotechnology (minimum 5 credits).

WZ2626	Applied microbiology	D	3			**3**	**5**		S	60
WZ2634	Bioinformatics for life scientists	D	2	2		**4**	**5**		S	60
CH0247	Biocatalysis and protein technology	D	2			**2**	**5**		S	60
MW1145	Bioproduct reprocessing 1	D	2	1		**3**	**5**		S	90
MW1146	Bioproduct reprocessing 2	D	2	1		**3**	**5**		S	90
MW1326	Bioprocesses and biotechnological production	D	3			**3**	**5**		S	90
WZ2227	Computer-aided Drug and Protein Design	D	2			**2**	**5**		S	60
WZ1045	Endocrinology and reproductive biology	D	4			**4**	**6**		S	60
WZ2019	Metabolic engineering and natural product production	D	2			**2**	**5**		S	60
WZ2235	Modeling and simulation of biological macromolecules	D	2			**2**	**5**		S	60
WZ2179	Molecular biology of infectious diseases	D	2			**2**	**6**		S	60
WZ2013	Molecular bacterial genetics	D	2			**2**	**5**		S	60
WZ2222	Plant biotechnology and plant genetic engineering	D	2			**2**	**5**		S	60
WZ2413	Pharmacology and Toxicology (Advanced)	D	2	2		**4**	**5**		S	100
WZ0443	Protein technology: membranes and membrane proteins	D	2			**2**	**5**		S	60
WZ2243	Technical cell biology	D	3			**3**	**5**		S	60

Chemistry and physics

WZ5032	Applied Organic Chemistry	D	3			**3**	**5**		S	120
CH0648	Bioinorganic chemistry	D	2			**2**	**5**		S	60
CH0263	Biophysical chemistry	D	2	1		**3**	**5**		S	60
PH2005	DNA biophysics and DNA nanotechnology	D	4			**4**	**5**		S	60
WZ2933	Theory and practice of protein crystallography	D	5		6	**11**	**7**		S	90

Energy and environmental technology

WZ5048	Energy monitoring	D	2			**2**	**5**		S	60
WZ5061	Basics of energy supply	D	2			**2**	**5**		S	90
WZ5127	Renewable energies, new energy technologies	D	2			**2**	**5**		S	60
WZ5411	Water management	D	6			**6**	**5**		S	120

No.	Module name	Language	SWS				Credits	Semester	Testing	
			V	Ü	P	Total			Type	Duration

Engineering and process technology (at least 5 credits)

WZ5416	CAD for Engineers - Introduction to Computer Aided Design (2D) and Solid Modeling (3D)	D	6			**6**	**5**		S	60
WZ5046	Introduction to electronics	D	2			**2**	**5**		S	60
WZ5407	Enzyme kinetics	D	2	2		**4**	**5**		M	20
WZ5063	Programming basics	D	1	2		**3**	**6**		ÜL	
WZ5121	Industrial Engineering	D	2			**2**	**5**		S	60
WZ5391	Process analysis and digitization	D	2	1	2	**5**	**6**		S	90
WZ5312	Molecular Dynamics Simulation in Life Science Engineering	D	1	1		**2**	**5**		M	30
WZ5189	Process control technology	D	2			**2**	**5**		PS	30
WZ5128	Rheology	D	2	1		**3**	**5**		S	60
WZ5215	Stirring and mixing	D	2	1		**3**	**5**		S	60
WZ5134	Production system simulation	D	2	1		**3**	**5**		S	60
WZ5241	Systems Process Engineering	D	2	2		**4**	**6**		S	60
WZ5380	Separation process for biogenic substances	D	2			**2**	**5**		S	60
WZ5005	Materials science	D	2			**2**	**5**		S	60
WZ5264	Scientific computing with MATLAB	D	1	3		**4**	**6**		M	20

Law and economics

WI000190	General business administration	D	2			**2**	**5**		S	60
WZ2755	General economics	D	2			**2**	**5**		S	60
WZ5196	Patents and trademarks	D	2			**2**	**5**		S	60
WI001165	Sustainable Entrepreneurship - Getting Started	E		4		**4**	**6**		W+PS (3:1)	-
WI001161	Fundamentals of corporate management	D	3			**3**	**5**		S	120
WZ5499	Applied technical and scientific communication	D			4	**4**	**6**		W+PS (1:1)	-
WZ5297	Accounting, cost and investment accounting	D	5			**5**	**6**		S	120
WZ5138	Technical innovation management	D	2			**2**	**5**		M	30

Explanations:

Sem. = semester; SWS = semester hours per week; V = lecture; Ü = exercise; ÜL = exercise performance; P = practical; S = written exam; M = oral exam; L = laboratory performance; W = scientific paper; PS = presentation; D = German; E = English

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

D Credit balance

Semester	Credits					Exams		SWS	
	Mandatory modules	Elective modules: Prüfungs-leistung	Studien-leistung	Master's Thesis	Total	Duty	Choice	Duty	Choice
1	15	19	4		60	3	4	7	20
2	22					4		10	
3	13	15	2		60	3	3	12	10
4				30					
	50	**34**	**6**	**30**	**120**	**10**	**7**	**29**	**30**

The time distribution of the elective modules represents a possible example. Students are free to distribute the elective modules over the entire course of study according to their personal needs.

Appendix 2: Suitability procedure

Qualification procedure for the Master's degree in Pharmaceutical Bioprocess Engineering at the Technical University of Munich

1. purpose of the procedure

[1]In addition to the requirements of Section 36, Paragraph 1, Nos. 1 and 3, qualification for the Master's degree program in Pharmaceutical Bioprocess Engineering requires proof of suitability in accordance with Section 36, Paragraph 1, No. 2, subject to the following regulations. [2]The special qualifications and skills of the applicants should correspond to the occupational field of pharmaceutical bioprocess technology. [3]Individual suitability parameters are:

1.1 Ability to work in a scientific or basic and methodological manner,

1.2 Existing expertise from undergraduate studies in engineering and bioprocess technology,

1.3 Ability to solve complex and difficult problems,

1.4 Understanding of application problems,

1.5 Discernible understanding and appropriate background knowledge of issues in pharmaceutical bioprocessing and related fields.

2. Suitability testing procedure

2.1 The eligibility review process is conducted annually in the winter semester by the Campus Office of the TUM School of Life Sciences.

2.2 Applications for admission to the procedure must be submitted to the Technische Universität München together with the documents according to 2.3.1 up to and including 2.3.5 for the winter semester in the online application procedure by May 31 (cut-off deadline).

2.3 The application must be accompanied by:

2.3.1 a transcript of records with modules amounting to at least 120 credits, of which at least 110 credits must be designated as examination credits; the transcript of records must be issued by the competent examination authority or the competent study secretariat,

2.3.2 a Curricular Analysis derived from the Transcript of Records must be completed as part of the online application process and attached as a hard copy to the application materials,

2.3.3 a curriculum vitae in tabular form,

2.3.4 a written justification of one DIN-A4 page for the choice of the study program Pharmaceutical Bioprocess Engineering at the Technical University of Munich, in which the applicants explain their special motivation for the Master's program Pharmaceutical Bioprocess Engineering at the Technical University of Munich; the special motivation is to be justified, for example, by explanations of study program-specific vocational training, internships, stays abroad or subject-specific further education in the Bachelor's program that went beyond attendance times and compulsory courses; this is to be supported by attachments, if applicable This must be substantiated by attachments, if necessary,

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. Suitability procedure commission

3.1 [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 Pharmaceutical Bioprocess Engineering, at least two university professors and at least one research assistant. [2]At least half of the commission members must be university professors. [3]A student representative shall participate in the commission in an advisory capacity.

3.2 [1]The appointment of the members shall be made by the Dean in consultation with the Associate Dean for Academic Affairs. [2]At least one university lecturer is appointed as a deputy member of the commission. [3]The Study Program Director usually chairs the commission. [4]Article 41 of the BayHSchG, as amended from time to time, shall apply to the course of business.

3.3 [1]If the commission acts in accordance with these statutes, the revocable assignment of certain tasks to individual commission members is permissible. [2]If, pursuant to sentence 1, only one commission member is active in the performance of certain tasks, this member must be a university lecturer. [3]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. [4]The commission shall ensure an appropriate allocation of responsibilities. [5]If there is room for maneuver in the evaluation of an assessment criterion of the suitability procedure and two members of the commission are active in the evaluation of this criterion, the members of the commission shall evaluate independently according to the weighting specified, unless otherwise regulated; the score shall be the arithmetic mean of the individual evaluations, 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. 2.3 are submitted in due form and time and in full.

4.2 [1]Whoever fulfills the necessary requirements according to No. 4.1 will be examined in the suitability procedure according to No. 5. [2]If 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 <u>First stage of the implementation of the suitability procedure</u>

5.1.1 [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). [2]The commission shall evaluate the submitted documents on a scale of 0 to 90 points, whereby 0 is the worst and 90 the best result to be achieved.

The following evaluation criteria are included:

a) **Professional qualification**

[1]The curricular analysis is not carried out by schematic comparison of the modules, but on the basis of competencies. [2]It is based on the elementary subject knowledge

groups of the bachelor's degree program in bioprocess technology at the Technical University of Munich listed in the table.

Expertise group	Minimum number of creditsTUM
Science and general education	40
Engineering	35
Bioprocess technology, biotechnology, pharmacy	35

[3]If it has been determined that there are no significant differences with regard to the acquired competencies (learning outcomes), a maximum of 60 points will be awarded. [4]If this value is not an integer, it will be rounded up to the next higher number. [5]Missing competencies will be deducted according to the credits of the assigned modules of the bachelor's degree program Bioprocess Engineering at the Technical University of Munich.

b) **Final grade**

[1]One point is awarded for each tenth of a grade that the average calculated over examination performances amounting to 110 credits is better than 4.0. [2]The maximum number of points is 30. [3]Negative points are not awarded. [4]For foreign degrees, the grade converted via the Bavarian formula is used.

[5]If a degree certificate with more than 110 credits is available at the time of application, the evaluation will be based on the best graded modules amounting to 110 credits. [6]The applicants must list these as part of the application as well as assure the correctness of the information provided in writing.

[7]The average is calculated from graded module examinations amounting to 110 credits. [8]The overall grade point average is calculated as the weighted grade point average of the modules. [9]The grade weights of the individual modules correspond to the assigned credits.

5.1.2 [1]The total score for the first stage of the suitability procedure is the sum of the individual scores according to 5.1.1 a) and b). [2]Digits that do not disappear are to be rounded up.

5.1.3 [1]Whoever has achieved at least 60 points has passed the aptitude test. [2]In cases where it has been determined that only individual subject requirements from the first degree program are not met, the commission for the aptitude test may require as a condition that basic examinations from the bachelor's degree program in bioprocess engineering to the extent of a maximum of 30 credits be taken. [3]These basic examinations must be successfully passed in the first year of study. [4]Failed basic examinations may only be repeated once within this period on the next examination date. [5]The examination board may make admission to individual module examinations dependent on passing the basic examination.

5.1.4 Those who have scored less than 50 points have not passed the eligibility process.

5.2 Second stage of the implementation of the suitability procedure

5.2.1 [1]The remaining applicants shall be invited to a selection interview. [2]In the second stage of the aptitude test, the qualification acquired in the first degree program and the result of the selection interview shall be evaluated. [3]The date of the selection interview shall be announced at least one week in advance. [4]Time slots for any selection interviews to be held must be set before the application deadline. [5]The date set for the interview must be observed by the applicants. [6]If the request is justified and approved by the Commission, a selection interview by video conference is possible. [7]The applicant

bears the risk in the event of any technical problems, unless the Technische Universität München is responsible for these. [8]Anyone who is prevented from attending the selection interview for reasons for which he or she is not responsible may, upon justified request, be given a subsequent appointment no later than two weeks before the start of lectures.

5.2.2 [1]The selection interview shall be conducted individually for the applicants. [2]The interview shall last a minimum of 20 minutes and a maximum of 30 minutes per applicant. [3]The written statement of reasons submitted in accordance with No. 2.3.4 is available to the commission members at the selection interview and serves as the basis for the interview. [4]It shall not be evaluated. [5]The content of the interview covers the following main topics:

- The applicant's special willingness to perform for the pharmaceutical bioprocess technology program, whereby the following criteria (maximum 9 points each) are included in the evaluation:
  The applicant or the applicant
  - Demonstrates an understanding of the subject areas of the program as well as a scholarly approach to them,
  - Reflects on his/her life and career goals and, in this context, explains the importance of the course of study in achieving these goals,
  - Reflects on own talents and competencies and relates them to the goals of the program,
  - Is willing to engage in independent learning beyond the hours of attendance,
  - correctly assesses the personal suitability profile to be proven on the basis of the curriculum vitae and previous education.
- understanding of engineering issues and interrelationships by outlining the solution to an exemplary problem (maximum 45 points).

[6]The subject of the interview may also be the documents submitted according to 2.3. [7]Scientific knowledge that is to be imparted only in the Master's program in Pharmaceutical Bioprocess Engineering is not decisive. [8]With the consent of the applicants, a member of the student group may be admitted to the audience.

5.2.3 [1]The selection interview is conducted by two members of the commission. [2]The commission members independently evaluate each of the two focal points, with the two focal points being weighted equally and added up. [3]Each of the members records the result of the selection interview on the point scale from 0 to 90, where 0 is the worst and 90 is the best result to be achieved. [4]The score is the arithmetic mean of the scores of the two members. [5]Non-vanishing decimal places shall be rounded up.

5.2.4 [1]The total score of the second stage results from the arithmetic mean of the evaluation of the qualification acquired in the first degree (sum of the scores of 5.1.1 a) and 5.1.1 b) and the evaluation of the selection interview according to 5.2.3. [2]Whoever has achieved 70 or more points has passed the aptitude test. [3]Applicants with a total score of less than 70 points have not passed the aptitude test.

5.3 Announcement of the result

[1]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. [2]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. [3]Rejection notices shall state the reasons and be accompanied by instructions on how to appeal.

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

6. Documentation

[1]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. [2]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.