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Academic and Examination Regulations of the Master's Degree Program in Civil Engineering at the Technical University of Munich

As of 1 June 2016

Consolidated version as amended by the Fifth Amending Statute of 15 November 2021

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

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§ 34
Applicability, Academic Titles

(1) [1]The Academic and Examination Regulations for the Master's Program in Civil Engineering (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. [2]The APSO has precedence.

(2) [1]Upon successful completion of the master's examination the degree "Master of Science" ("M.Sc.") is conferred. [2]This academic title may also be used with the name of the university ("TUM").

§ 35
Commencement of Studies, Standard Duration of Studies, ECTS

(1) [1]Commencing studies in the Master's Program in Civil Engineering at the Technical University of Munich is possible both in the winter and in the summer semester. [2]TUM recommends starting the degree program in the winter semester.

(2) [1]The number of classes in required and elective subjects needed to obtain the master's degree is 90 credits (70 weekly hours per semester) spread over three semesters. [2]As set out in § 46, another 30 credits are earned for the master's thesis. [3]The number of examinations to be completed in the Civil Engineering master's program thus totals at least 120 credits. [4]The 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 Civil Engineering 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 Civil Engineering or a comparable degree program,
2. sufficient knowledge of German in accordance with § 7(4)9 of the TUM Enrollment, Student Fees Payment, Leave of Absence, and Disenrollment Regulations (ImmatS) of 9 January 2014 as amended, or adequate knowledge of English; for this purpose, students whose language of instruction was not English must demonstrate proficiency through a recognized 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
3. passing of the Aptitude Assessment in accordance with Appendix 2.

(2) A degree is considered a qualified degree within the meaning of (1) above if there are no significant differences from the competencies (learning outcomes) acquired in the scholarly oriented Bachelor's Degree Program Civil Engineering of the Technical University of Munich specified in § 36(1)1 and if these outcomes correspond to the subject-specific requirements of the master's program.

(3) The module catalog of the Bachelor's Degree Program Civil Engineering is taken into consideration when carrying out the first stage of the Aptitude Assessment in accordance with § 36(2).

§ 37
Modular Structure, Module Examination, Courses, Areas of Specialization, Language of Instruction

(1) [1]General provisions concerning modules and courses are set out in §§ 6 and 8 of the APSO. [2]§ 12(8) of the APSO applies for any changes to the stipulated module provisions.

(2) The curriculum listing the required modules is included in Appendix 1.

(3) [1]In accordance with Appendix 1, students must choose either four areas of concentration, or three areas of concentration plus a non-major concentration to personalize their degree program profile. [2]One of the concentrations must be declared as the major subject. [3]The major must be one of the subject areas in Appendix 1. [4]The choice of concentrations as well as required modules within the non-major concentration should be made by the end of the first semester of enrollment in the degree program and may only be changed during that first semester. [5]An authorized examiner from the relevant Chair (or discipline) who acts as mentor for the major subject advises students on creating their degree program profile. [6]The scope of the individual degree program profile is determined by indicating the selected concentrations and major subject and, in the case of the non-major concentrations, indicating the subjects to be studied, which can also be selected from several TUM Schools and Departments. [7]In consultation with students, the mentor specifies which of the modules are required in the event that non-major concentrations are being chosen. [8]It is assumed in this context that foundational and elective courses constituting part of a concentration in upper-division courses in the TUM Bachelor's Degree Program Civil Engineering have been successfully completed or comparable credits successfully earned or that these subjects are chosen as subjects toward a minor. [9]Checking whether combinations of subjects are permitted is carried out while considering whether the choice of modules may be justified in reference to professional qualification. [10]Cases where unusual combinations are indicated that are not mentioned for the master's degree program curriculum in Civil Engineering must be justified in writing.

(4) [1]Each concentration must include completion of required modules amounting to 12 credits as well as elective modules amounting to at least 6 credits. [2]The elective modules must each be selected from a catalog of elective modules for the concentrations in question. [3]Modules amounting to a total of 21 credits must be completed for a non-major concentration. [4]In this case, too, required modules amounting to 12 credits must be specified. [5]At the same time, students are also required to complete 9 credits of elective modules (in case of a non-major concentration) or 12 credits of elective modules (for a major concentration) from the general course catalog of elective modules of the Civil Engineering master's degree program. [6]Furthermore, in addition to the modules completed as part of the bachelor's degree, students are required to select graded modules amounting to at least 6 credits from the general course catalog of the Technical University of Munich (minor subjects).

(5) [1]Contrary to (3), students who have contractually committed to take part in a 1:1 or double-degree program must choose courses individually. [2]The choice of individual courses must be made in consultation with a mentor and with Departmental Student Advising and must be approved by the Examination Board.

(6) [1]In addition to German-language modules, a sufficient number of modules are offered in English. [2]This means it is possible to complete the master's degree program as an English Track. [3]Students who have not verified their knowledge of German in the application process are conditionally admitted with the stipulation that by the end of the second semester of enrollment in the degree program they complete at least one module of integrative German skills. [4]The offer is announced by the Examination Board via its standard communication channels. [5]Optional credits completed in extracurricular courses, such as German courses offered by the TUM Language Center, are also recognized. [6]The language of the respective required module is indicated in Appendix 1.

§ 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) [1]At least one of the module examinations from the electives listed in Appendix 1 or at least one of the module examinations from the required non-major concentration must be successfully

completed by the end of the second semester. [2]If the deadline is missed, §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 Master's Examination Board for Civil Engineering of the TUM School of Engineering and Design.

§ 40
Recognition of Periods of Study, Coursework, and Examination Results

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

(2) Coursework and examination requirements credits completed for this master's degree program in accordance with an individual curriculum for a double degree program or a 1:1 program are recognized without an equivalence assessment.

§ 41
Examinations to Accompany Courses, Types of Examination

(1) In addition to written examinations and oral examinations, types of examination in accordance with § 12 and § 13 of the APSO may include (but are not limited to) laboratory assignments, practical credit requirements (course certificates, if applicable), reports, project work, presentations, learning portfolios, research papers, or *Prüfungsparcour* (a series of different exams).

[1]A 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 and solution strategies and, if required, implement these strategies. [2]The duration of written examinations is governed by § 12(7) of the APSO.

b) [1]Practical credit requirements (course certificates, if applicable) involve students completing assigned tasks (such as solving mathematical problems, writing computer programs, preparing models) with the objective of using theoretical knowledge to solve application-oriented problems. [2]Laboratory assignments are designed to assess a student's factual and detailed knowledge and its application. [3]Practical credit requirements may be carried out in writing, verbally, or electronically. [4]Possible forms are, for example, assignments, lab-procedure instructions, programming assignments, (e-)tests, assignments in connection with internships, etc. [5]Details of each practical credit requirement and the competencies to be examined are set out in the module description.

c) [1]A 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. [2]Students are expected to demonstrate that they have understood all essential aspects and are able to present them in writing. [3]Reports may include excursion reports, internship reports, work reports, etc. [4]The written report may be complemented by a presentation for the purpose of assessing the student's communication skills when presenting scholarly work to an audience.

d) [1]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. [2]In addition, project work may include a presentation or a subject-specific discussion in order to assess a student's communication skills when presenting scholarly work to an audience. [3]Details of each module examination and the related competencies to be examined are set out in the module description. [4]Project work may also be carried out in groups. [5]Such projects should demonstrate the ability to complete tasks in a team. [6]The contribution to be graded as the examination must be clearly recognizable as unique and assessable. [7]This also applies to individual contributions as part of a group outcome.

e) [1]A 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 relevant discipline. [2]Students are expected to demonstrate that they are able to solve problems corresponding to the learning outcomes of the module in question in compliance with the guidelines for scholarly work – from analysis and conception, all the way to implementation. [3]Forms of presentation which differ in how demanding they are may include research papers, conceptual framework/theory paper, abstract, term paper, seminar paper, etc. [4]The research paper may be complemented by a presentation and/or a colloquium for the purpose of assessing the student's communication skills when presenting scholarly work to an audience. [5]The specific details of each research paper and the related competencies to be examined are set out in the module description.

f) [1]A 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 reducing complex problems to their essential core. [2]The presentation should demonstrate the ability to prepare a 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. [3]In addition, the student is expected to demonstrate that he or she is able to respond competently to any questions, suggestions, or discussion issues raised by the audience. [4]The presentation may be complemented by a brief written précis. [5]The presentation can be given either for individual or group credit. [6]The contribution to be respectively graded as the examination must be clearly recognizable as unique and assessable. [7]This also applies to individual contributions as part of a group outcome.

[1]An oral examination is a timed, graded discussion on relevant topics and specific questions that are to be answered. [2]Oral examinations must demonstrate that the goals specified in module descriptions have been achieved, the structure of the area being examined has been recognized, and that specific questions can be answered in terms of this structure. [3]An oral examination can be carried out with a single candidate or as a group exam. [4]The duration of the examination is governed by § 13(2) of the APSO.

h) [1]Depending on the discipline, laboratory assignments may include experiments, measurements, field work, field exercises, etc., with the objective of students carrying out such work, evaluating results, and gaining knowledge. [2]These may consist of, for example, process descriptions and presentation of the underlying theoretical principles including studying the relevant literature; preparation and practical implementation; carrying out any calculations necessary, and documentation, evaluation, and interpretation of the results in the context of the knowledge to be gained. [3]Laboratory assignments may be complemented by presentations designed to demonstrate a student's communication skills when presenting scholarly work to an audience. [4]The specific details of each lab assignment and the related competencies to be examined are set out in the module description.

i) [1]A learning portfolio is a collection of written materials compiled by the student according to predefined criteria that exhibits the student's progress and achievements in defined content areas at a given time. [2]Students are required to explain according to which criteria they have chosen the materials and their relevance for their learning progress and the achievement of the qualification objectives. [3]The learning portfolio should demonstrate that aforesaid students

took personal responsibility for their learning progress and that the learning objectives defined in the module description were achieved. [4]Depending 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. [5]Details of each module examination and the related competencies to be examined are set out in the module description.

j) [1]Several examination components must be completed as part of a graded exam within the framework of a parcours examination. [2]Unlike a module examination component, parcours exam components are administered in sequence and completed in a specific time frame and at a specific location. [3]Parcours elements entail various examination formats, which together cover the entire profile of skills in the module. [4]The elements of the examination can involve the forms of examination set out in sections a) to i). [5]The overall duration of the examination must be set out in the module catalog, while the type and duration of individual examination elements must be specified in the module description.

(2) [1]As a rule, module examinations are taken concurrently with the degree program. [2]The type and duration of module examinations are stipulated in Appendix 1. [3]§ 12(8) of the APSO applies for any changes to the stipulated module provisions. [4]The assessment of the module examination is governed by § 17 of the APSO. [5]The grade weights of module examination components correspond to the weighting factors assigned to them in Appendix 1. [6]The relevant modules identified in Appendix 1 are only given a passing grade if every module examination component is given a passing mark.

(3) Where Appendix 1 indicates that a module examination is either in written or oral form, the examiner must officially inform students in an appropriate manner of the type of examination no later than the first day of classes.

§ 42
Registration for and Admission to the Master's Examination

(1) [1]Students who are enrolled in the Master's Degree Program Civil Engineering are deemed to be admitted to the module examinations of the master's examination. [2]Students are also deemed admitted to individual module examinations if they take additional examinations as part of the consecutive Bachelor's Degree Civil Engineering at the Technical University of Munich in accordance with the program-specific Academic and Examination Regulations for the Master's Degree Program Civil Engineering at the Technical University of Munich that apply to them.

(2) [1]Registration requirements for required and elective module examinations are stipulated in § 15(1) of the APSO. [2]The registration requirements for repeat examinations for failed required modules are governed by § 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 specified modules according to § 43(2), and
2. the master's thesis pursuant to § 46.

(2) [1]The module examinations are listed in Appendix 1. [2]There are 48 credits required in compulsory modules and 42 credits in elective modules. [3]The 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

In the Master's Degree Program Civil Engineering, no modules are completed as pass/fail credits.

§ 45a
Multiple Choice Tests

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

§ 46
Master's Thesis

(1) As part of the master's examination, each student must write a master's thesis in accordance with § 18 of the APSO.

(2) [1]Work on the master's thesis should commence immediately after successful completion of all module examinations. [2]Students can apply for early admission to the master's thesis if 75 credits have been earned. [3]The master's thesis should be written in a concentration chosen according to Appendix 1. With the approval of the Examination Board, the master's thesis can be completed in a non-major concentration.

(3) [1]The period between topic assignment and submission of the completed master's thesis must not exceed six months. [2]The master's thesis is considered presented and failed if the student fails to submit it on time without valid reasons as specified in § 10(7) of the APSO. [3]The master's thesis may be written in either German or English.

(4) [1]The completion of the master's thesis consists of a written paper and a presentation about its content. [2]The presentation does not affect the grade.

(5) [1]If the master's thesis was not graded with at least "sufficient" (4.0), it may be repeated once with a new topic. [2]In such cases, students must re-register their application to prepare the master's thesis module within six weeks of receipt of the grade.

§ 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 at least 120 credits have been earned.

(2) [1]The module grade is calculated in accordance with § 17 of the APSO. [2]The overall grade for the master's examination is calculated as the weighted grade point average of the modules according to § 43(2) and the master's thesis. [3]The grade weights of the individual modules correspond to the credits assigned for each module. [4]The overall assessment is expressed using the categories designated in § 17 of the APSO.

§ 48
Degree Certificate, Diploma, Diploma Supplement

If the master's examination is 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.

§ 49
§ 49 Double Degree

[1]The Technical University of Munich and the universities École Polytechnique (France), École Nationale des Ponts et Chaussées (France), Universidad Politécnica de Madrid (Spain), Kungliga Tekniska Högskolan (Sweden), České vysoké učení technické v Praze (Czech Republic), Universidad Nacional de Tucumán (Argentina) and Universidad Nacional de Cuyo (Argentina) all offer a double degree program based on a cooperation agreement. [2]The following special regulations apply to students completing the Master's Degree Program Civil Engineering at the Technical University of Munich who are taking part in one of these double degree programs:

1. [1]The participants are selected in two stages. [2]First, potential participants are selected based on their success in secondary school, academic success at university, knowledge of the German or English language, and motivation. [3]The final selection is then made on the basis of personal discussions with representatives of both universities.
2. [1]The following also applies to students participating in one of the programs with the Universidad Nacional de Tucumán or the Universidad Nacional de Cuyo: [2]Adequate mastery of Spanish at the B2 level is required. [3]Contrary to § 37(3), students of the Technical University of Munich who have been selected for the program are required to choose the specializations geotechnics, tunnel construction and a specialization from among mechanics, hydromechanics, solid construction, traffic route construction or risk analysis. In addition, an interdisciplinary specialization must be chosen, which is to be completed during the period of study at the Universidad Nacional de Tucumán or the Universidad Nacional de Cuyo. [4]The master's thesis can be completed at the Technical University of Munich, the Universidad Nacional de Tucumán, or the Universidad Nacional de Cuyo, whichever the student chooses.
3. Students who successfully complete the double-degree program receive, in addition to the degree of the Technical University of Munich, a degree from the particular partner university.

§ 50
Entry Into Force*)

(1) [1]These regulations enter into force on 1 October 2016. [2]Contrary to Sentence 1, the provisions of Appendix 2 prevail: They apply to all students who commence their studies at the Technical University of Munich as of the summer semester 2017.

(2) [1]At the same time, the Academic and Examination Regulations for the Master's Degree Program Civil Engineering at the Technical University of Munich of 1 August 2011, last amended by the regulations of 20 August 2015 no longer apply, with the exception of the provision in Paragraph 1. [2]Students who commenced their studies at the Technical University of Munich prior to the winter semester 2016/17 are to complete their studies in accordance with the regulations named in Sentence 1. [3]Students who commenced their master's degree studies in civil engineering at the Technical University of Munich in the summer semester of 2016 can apply to switch to the new program-specific Academic and Examination Regulations.

*) This provision relates to the entry into force of the regulations in the original version of 1 June 2016. The date of entry into force of the changes results from the amendment statutes.

Appendix 1: Examination modules (required modules)

[1]In each selected area of concentration, 12 credits must be earned in required modules and 6 credits in elective modules. [2]In addition, 12 credits (or 9 credits if a non-major concentration is chosen) must be earned from the complete catalog of elective modules in the Master's Degree Program Civil Engineering.
[3]The Examination Board regularly updates the elective modules course catalog. [4]This is communicated in an appropriate manner by the beginning of the semester at the latest. [5]Furthermore, in addition to the modules completed as part of the bachelor's degree, students are required to select graded modules amounting to at least 6 credits from the general course catalog of the Technical University of Munich (minor subjects).

1 Structural Design
(Baukonstruktion)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU51038	Structural Design concentration	4	8	2VI + 2SE	Learning portfolio	German	WiSe
BV060001	Fundamentals of Fire Protection	2	4	2VI	K (60 min)	German	WiSe

2 Structural Mechanics
(Baumechanik)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV430008	Structural Dynamics	5	6	2VO + 1SE + 2UE	K (90 min)	English	SoSe
BV020001	Continuum Mechanics	5	6	4VI + 1SE	K (90 min)	English	WiSe

3 Building Physics
(Bauphysik)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV360014	Building Physics Major	8	12	3VO+ 1UE + 3VO + 1UE	K (180 min)	German	SoSe + WiSe

4 Building Process Management

Management of Business and Engineering Processes

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV550009	Project and Corporate Processes in the Building Industry	4	6	2VI + 2VI	K (90 min) or M (60 min)	German	SoSe
BV550010	Seminar "The Engineer as an Entrepreneur in the Building Industry"	2	6	2SE	K (60 min) or M (60 min)	German	WiSe

5 Building Maintenance

Condition Control and Repair of Structures

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU64008	Building Maintenance	10	12	1UE + 1VO +3VO + 3VO + 2VO	K (180 min)	German	WiSe + SoSe Duration: 3 Sem.

6 Computation in Engineering

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU44013T2	Computation in Engineering I	3	6	2VO + 1UE	K (90 min) Practical credit requirement (SL)	English	WiSe
BGU44014T2	Computation in Engineering II	3	6	3VI	K (90 min) Practical credit requirement (SL)	English	SoSe

7 Energy-efficient and Sustainable Design and Building

(Energieeffizientes und nachhaltiges Planen und Bauen)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem. BGU6 2040
	System Effects and Interdependencies of Sustainable Planning in Civil Engineering	4	6	2VO + 2SE	K (90 min)	English	WiSe
BGU62039	Case Studies of Sustainable Urban Developments and Infrastructure	4	6	2VO + 2SE	Research Paper	English	SoSe

8 Geotechnical Engineering

Advanced Geotechnics

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU50014	Advanced Soil and Rock Mechanics	5	6	5VI	K (120 min)	German	WiSe
BGU50017	Special Mining and Rock Engineering	4	6	4VI	K (120 min)	German	SoSe

9 Timber Technology
(*Holzbau*)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU51034	Timber Engineering	5	8	3VI + 2VI	K (120 min)	German	WiSe + SoSe
BGU51024	Timber in Construction	2	4	2VI	K (60 min) or M (30 min)	German	WiSe

10 Hydromechanics
(*Hydromechanik*)

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU41025T2	Numerical Methods in Hydromechanics	4	6	2VO + 2UE	K (60 min) Presentation Weighting (1:1)	English	SoSe
BGU41016	Fluid Mechanics and Groundwater Hydraulics	4	6	2O + 2VO	K (90 min)	English	WiSe

11 Real-Estate Development

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV550017	Sustainable Real-estate Development	4	6	2VI + 2VI	K (90 min) or M (60 min)	German	SoSe

BV550018	Seminar Real-Estate Investment	2	6	2SE	K (60 min) or M (60 min)	German	WiSe

12 Concrete and Masonry Structures

Massivbau

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV090060	Concrete Construction in Structural Engineering	2	4	1V+1Ü	K (60 min)	German	WiSe
BGU63016	Pre-set Concrete and Masonry Bridge Building	6	8	1.5 VO + 1.5 VO + 1.5 UE + 1.5 UE	K (120 min)	German	WiSe + SoSe

13 Metal Structures

Metallbau

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU42014T2	Composite Structural and Bridge Engineering	3	6	3VI	K (75 min) Project work (SL)	German	WiSe
BGU42015T2	Plate Buckling and Steel Bridge Engineering	3	6	3VI	K (75 min) Project work (SL)	German	SoSe

14 Engineering Risk and Reliability

Risikoanalyse und Zuverlässigkeit

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU60020	Risk Analysis	4	6	4VI	K (90 min)	English	WiSe
BGU60021	Risk Assessment and Reliability of Engineering Systems	5	6	2O + 3VO	M (40 min)	English	SoSe

15 Urban Water Systems Engineering

Siedlungswasserwirtschaft

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.

BGU38014	Water and Wastewater Treatment Engineering	4	6	4 VI	K (120 min)	English	WiSe
BGU38011	Management of Channel Networks and Rainwater Management	4	6	4 VI	K (120 min)	German	SoSe

16 Structural Analysis

Statik

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU32027D2	Structural Analysis of Plates and Shells	8	6	2VO + 2UE + 2VO + 2UE	K (90 min) + K (90 min) Weighting (1:1)	English	WiSe + SoSe
BGU32028	Finite Element Method	8	6	4VI + 2VO + 2UE	K (180 min)	English	WiSe + SoSe

17 Traffic Control and Transport Planning

Verkehrstechnik und Verkehrsplanung

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU52018	Interactions of Land Use and Transport	2	3	2 VO	K (60 min)	English	WiSe
BGU56045	Modeling and Control of Traffic Flow	6	9	1VO + 1VO + 1UE + 1 UE + 2 VO	K (180 min)	English	WiSe + SoSe

18 Road, Railway and Airfield Construction

Verkehrswegebau

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV340010	Surveying in Highway Engineering	4	8	1VO + 1 SE + 1 VO + 1 SE	K (90 min) Practical credit requirement (SL)	German	WiSe + SoSe
BV340011	Special Issues in Highway Engineering	2	4	1VO + 1VO	K (60 min) Practical credit requirement (SL)	German	WiSe

19 Hydraulic and Water Resources Engineering

Wasserbau und Wasserwirtschaft

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BV460007	Planning and Design in Hydraulic Engineering	8	12	2VO + 4PT + 2VO	K (120 min) + Report Weighting (1:1)	English	WiSe + SoSe

20 Building Materials
Werkstoffe

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU35009	Additive Materials and Special-Purpose Concretes	5	7	2VO + 3VO	K (150 min)	German	WiSe
BGU37011	Mineral Materials	4	5	2O + 2VO	K (120 min)	German	WiSe + SoSe

21 Advanced Tunneling
Tunnelbau

Module no.**	Title	SWS	Credits	Type of instruction[X]	Examination type and duration	Language of instruction	Sem.
BGU50013	Engineering Geology and Geotechnical Aspects of Tunnel Engineering	4	6	4VI	K (90 min)	German	WiSe
BGU50011	Concrete Construction and Engineering Surveying in Tunnel Construction	4	6	2.5VI + 1.5VO	K (120 min)	German	SoSe

Legend:

WiSe = winter semester, SoSe = summer semester, Sem. = semester, SWS = weekly hours per semester, K = written exam, M = oral exam, SL = pass/fail coursework, VO = lecture, VI = lecture with integrated practical activity, UE = practical activity, SE = seminar, PT = project

Up to 30 credits for examinations passed at another university as part of a master's degree (e.g., semester abroad) can be transferred and can also be included as electives in the master's examination according to the electives catalog, even where there is no corresponding module in the module catalog of the Technical University of Munich but the requirements correspond to those of the master's program in civil engineering. The Master's Examination Board in Civil Engineering decides on the acceptance of examination results in coordination with the academic advisor for the Master's degree in Civil Engineering and the international representative of the TUM School of Engineering and Design.

** The specified module numbers are subject to change; the current module numbers are found in the study flow chart from TUMonline.

x Depending on the requirements for the current semester, the allocation of SWSs to courses can vary by one SWS; the specific allocation of SWSs to courses is announced in the module description in accordance with local practice.

Appendix 2: Aptitude Assessment

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

1. Purpose of the Process

[1]Eligibility for the Master's Degree Program Civil Engineering, in addition to the requirements in accordance with § 36(1)1 and 2, requires proof of aptitude as set out in § 36(1)3 in accordance with the following provisions. [2]The special qualifications and skills of candidates should correspond to the professional field of Civil Engineering. [3]The individual aptitude parameters are:

1.1 ability to do research work and/or basic research and methodological work,

1.2 specialist knowledge in the field of Process Engineering from a bachelor's degree program comparable to the bachelor's degree program in Civil Engineering at the Technical University of Munich,

1.3 subject-specific spoken and written language skills in both,

1.4 A scholarly interest in civil engineering problems and challenges.

2. The Aptitude Assessment process

2.1 The Aptitude Assessment Process is conducted every six months, once in the summer semester for the following winter semester and once in the winter semester for applications to commence studies in the following summer semester.

2.2 [1]Applications for admission to the Aptitude Assessment Process for the winter semester must be submitted to the Technical University of Munich together with the documents listed in 2.3.1 through 2.3.4 no later than 31 May and for the summer semester by 15 January (absolute deadlines). [2]The student's diploma and graduation certificate, serving as proof of the conferral of the bachelor's degree, must be submitted to the Admissions and Enrollment Office of the Technical University of Munich no later than five weeks after the first day of classes. [3]In accordance with § 36 of these regulations, admission to the master's program is otherwise not possible.

2.3 The application must include:

2.3.1 a transcript of records containing modules amounting to at least 135 credits; the transcript of records must be issued by the relevant examination authority or academic programs office;

2.3.2 a curriculum vitae in tabular format,

2.3.3 a written statement (max. 1-2 A4 pages) giving the reasons for selecting the degree program in Civil Engineering at the Technical University of Munich, in which applicants explain why, based on what specific talents and interests, they consider themselves particularly suitable for the Master's Degree Program Civil Engineering at the Technical University of Munich. The applicant's exceptional motivation to perform must be demonstrated, for example, by providing details of program-related vocational training, internships, periods spent abroad, or program-related further education going beyond the attendance and course requirements of the bachelor's program. This is to be confirmed by appendices, as appropriate.

2.3.4 a declaration that the written statement (2.3.3) is the applicant's own work and that the applicant has clearly identified any ideas taken from outside sources.

3. The Aptitude Assessment Commission, Selection Committees

3.1 [1]The Aptitude Assessment is administered by the Aptitude Assessment Commission and the Selection Committees. [2]The Aptitude Assessment Commission is responsible for preparing and

organizing the Aptitude Assessment and ensuring a structured and standardized process for determining aptitude within the framework of these Regulations; it bears responsibility, as long as no other body is specified by these Regulations or its authority is delegated to another body. [3]Selection Committees are to carry out the assessment process in accordance with No. 5 below, subject to No. 3.2 Sentence 11.

3.2 [1]The Aptitude Assessment Commission consists of five members. [2]In consultation with the Vice Dean of Academic and Student Affairs, Commission members are appointed by the Dean from among authorized examiners of the TUM School of Engineering and Design who are members of the degree program faculty. [3]At least three of the Commission members must be university educators within the meaning of the Bavarian Act on Higher Education Staff (*BayHSchPG*). [4]The Departmental Student Council has the right to name a student representative to serve on the Commission in an advisory capacity. [5]A deputy is to be appointed for each member of the Commission. [6]The Commission elects a chairperson and a deputy chairperson from among its members. [7]Procedures are governed by § 30 of the TUM Charter as last amended. [8]The term of office for Commission members is one year. [9]Extensions of the term of office and reappointments are possible. [10]Urgent decisions that cannot be postponed can be made by the chairperson on behalf of the Commission; he or she must inform the Commission of such decisions without delay. [11]The Academic Programs Office supports the Commission and the Selection Committee; the Commission may delegate to the Academic Programs Office the task of assessing formal admissions requirements in accordance with Subsection 4, as well as the determination of points to be awarded based on defined criteria for which there is no discretionary leeway. This includes, in particular, conversion of grades and 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 appointed commissioners and assigning them to applicants.

3.3 [1]Each Selection Committee consists of two members of the TUM School of Engineering and Design authorized to administer examinations in the degree program according to § 62(1) Sentence 1 of the Bavarian Higher Education Act (*BayHSchG*) in conjunction with the act governing examiners at institutions of higher education (*HSchPrüferV*). [2]At least one member must be a university educator within the meaning of the Bavarian Act on Personnel in Higher Education (*BayHSchPG*). [3]It is permissible to serve on both the Aptitude Assessment Commission and the Selection Committee at the same time. [4]Members of the Committee are appointed by the Commission for a term of 1 year; No. 3.2 Sentence 9 applies accordingly. [5]Different Selection Committees may be assigned to individual criteria and stages.

4. Admission to the Aptitude Assessment

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

5. Stages of the Aptitude Assessment Process

5.1 <u>First Stage</u>

5.1.1 [1]It 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 pursuant to no. 1 (First stage of the aptitude assessment process). [2]The applicant's documents will be evaluated on a scale ranging from 0 to 100 points, 0 being the worst and 100 the best possible result.

The following criteria are applied:

1. **Discipline-specific Skills and Qualifications**

[1]The curricular analysis is conducted on the basis of competencies, rather than a schematic comparison of modules. [2]The analysis is based on the fundamental subject areas of the Bachelor's Degree Program Civil Engineering at the Technical University of Munich listed in the following table.

Academic Subject Area	Credits TUM
Higher Mathematics	**12**
Technical Mechanics, Hydromechanics	**22**
Civil Engineering Informatics and Environmental Informatics	**10**
Construction Process Management, Planning and Building Laws	**12**
Materials, Building Physics	**15**
Structural Design, Structural Theory, Statics	**18**

[3]If it is established that there are no significant differences in the competencies acquired (learning outcomes), a maximum of 60 points is awarded. [4]If this value is not a whole number, it is rounded up to the next whole number. [5]For any competencies missing, points equivalent to the amount of module credits for the respective competencies in the TUM bachelor's program in Civil Engineering are deducted from the overall score.

2. **Final Score**

[1]One point is awarded for each one-tenth of a grade point by which the average grade calculated from examinations worth a total of 150 credits exceeds 3.0. [2]The maximum score is 20. [3]Negative scores are not awarded. [4]Grades for international degrees are converted by applying the Bavarian formula.
[5]If the candidate has submitted a degree certificate exceeding 135 credits with the application, the assessment is made on the basis of the modules with the best grades amounting to 135 credits. [6]The applicant must submit a list of the modules with the best grades together with the application and confirm their accuracy in writing.
[7]If such a list is submitted, the average is calculated from graded module examinations with the highest grades that add up to 135 credits; if this list is not provided by the applicant, the overall average grade submitted is applied. [8]The overall grade average is calculated as a weighted grade average. [9]The grade weights of the individual modules correspond to the credits assigned to each module.

3. **Letter of Motivation**

[1]The applicant's written statement of reasons is evaluated and graded on a scale of 0 to 20 points. [2]The contents of the motivation letter are assessed using the following criteria:

1. ability to give objective reasons for choice of degree program,
2. ability to describe the relationship between personal interests and the content of the degree program in a well-structured manner.
3. ability to convincingly demonstrate special aptitude for the master's program by means of arguments and relevant extra-curricular activities and interests (see 2.3.3),
4. ability to verbally emphasize important points in his/her reasoning in an appropriate manner.

[3]Committee members independently assess each of the criteria with equal weighting. [4]The total score is calculated as the arithmetic mean of the individual assessments, rounded up to the next whole number.

5.1.2 [1]The total score of the first stage is calculated as the sum of the individual assessments. [2]Nonvanishing decimal places must be rounded up.

5.1.3 Applicants who score at least 80 points pass the Aptitude Assessment.

5.1.4 Applicants who score less than 70 points fail the Aptitude Assessment.

5.1 <u>Second stage</u>

5.2.1 [1]The remaining applicants are invited to an Aptitude Assessment interview. [2]During the second stage of the Aptitude Assessment, the skills acquired during the applicant's previous course of studies and the result of the assessment interview are evaluated. [3]Interview appointments are announced at least one week in advance. [4]Time slots for Aptitude Assessment interviews must be scheduled before the application deadline expires. [5]The interview appointment must be kept by the applicant. [6]If the applicant is unable to attend the Aptitude Assessment interview due to circumstances beyond his/her control, a later appointment may be scheduled upon a student's well-founded request, but must be set no later than two weeks before the first day of classes.

5.2.2 [1]The Aptitude Assessment interviews are held individually for each applicant. [2]Each applicant's interview must be carried out in English or German and be at least 20 minutes but not exceed 30 minutes. [3]The interview focuses on the following topics:

1. the reason for choosing the master's program in civil engineering,
2. discussion of the subject area for the bachelor's thesis,
3. understanding complex engineering issues and questions as expressed in a schematic presentation of a solution to an exemplary problem,
4. personal impression (after the interview):

[4]The documents submitted as specified in 2.3 can also serve as the subject matter. [5]Any subject-specific academic knowledge to be taught in the Civil Engineering master's degree program has no effect on the decision. [6]Subject to the applicant's approval, a representative of the student body may sit in on the interview.

5.2.3 [1]Each Selection Committee member assesses each of the four areas independently, with equal weighting assigned to each area of focus. [2]Each Selection Committee member grades the result of the interview on a 0 to 80 scale with 0 being the worst and 80 the best possible score. [3]The total score achieved is calculated based on the arithmetic mean of the individual assessment scores. [4]Nonvanishing decimal places must be rounded up.

5.2.4 [1]The total number of points awarded in stage 2 is the sum of the points scored under 5.2.3 and points under 5.1.1.1 (subject-specific qualification) and 5.1.1.2 (final grade). [2]Applicants who achieve a score of 115 points or more pass the Aptitude Assessment. [3]Applicants scoring less than 115 points fail the Aptitude Assessment.

5.3 Determining and announcing the result

[1]Official notification of the Aptitude Assessment is sent to the applicant based on the score achieved. [2]Notices of rejection must state the grounds for rejection and offer advice on legal remedies.

5.4 The aptitude determined for a degree program applies to all subsequent applications for admission to said degree program.

6. Documentation

[1]The 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, and the overall results must be specified. [2]The Aptitude Assessment interview must be documented, including the date, duration and location of the assessment, the names of the participating Selection Committee members, the applicant's name, and a bulleted list of main topics covered in the interview.

7. Repeating an Aptitude Assessment interview

Applicants who have failed an Aptitude Assessment may re-register one time only to repeat the assessment.