

**The officially published GERMAN text alone has binding force**

**Academic and Examination Regulations  
for the Master's Degree Program in  
Information Technologies for the Built Environment  
at the Technical University of Munich**

**As of 27 January 2022**

In accordance with § 13(1)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) <sup>1</sup>The Academic and Examination Regulations (FPSO) for the master's program in Information Technologies for the Built Environment 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. <sup>2</sup>The APSO has precedence.
- (2) <sup>1</sup>Upon successful completion of the master's examination the degree "Master of Science" ("M.Sc.") is conferred. <sup>2</sup>This academic title may also be used with the name of the university ("TUM").

### **§ 35**

#### **Commencement of Studies, Standard Duration of Studies, ECTS**

- (1) As a rule, the master's program in Information Technologies for the Built Environment at the Technical University of Munich commences in the winter semester.
- (2) <sup>1</sup>The number of credits in required and elective subjects needed to obtain the master's degree is 90 credits (60 weekly hours per semester) spread over three semesters. <sup>2</sup>In addition, a maximum of six months is scheduled for the completion of the master's thesis in accordance with § 46, as well as the master's colloquium. <sup>3</sup>The number of coursework units and examinations in required and elective subjects to be completed for the master's program in Information Technologies for the Built Environment thus totals at least 120 credits <sup>4</sup>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 Information Technologies for the Built Environment 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 Architecture, Landscape Architecture, Urban Planning, Civil Engineering, Geodesy and Geoinformatics, Informatics or comparable degree programs,
  2. 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(1) above if in the first qualifying degree there are no significant differences with regard to the competencies (learning outcomes) in the fundamental subject areas as stipulated in Appendix 2 Nr. 5.1.1 a).

### **§ 37**

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

- (1) <sup>1</sup>General provisions concerning modules and courses are set forth in §§ 6 and 8 of the APSO. <sup>2</sup>§ 12(8) of the APSO applies for any changes to the stipulated module provisions.
- (2) The curriculum listing the required and elective modules is included in Appendix 1.
- (3) <sup>1</sup>As a rule, the language of instruction in the Master's Degree Program Information Technologies for the Built Environment is English. <sup>2</sup>Modules taught entirely or partly in German are identified in Appendix 1. <sup>3</sup>Where the language of a module is specified as either English or German in Appendix 1, the examiner will determine the language of instruction and inform students in a suitable manner prior to commencement of classes. <sup>4</sup>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 in which they acquire integrative knowledge of German. <sup>5</sup>The offer is announced by the Examination Board via its standard communication channels. <sup>6</sup>Optional credits completed in extracurricular courses, such as German courses offered by the TUM Language Center, are also recognized.

### § 38

#### **Examination Deadlines, Academic Progress Checks, Failure to Meet Deadlines**

Examination deadlines, progress monitoring, and failure to meet deadlines are governed by § 10 of the APSO.

### § 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 Digital Built Environment of the TUM School of Engineering and Design.

### § 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) <sup>1</sup>In addition to written and oral examinations, assessment in accordance with § 12 and § 13 of the APSO may include (but is not limited to) laboratory assignments, practical credit requirements (course certificates, if applicable), reports, project work, presentations, learning portfolios, research papers, or parcours examinations (a series of different exams). <sup>2</sup>Details of each module examination and the competencies to be assessed in each examination are set out in the module description. <sup>3</sup>Where the topic permits, the examination can be held either as an individual or group examination; § 18(2) Sentences 2 and 3 of the APSO apply accordingly.
  - a) <sup>1</sup>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, find solution strategies and, if necessary, implement these strategies. <sup>2</sup>The duration of written examinations is specified in § 12(7) of the APSO.

- b) <sup>1</sup>Depending on the discipline, **laboratory assignments** may include experiments, measurements, fieldwork, field exercises, etc., with the objective of students carrying out such work, evaluating results, and gaining knowledge. <sup>2</sup>These may consist of, for example, process descriptions and the underlying theoretical principles including studying the relevant literature; preparation and practical implementation; any calculations necessary, and documentation, evaluation, and interpretation of the results in the context of the knowledge to be gained. <sup>3</sup>Laboratory assignments may be complemented by presentations designed to demonstrate a student's communication skills when presenting scholarly work to an audience.
- c) <sup>1</sup>**Practical credit requirements** involve students completing assigned tasks (for example, solving mathematical problems, writing computer programs, preparing models, preparing designs) using theoretical knowledge to solve application-oriented problems. <sup>2</sup>Practical credit requirements are designed to assess a student's factual and detailed knowledge and its application <sup>3</sup> and may be carried out in writing, orally, or electronically. <sup>4</sup>They may be in the form of homework assignments, practice sheets, programming exercises, (e-)tests, design tasks, posters, tasks assigned within a university internship program, course certificates, etc.
- d) <sup>1</sup>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. <sup>2</sup>In the report, students are expected to demonstrate that they have understood all essential aspects and are able to present them in writing. <sup>3</sup>Reports may include excursion reports, internship reports, work reports, etc. <sup>4</sup>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.
- e) <sup>1</sup>**Project work** is designed to achieve the defined objective of a project assignment in several phases (initiation, problem definition, role assignment, idea generation, criteria development, decision, implementation, presentation, written evaluation), within the allotted time while using suitable means. <sup>2</sup>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. <sup>3</sup>Project work may also encompass design sketches, drawings, plans, models, objects, simulations or documentation.
- f) <sup>1</sup>A **research paper** is a written assignment in which students work independently on solving complex scholarly or scholarly/application-oriented problems while applying the scientific methods of the relevant discipline. <sup>2</sup>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. <sup>3</sup>Because their level of ambition differs, research papers may take the form of a thesis paper, abstract, essay, research paper, term paper, etc. <sup>4</sup>The research may also be supported by an oral presentation and/or included in a colloquium for the purpose of assessing the student's communication skills when presenting scholarly topics to an audience.
- g) <sup>1</sup>The researcher delivers a systematic and structured oral **presentation** supported by suitable audio-visual equipment (such as a beamer, slides, posters, videos) that demonstrates and summarizes specific issues or results and reducing complex problems to their fundamental core. <sup>2</sup>The presentation should demonstrate the ability to prepare a topic within a given time frame in such a way that it can be reported to an audience in a clear and comprehensible manner. <sup>3</sup>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. <sup>4</sup>The presentation may be complemented by a brief written précis.
- h) <sup>1</sup>An **oral examination** is a timed, graded discussion of relevant topics and questions that are to be answered in detail. <sup>2</sup>In oral examinations students are expected to demonstrate that they have understood the central concepts of the subject matter covered by the exam and are able to apply them to specific problems. <sup>3</sup>The duration of the examination is governed by § 13(2) of the APSO.

- i) <sup>1</sup>A **learning portfolio** is a collection of work compiled by the student according to predefined criteria that provides evidence of the student's progress and achievements regarding specific subject matter at a given time. <sup>2</sup>Students are required to give reasons for choosing the work in their portfolio, its relevance to their learning progress and its contribution to achieving the learning outcomes. <sup>3</sup>The learning portfolio should offer evidence that responsibility was assumed for the learning process. <sup>4</sup>Depending on the module description, types of independent study assessment in a learning portfolio may include, in particular, application-oriented assignments, web pages, blogs, bibliographies, analyses, conceptual framework/theory papers, as well as the graphic representation of facts or problems. <sup>5</sup>A subject-specific final oral discussion may also take place for the purpose of reflection and based on the content of the learning portfolio.
- j) <sup>1</sup>Several exam components within a graded examination requirement must be completed in a **parcours examination**. <sup>2</sup>Unlike a module examination component, the graded examination is administered in sequence (in a specific time frame and at a specific location). <sup>3</sup> Examination elements consist of various exam formats, which together cover the entire profile of skills in the module. <sup>4</sup>Examination components may also include in particular those listed in g) and h) in combination with a practical requirement. <sup>5</sup>The total duration of the examination with all its components is indicated in the module catalog.
- (2) <sup>1</sup>As a rule, the module examinations are taken concurrently with the degree program. <sup>2</sup>The type and duration of module examinations is stipulated in Appendix 1. <sup>3</sup>For any changes to the stipulated module provisions, § 12(8) of the APSO applies. <sup>4</sup>The assessment of the module examination is governed by § 17 of the APSO. <sup>5</sup>The grade weights of module examination components correspond to the weighting factors assigned to them in Appendix 1.
- (3) Where Appendix 1 indicates that a module examination is to be either in written or oral form, the examiner must officially inform students no later than on the first day of classes and in an appropriate manner what type of examination will be held.
- (4) At the request of the students and with the consent of the examiners, examinations for German-language modules may be taken in English.

## § 42

### Admission to and Registration for the Master's Examination

- (1) Upon enrollment in the master's program Information Technologies for the Built Environment, a student is deemed admitted to the module examinations of the master's program.
- (2) <sup>1</sup>Registration requirements for required and elective module examinations are stipulated in § 15(1) of the APSO. <sup>2</sup>Registration for repeat examinations for failed required modules are stipulated 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 relevant modules in accordance with § 43(2);
  2. the Master's Thesis module in accordance with § 46 and § 46a.
- (2) <sup>1</sup>The module examinations are listed in Appendix 1. <sup>2</sup>Evidence for 54 credits must be provided in the required modules and for 36 credits in the elective modules. <sup>3</sup>In the elective modules
- at least 3 credits must be earned in the "Ethics and the Human Factor" elective modules and
  - at least 21 must be credits earned in the "Interdisciplinary Methods" elective modules.
- <sup>4</sup>A maximum of 12 credits of electives can be included from all modules offered by TUM. <sup>5</sup>The selection of modules must comply with § 8(2) of the APSO.

### **§ 44**

#### **Repeat Examinations, Failed Examinations**

- (1) <sup>1</sup>The repetition of examinations is governed by § 24 of the APSO. <sup>2</sup>The repeat examination is offered in the following semester. <sup>3</sup>Contrary to Sentence 2, in the case of examinations not administered by the TUM School of Engineering and Design, the time at which the repeat examination is offered is governed by the regulations of the school or department offering the examination.
- (2) Failure of examinations is governed by § 23 of the APSO.

### **§ 45**

#### **Coursework**

<sup>1</sup>In place of the examination requirements for elective modules specified in § 43(2) Sentence 2, in elective modules the fulfillment of course requirements may also be required. <sup>2</sup>The number of credits that have to be achieved through examinations specified in § 43(2) Sentence 2 is then reduced accordingly.

### **§ 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 pursuant to § 18 of the APSO.

- (2) <sup>1</sup>As a rule, completion of the Master's Thesis module is the final examination requirement. <sup>2</sup>Upon 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 achieved taking account of the progress of studies to date.
- (3) <sup>1</sup>The period between topic assignment and submission of the completed master's thesis must not exceed six months. <sup>2</sup>The thesis is considered submitted and failed if the student fails to submit it on time without valid reasons as specified in § 10(7) of the APSO. <sup>3</sup>The master's thesis may be written in either the German or the English language.
- (4) <sup>1</sup>The completion of the module "Master's Thesis" requires a scientific report and a master's colloquium in accordance with § 46a. <sup>2</sup>The module "Master's Thesis" involves 30 credits.
- (5) <sup>1</sup>If the master's thesis module was not graded with at least "sufficient" (4.0), it may be repeated once with a new topic. <sup>2</sup>The topic of the master's thesis must be registered six weeks of receiving notification of the grade at the latest.

### **§ 46a Master's Colloquium**

- (1) The master's colloquium is to be held without delay after successful submission of the thesis.
- (2) The master's colloquium is carried out by the thesis supervisor or the supervisor's deputy and a specialist co-examiner.
- (3) <sup>1</sup>As a rule, the master's colloquium is carried out in English. <sup>2</sup>Students may apply to have the colloquium carried out in German
- (4) <sup>1</sup>The duration of the master's colloquium is, as a rule 30 minutes. <sup>2</sup>Students have approximately 20 minutes to present their thesis. <sup>3</sup>This is followed by a discussion which involves the link between the topic of the thesis and the broader area of specialization with which it is concerned.

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

- (1) The master's examination is deemed to have been 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) <sup>1</sup>The module grade is calculated in accordance with § 17 of the APSO. <sup>2</sup>The overall grade for the master's examination is calculated as the weighted grade average of the modules in accordance with § 43(2) and the master's thesis module. <sup>3</sup>The grade weights of the individual modules correspond to the credits assigned for each module. <sup>4</sup>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**  
**Entry into Force**

<sup>1</sup>These Examination Regulations enter into force as of 1 January 2022. <sup>2</sup>They apply to all students who commence their studies at the Technical University of Munich from the winter semester 2022/23.



## APPENDIX 1: Examination Modules

### Required Modules

No.**	Module name	Type of instruction	Sem.	SWS <sup>x</sup>	Credits	Type of examination	Duration of examination	Weighting	Language of instruction
ED110045	Geospatial Information Science	VI	WiSe	4	6 credits	K	120	-	EN
AR30472	Computational Design in Architecture	V	WiSe	2	3 credits	K	60	-	EN
BGU48029	Photogrammetry and Remote Sensing	V	WiSe	2	3 credits	K	60	-	EN
ED130001	Professional Software Engineering	V + Ü	WiSe	3 + 1	6 credits	K	60	-	EN
ED110044	Semantic Modeling of the Built World	VI + VI	SoSe	3 + 2	6 credits	K	120	-	EN
BGU65016	BIM.Fundamentals	V + Ü	WiSe/ SoSe	2 + 2	6 credits	K	60	-	EN
ED130004	Platform Oriented Construction Management	VI + VI	WiSe/ SoSe	2 + 2	6 credits	W	-	-	EN
ED130002	Distributed and Cloud-Based Systems	VI + VI	WiSe	2 + 2	6 credits	K	60	-	EN
ED130003	ITBE Fusion Lab	VI + S	WiSe	4 + 4	12 credits	PA	-	-	EN
	<b>Total</b>				<b>54 credits</b>				

ED100001	Master's Thesis – Information Technologies for the Built Environment				30 credits				EN/DE
	Master's Thesis					W		4/5	
	Final colloquium					T		1/5	

\*\* The module numbers may change during the School transition; during this phase the old and new module numbers are listed side by side on the website for the degree program.

x Depending on the requirements for the current semester, the allocation of SWS to courses can vary by one SWS; the specific allocation of SWS to courses is announced in the module description via the standard communication channels.

#### Legend:

Sem. = semester, SWS = weekly hours per semester, V = lecture, Ü = exercise, VI = lecture with integrated practical activity, P = internship, S = seminar, K = written examination, LL = lab assignment, ÜB = practical credit requirement, LP = learning portfolio, B = report, M = oral exam, W = research paper, Pr = presentation, PA = project work, PP = parcours examination, DE = German, EN = English, EN/DE = English or German

### Elective Modules

At least 36 credits are required from the following list of elective modules (not exhaustive) of the master's degree program in Information Technologies for the Built Environment (ITBE). The breakdown for these credits is:

- At least 3 credits earned in the "Ethics and the Human Factor" elective modules

- At least 21 credits earned in the “Interdisciplinary Methods” elective modules.

The Examination Board regularly updates the elective modules course catalog. Any changes are officially announced on the website for the degree program no later than the beginning of the semester.

### Ethics and the Human Factor

No.**	Module name	Type of instruction	Sem.	SWS <sup>x</sup>	Credits	Type of examination	Duration of examination	Weighting	Language of instruction
MW2272	Interaction Prototyping	P	WiSe	3	4	PA	-	-	EN
MW2131	Human Reliability	V + Ü	SoSe	2 + 1	5	K	90	-	DE
MW2130	Software Ergonomics	V + Ü	WiSe	2 + 1	5	K	60	-	DE

\*\* The module numbers may change during the School transition; during this phase the old and new module numbers are listed side by side on the website for the degree program.

- x Depending on the requirements of the current semester, the allocation of SWS to courses can vary by one SWS; the specific allocation of SWS to courses is announced in the module description via the standard communication channels.

### Interdisciplinary methods

No.**	Module name	Type of instruction	Sem.	SWS <sup>x</sup>	Credits	Type of examination	Duration of examination	Weighting	Language of instruction
BV030004	Software Lab	S + S	WiSe/ SoSe	2 + 2	6	PA	-	-	EN
ED110046	Internet of Things in the Built Environment	VI	SoSe	4	5	PA	-	-	EN
ED110029	Spatial Data Management and System Architectures – Advanced Methods	V + Ü	WiSe	3 + 2	5	K	120	-	EN
LRG2000	Big Geospatial Data	V + Ü	SoSe	2 + 1	3	K	60	-	EN
LRG1500	Principles of Spatial Data Mining and Machine Learning	V + Ü	WiSe	2 + 1	3	K	60	-	EN
AR30364	Parametric Design	S	SoSe	4	6	PA	-	-	EN/DE
AR30365	Interactive Visualization	S	WiSe	4	6	PA	-	-	EN/DE
AR30366	Performance Based Design	S	WiSe	4	6	PA	-	-	EN/DE
AR30362	Tube Rendering	S	SoSe	4	6	PA	-	-	EN/DE
BGU30047	Principles of Databases	VI	WiSe	3	5	K	120	-	EN
BGU30048	Spatial Decision Support Systems	VI	WiSe	3	5	K	120	-	EN
BV030012	Engineering Databases	V	WiSe	2	3	K	60	-	EN
AR30417	Robotic Fabrication in Architecture	S	SoSe	4	6	ÜB	-	-	EN/DE
ED150001	Modeling Urban Development	V + S	WiSe	2 + 2	6	K	90	-	EN

\*\* The module numbers may change during the School transition; the old and new module numbers are listed side by side on the website for the degree program.

- x Depending on the requirements of the current semester, the allocation of SWS to courses can vary by one SWS; the specific allocation of SWS to courses is announced in the module description via the standard communication channels.

#### Legend:

Sem. = semester, SWS = weekly hours per semester, V = lecture, Ü = exercise, VI = lecture with integrated practical activity, P = internship, S = seminar, K = written examination, LL = lab assignment, ÜB = practical credit requirement, LP = learning portfolio, B = report, M = oral exam, W = research paper, Pr = presentation, PA = project work, PP = parcours examination, DE = German, EN = English, EN/DE = English or German



## **APPENDIX 2: Aptitude Assessment**

### **Academic and Examination Regulations for the Master's Degree Program Information Technologies for the Built Environment at the Technical University of Munich**

#### **1. Purpose of the Process**

<sup>1</sup>In addition to the requirements set out in § 36(1)1 and 2, eligibility for the Master's Degree Program Information Technologies for the Built Environment requires proof of aptitude in accordance with § 36(1)2, subject to the following provisions. <sup>2</sup>The special qualifications and skills of candidates should correspond to the professional field of Information Technologies for the Built Environment. <sup>3</sup>The individual aptitude parameters are:

- 1.1 ability to carry out scholarly and/or basic and methodologically sound research,
- 1.2 existing specialized knowledge deriving from the undergraduate degree program as defined in § 36(1)1 or a comparable course of studies related to the bachelor's degree program in Architecture, Civil Engineering, Geodesy and Geoinformatics, or Informatics at the Technical University of Munich,
- 1.3 mastery of specialist (discipline-specific) terminology in written form,
- 1.4 scientific interest in problems at the interface between civil engineering and information technologies.

#### **2. Aptitude Assessment Process**

- 2.1 The Aptitude Assessment process is carried out annually.
- 2.2 <sup>1</sup>Applications for admission to the Aptitude Assessment 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. and in § 36(1)2 no later than 31 May (absolute deadline) using the online application procedure. <sup>2</sup>As proof of the conferral of the bachelor's degree, official copies of the student's diploma and graduation certificate must be submitted to the TUM Center for Study and Teaching – Admissions and Enrollment no later than five weeks after the first day of classes. <sup>3</sup>Otherwise, as set out in § 36 of these regulations commencing studies in the master's program is not yet possible.
- 2.3 The application must include:
  - 2.3.1 a transcript of records confirming modules amounting to at least 150 Credits; the transcript of records must be issued by the relevant examination authority or academic programs office;
  - 2.3.2 a curriculum vitae formatted as a table
  - 2.3.3 a written statement (max. 1-2 A4 pages) giving the reasons for selecting the degree program in Information Technologies for the Built Environment at the Technical University of Munich in which applicants explain the special motivation on the basis of which they consider themselves particularly suitable for the Master's Degree Program Information Technologies for the Built Environment at the Technical University of Munich; this special motivation must be demonstrated, for example, by providing details of program-related vocational training, internships, stays abroad, or program-related further education beyond attending and satisfying the requirements of the bachelor's program. This is to be confirmed by appendices, as appropriate.
  - 2.3.4 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 <sup>1</sup>The Aptitude Assessment is administered by the Aptitude Assessment Commission and the Selection Committees. <sup>2</sup>The Aptitude Assessment Commission is responsible for preparing and organizing the Aptitude Assessment and ensuring a structured and standardized process is in place 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. <sup>3</sup>Selection Committees are to carry out the assessment process in accordance with No. 5 below, subject to No. 3.2 Sentence 11.
- 3.2 <sup>1</sup>The Aptitude Assessment Commission consists of five members. <sup>2</sup>These are appointed by the Dean in consultation with the Vice Dean of Academic and Student Affairs from among authorized examiners of the TUM School of Engineering and Design who are members of the degree program faculty. <sup>3</sup>Commission members must be university educators within the meaning of the Bavarian Act on Higher Education Staff (*BayHSchPG*). <sup>4</sup>The Departmental Student Council has the right to name a student representative to serve on the Commission in an advisory capacity. <sup>5</sup>A deputy is to be appointed for each member of the Commission. <sup>6</sup>The Commission elects a chairperson and a deputy chairperson from among its members. <sup>7</sup>Procedures are governed by § 30 of the TUM Charter as last amended. <sup>8</sup>The term of office for Commission members is one year. <sup>9</sup>Extensions of the term of office and reappointments are possible. <sup>10</sup>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. <sup>11</sup>The Academic Programs 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 No. 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 <sup>1</sup>Each Selection Committee consists of two members of the TUM School of Engineering and Design, who are authorized to administer examinations in the degree program according to Art. 62(1) Sentence 1 of the Bavarian Higher Education Act (*BayHSchG*) in conjunction with the act governing examiners at institutions of higher education (*Hochschulprüferverordnung*). <sup>2</sup>At least one member must be a university educator within the meaning of the Bavarian Act on Personnel in Higher Education (*BayHSchPG*). <sup>3</sup>It is permissible to serve on both the Aptitude Assessment Commission and the Selection Committee at the same time. <sup>4</sup>Members of the Committee are appointed by the Commission for a term of one year; No. 3.2 Sentence 9 applies accordingly. <sup>5</sup>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 all documentation specified in No. 2.2 to have been submitted in full and in a timely and complete manner.
- 4.2 <sup>1</sup>Applicants who have fulfilled the requirements according to No. 4.1 complete the aptitude assessment according to No. 5. <sup>2</sup>Applicants that do not fulfill said requirements 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 First Stage**

- 5.1.1 <sup>1</sup>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). <sup>2</sup>The candidate's application 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 for the evaluation:

**a) Discipline-specific Skills and Qualifications**

<sup>1</sup>A curriculum-based analysis of specialist skills and qualifications is carried out based on competencies rather than on a schematic comparison of modules. <sup>2</sup>This analysis is based on the fundamental subject groups listed in the following table of the bachelor's degree program Architecture, Landscape Architecture, Urban Planning, Civil Engineering, Geodesy and Geoinformatics, or Informatics at the Technical University of Munich.

<b>Subject areas</b>	<b>TUM ECTS</b>
<b>Architecture</b>	
A) Fundamentals of architecture, landscape architecture and/or urban construction (history of construction, urban construction, design methods, building typology, fundamentals of description)	22
B) Fundamentals of statics, load-bearing construction or housing technology	12 6
C) Discipline-specific contents (digital form finding, digital visualization)	
<b>Civil Engineering</b>	
A) General Fundamentals (Mathematics, Mechanics)	26
B) Fundamentals of building construction and design of supporting structures	6 8
C) Subject-specific contents (informatics, programming, CAD modeling)	
<b>Geodesy and Geoinformatics</b>	
A) Scientific Fundamentals (Mathematics and Geometry, Physics, Informatics)	8 10
B) Fundamentals of Geodesy (surveying, relationships, law, visualization.>	10
C) Fundamentals of Geoinformatics (GIS, spatial databases)	12
D) Specific contents (cartography, computer graphics, photogrammetry and remote sensing, sensor systems and methodology)	
<b>Informatics</b>	
A) General fundamentals (mathematics, discrete structures, linear algebra)	16
B) Algorithms and data structures	12
C) Computer graphics and visualization	6
D) Fundamentals of software development	6

<sup>3</sup>In cases of competency at least equal to the corresponding degree program at the Technical University of Munich, applicants receive a maximum of 60 points. <sup>4</sup>If skills/competencies are missing, credits are deducted in proportion to the corresponding bachelor's degree program module offered at the Technical University of Munich. <sup>5</sup>Negative points are not awarded.

**b) Final Score**

<sup>1</sup>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 2.0. <sup>2</sup>The maximum score is 10. <sup>3</sup>Negative scores are not awarded. <sup>4</sup>Grades for international degrees are converted by applying the Bavarian formula. <sup>5</sup>If the candidate has submitted a degree certificate containing more than 150 credits with the application, the assessment is based on the modules with the best grades up to 150 credits. <sup>6</sup>It is the responsibility of the applicants to submit a list of these with the application and confirm its accuracy in writing. <sup>7</sup>If the candidate submits this list, the average is calculated on the basis of graded module examinations with the best grades, up to 150 credits; if no list is submitted, the overall average of grades submitted by the candidate are used to calculate the average. <sup>8</sup>The overall grade average is calculated as a weighted grade average. <sup>9</sup>The grade weights of the individual modules correspond to the credits assigned to each module.

**c) Letter of motivation**

<sup>1</sup>The applicant's written statement of reasons is evaluated and graded on a scale of 0 to 30 points. <sup>2</sup>The content is assessed using the following criteria:

- (1) ability to formulate his/her reasons for applying in a factual and objective manner,
- (2) ability to describe the relationship between his/her personal interests and the contents of the degree program in a well-structured manner
- (3) ability to convincingly demonstrate the particular motivation for the master's degree program supported by arguments and meaningful examples (see 2.3.4),
- (4) ability to verbally emphasize important points in his/her reasoning in an appropriate manner.

<sup>3</sup>The two committee members independently assess each of the 5 criteria with equal weighting. <sup>4</sup>The total score is calculated as the arithmetic mean of the individual assessments, rounded up to the next whole number.

5.1.2 The total score in the first stage is calculated from the sum of the individual evaluations, rounded up to the nearest whole number.

5.1.3 Applicants who score at least 70 points pass the Aptitude Assessment.

5.1.4 Applicants scoring less than 60 points fail the Aptitude Assessment.

**5.2 Second Stage:**

5.2.1 <sup>1</sup>The remaining applicants are invited to an electronic test (written and anonymized performance assessment). <sup>2</sup>Alternatively, an in-person oral exam is offered for the same time. <sup>3</sup>In the second stage of the Aptitude Assessment, the qualifications acquired in the bachelor's degree program and the result of the written test are evaluated, with equal weight given to the qualification acquired in the bachelor's program.

5.2.2 <sup>1</sup>The date of the test is announced at least one week in advance. <sup>2</sup>Time slots for the test must be scheduled before expiration of the application deadline. <sup>3</sup>The appointment for the test must be kept by the applicant. <sup>4</sup>The performance assessment takes place only once per application phase. <sup>5</sup>Missed testing dates cannot be rescheduled.

5.2.3 <sup>1</sup>The purpose of the test is to demonstrate whether it can be expected that the applicant will attain the goal of the degree program on a scientific basis independently and responsibly and whether he or she has the general level of knowledge corresponding to the fundamentals of the relevant bachelor's degree program, so that successful completion of the degree program is to be expected. <sup>2</sup>The test covers the following topics:

1. Fundamental and application-related questions regarding the field of Built Environment (maximum 30 points),
2. Fundamental and application-related questions regarding the field of Informatics (maximum 30 points).

<sup>3</sup>Any subject-specific academic knowledge to be taught in the Master's Degree Program Information Technologies in the Built Environment has no effect on the decision. <sup>4</sup>In the test, applicants must confirm the impression that they have the aptitude for the degree program. <sup>5</sup>The maximum number of points possible in the performance assessment is 60. <sup>6</sup>Both Committee members assess the written test independently. <sup>7</sup>The total score is calculated from the arithmetic mean of the individual assessments, rounded up to the nearest whole number.

- 5.2.4 <sup>1</sup>The total number of points awarded in stage 2 is the sum of the points from 5.2.3 and the points from 5.1.1.a) (subject-specific qualification) and 5.1.1.b) (final score). <sup>2</sup>Applicants with 105 points or more have passed the aptitude test. <sup>3</sup>Applicants scoring less than 105 points have failed the Aptitude Assessment.

### 5.3 Determination and Notification of Result

<sup>1</sup>The result of the Aptitude Assessment is determined based on the number of points earned after which an official notification is then sent to applicants. <sup>2</sup>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

<sup>1</sup>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. <sup>2</sup>A record is to be kept of administering the test (date, place, time when test was started and ended, the names of the members of the Committee present, the names of applicants, as well as any unusual occurrences).

## 7. Repeat Aptitude Assessment

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

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Executed following a resolution of the Senate of the Technical University of Munich dated 13 October 2021 and approval by the President of the Technical University of Munich on 27 January 2022.

Munich, 27 January 2022  
 Technical University of Munich

Thomas F. Hofmann  
 President

These Regulations were deposited in the Technical University of Munich on 27 January 2022; the deposit was announced by way of public notice posted within TUM on 27 January 2022. The date of proclamation is thus 27 January 2022.