UNIVERSITÄT BAYREUTH

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Examination and Study Regulations for the Master's Programme Digitalization & Sustainability in Materials Science & Engineering at the University of Bayreuth dated 30 July 2026

On the basis of Art. 9 sentence 1 in conjunction with Art. 80 para. 1 sentence 1, Art. 84 para. 2 sentence 1 and Art. 90 para. 1 sentence 2 of the Bavarian Higher Education Innovation Act (BayHIG), the University of Bayreuth issues the following regulations:

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§ 1
General Examination and Study Regulations

[1]Study in the master's programme Digitalization & Sustainability in Materials Science & Engineering is governed by the General Examination and Study Regulations for the Bachelor's and Master's Programmes at the University of Bayreuth (APSO). [2]Supplementary and deviating provisions for study in the master's programme Digitalization & Sustainability in Materials Science & Engineering are set out in these Regulations.

§ 2
Objectives and Structure of the Programme

(1) [1]The master's examination, as the conclusion of university studies in the master's programme Digitalization & Sustainability in Materials Science & Engineering, determines whether the student has acquired the specialist knowledge and competencies provided for in these Subject-Specific Examination and Study Regulations in the following areas:

1. Development of materials for sustainable applications using digital methods
2. Concepts for substituting existing, non-sustainable materials
3. Assessment of existing material cycles & development of circular-economy concepts
4. Development of sustainable technologies and materials
5. Thinking in terms of sustainability principles and understanding the interconnections between digitalization, sustainability and materials science

and whether the student is able to work independently using established methods from engineering science and computer science. [2]It is likewise determined whether the student has a sufficiently broad understanding of subject-specific and interdisciplinary connections in materials science, sustainability and digitalization to be capable of largely independent academic work. [3]The master's programme Digitalization & Sustainability in Materials Science & Engineering, including all examinations, is conducted in English. [4]Upon passing the master's examination, the University, through the Faculty of Engineering Science, awards the academic degree of Master of Science (abbreviated: M.Sc.).

(2) [1]The master's programme is to be completed as a full-time programme. [2]The programme may be commenced in the winter semester or the summer semester.

§ 3
Admission to the Programme

(1) The requirements for admission to the master's programme are:

1. a university degree in the bachelor's programme Materials Science and Engineering or Engineering Science at the University of Bayreuth, or an equivalent degree pursuant to Annex 2;
2. proof of English language proficiency at level B2 or higher of the Common European Framework of Reference for Languages for applicants who earned neither their higher education entrance qualification nor the first degree granting access to the programme in English;
3. proof of German language proficiency at level A1 or higher of the Common European Framework of Reference for Languages for applicants who earned neither their higher education entrance qualification nor the first degree granting access to the programme in German. Applicants who do not meet this requirement shall be enrolled on the condition that they submit proof of the required language proficiency by the end of the second semester at the latest;
4. determination of programme-specific aptitude in a process pursuant to Annex 3.

(2) [1]The degrees must not exhibit substantial differences, with regard to the competencies acquired, from the degrees referred to in para. 1 no. 1. [2]Where substantial differences are present that can be compensated for, applicants may be admitted subject to the condition that, in addition to the academic achievements required in the master's programme, they successfully complete coursework and examinations amounting to a maximum of 30 credit points from the bachelor's programme Materials Science and Engineering or Engineering Science by the end of the second semester at the latest; otherwise, the requirements for admission to the programme shall be deemed not to have been met. [3]The provisions of the respective Subject-Specific Examination and Study Regulations for the above-mentioned bachelor's programmes at the University of Bayreuth, as amended, shall apply. [4]Art. 86 BayHIG shall apply to determining the eligibility for recognition of domestic and foreign degrees. [5]These decisions shall be made by the board of examiners.

(3) [1]If the certificate for the relevant first degree is not yet available, a confirmation listing the individual grades for all examinations and coursework completed by the application deadline must be submitted. [2]These achievements must amount to at least 150 credit points in total. [3]Applicants who meet the requirements of sentence 2 and have successfully completed the process for determining programme-specific aptitude pursuant to Annex 3 shall be enrolled on the condition that they submit the certificate for the relevant first degree by the end of the second semester.

§ 4
Supplementary and Deviating Provisions

(1) In deviation from § 5 para. 3 APSO, applications for the recognition of competencies must be submitted to the board of examiners as soon as possible after enrolment, but no later than the beginning of the examination for the respective module.

(2) [1]In addition to § 6 APSO, additional examinations may be taken in the module areas Compulsory elective area and Focus area beyond the required scope; para. 3 and § 14 para. 1 APSO must be observed. [2]There is no obligation to repeat failed additional examinations. [3]The additional examinations shall be listed on the certificate unless the student requests otherwise.

(3) [1]In addition to § 14 para. 1 APSO, if more credit points than required are earned in the module areas Compulsory elective area and Focus area, only the modules with the best grades shall be taken into account when calculating the final grade, subject to the required number of credit points. [2]Ungraded modules shall be counted only after graded modules for the purpose of obtaining the required credit points. [3]If the final module to be taken into account causes the number of credit points for the module area to be exceeded, the grade for that module shall be included in the calculation of the final grade only on a pro rata basis corresponding to the remaining credit points required.

(4) Deviations from and supplements to § 31 APSO:

1. In addition to para. 2 sentence 2, with the approval of the board of examiners the master's thesis may also be carried out outside the Faculty of Engineering Science at other institutions within or outside the University of Bayreuth, provided that it is supervised there by a person from the Faculty of Engineering Science who is authorized to conduct examinations in the relevant subject pursuant to § 3 APSO.
2. In deviation from para. 4 sentence 1, the master's thesis must be submitted in English.
3. In addition to the master's thesis, its content shall be presented to the examiners in a 20-minute presentation, which shall be graded by the examiners pursuant to § 13 APSO.
4. In addition to para. 5, at the request of the first reviewer, up to two additional typed, bound and paginated copies of the master's thesis must be submitted to the examiners by the deadline.
5. In addition to para. 7 sentence 3, the board of examiners may call upon an additional examiner if the two grades awarded by the examiners differ by more than one grade.
6. In deviation from para. 8 sentence 1, the grades for the written thesis shall be weighted threefold and the two grades for the presentation shall each be weighted once in the overall grade for the master's thesis.

§ 5
Entry into Force

(1) [1]These Regulations shall enter into force on 31 July 2026. [2]They shall apply to students who commence this programme from the winter semester 2026/2027 onwards. [3]All other students shall complete their studies in accordance with the previous Examination and Study Regulations for the master's programme Digitalization & Sustainability in Materials Science & Engineering at the University of Bayreuth dated 25 September 2024 (AB UBT 2024/054).

(2) Upon entry into force of these Regulations, the Examination and Study Regulations for the master's programme Digitalization & Sustainability in Materials Science & Engineering at the University of Bayreuth dated 25 September 2024 (AB UBT 2024/054) shall cease to be in force, subject to para. 1 sentence 3.

Annex 1: Modules, Credit Points and Examinations

The module areas, the respective modules, credit points (CP), and the corresponding examinations are listed below.

Modules already taken in the underlying bachelor's programme may not be recognized or taken in the master's programme.

Deviations from and supplements to § 9 APSO:

- In deviation from para. 3 sentence 9, the assessment of written examinations should be available no later than six weeks after the respective written examination was taken.
- Where required for subject-specific reasons, the oral examination (para. 6) shall be conducted in German (in deviation from § 2 para. 1 sentence 3); this shall be announced by the examiner. In addition, the oral examination may be conducted in groups of no more than four students. The examination time for the entire group may not exceed 90 minutes.

Abbreviations:

|	Vertical bars between forms of examination indicate possible alternatives.
+	Plus signs indicate multiple examination components that must be completed.
x/y	Fractions indicate the weighting with which the respective examination component is included in the module grade.
( )	Round brackets group related examination components. They may be used to indicate alternative forms of an examination component or to define the division of an examination component into several components.
*	Examination components marked with '*' are not included in the calculation of the module grade or final grade.

K	written examination
mP	oral examination
H	term paper
P	presentation
B	contribution
semA	assignments during the semester
sA	written assignment

CO code		Module area Module	CP	Examination
		Compulsory area	**27**	
		Connected Knowledge in Materials Science	7	
Fak627751	CKM	Connected Knowledge in Materials Science	7	**K**
		Computer Science	10	
Fak627752	PML	Python and Machine Learning for Non-Programmers	5	Portfolio examination: **sA** 3/5 + (**semA** | **sA**) 2/5
Fak627753	NAS	Numerical Methods and Applied Statistics	5	Portfolio examination: **K** 2/5 + **K** 3/5
		Sustainability	10	
Fak630739	ERT	Environmental and Resource Technology	5	**K** | **mP** | **P**
Fak627754	CLM	Carbon & Life Cycle Management	5	**K**
		Compulsory elective area *Three modules amounting to 15 CP must be taken from the Materials Science area. One module amounting to 6 CP must be taken from Social, Economic and Legal Aspects of Sustainability, and one module amounting to 5 CP from Individual Knowledge Development.*	**26**	
		Materials Science	15	
Fak627755	BMB	Biomaterials and Biocomponents	5	**K**
Fak627757	PM	Polymer Materials and Technology (DSMSE)	5	Portfolio examination: **mP** + **B***
Fak627758	FSET	Functional Materials and Systems Aspects for Energy and Environmental Technology	5	Portfolio examination: (**K** | **mP**) + **B***
Fak631058	BMM	Basics of Metallic Materials	5	Portfolio examination: **mP** 2/5 + **mP** 3/5 + **B***
Fak627756	CMC	Ceramic Matrix Composites	5	**mP**
		Social, Economic and Legal Aspects of Sustainability	6	
Fak320210	PoE	Principles of Entrepreneurship	6	**semA**
Fak324906	IE	Impact Entrepreneurship – Developing Social and Ecological Innovations	6	**semA**
Fak629371	IM	Innovation Management	6	Portfolio examination: **semA** + **semA**
Fak322109	SEC	Social Entrepreneurship Cases: Analyzing Social Businesses	6	**semA**
Fak631067	TPI	Technopreneurship for Engineers	6	**semA**

CO code		Module area Module	CP	Examination
		Individual Knowledge Development	5	
		At least one module worth at least 5 CP must be completed. Modules may be selected from the following master's programmes: - Biofabrication (modules from '1. General Area', subsections 'a) Biofabrication' and 'b) Biomaterials') - Battery Materials and Technology (modules from 'Mandatory Area', 'Compulsory Choice in Natural Science' and 'Compulsory Choice in Engineering Science') - Materials Science and Engineering (modules from 'Materials and Engineering Sciences (Compulsory Area)', 'Materials Science Areas of Specialization' and 'Core Elective Area') - Environmental and Resource Technology (modules from 'A1: Compulsory Engineering Modules' and 'A2: Advanced Engineering (Core Elective Modules)') - Materials Chemistry and Catalysis (all modules except Fak225726, Fak225727 and Fak225728) - Polymer Science (all modules except Fak225726, Fak225727 and Fak225728) - Environmental Chemistry (modules from 'Mandatory', 'Elective I' and 'Elective II') - Scientific Computing (modules from 'A: Mathematical Foundation', 'B: Modeling and Simulation' and 'C: High-Performance Computing') - Computer Science (modules from 'Area A: Computer Science') Modules may not be selected if at least one course component has already been completed elsewhere in the programme Digitalization & Sustainability in Materials Science & Engineering.	5	see the respective (Subject-Specific) Examination and Study Regulations

CO code		Module area Module	CP	Examination
		Focus area *At least five modules amounting to at least 25 CP in total must be taken. At least one module must be taken from each of the three focus areas.*	**25**	
		Sustainable Applications & Processes for Materials		
Fak627760	PS	Polymer Systems for Sustainable Applications	5	**K**
Fak627761	BMF	Biomaterials and Biofabrication MOOC	5	**K**
Fak627762	EM	Energy Materials	5	Portfolio examination: **K** 2/5 + (**K** | **mP**) 3/5
Fak627763	BIM	Biomimetics	5	Portfolio examination: **K** 7/10 + **sA** 3/10
Fak627764	HE	Hydrogen embrittlement: Phenomenon and mechanism	5	Portfolio examination: **mP** 4/5 + **P** 1/5 + **B***
Fak627765	BM	Battery Materials 1	5	**K** | **mP**
Fak627766	PIB	Polymer Interfaces and Biosensors	5	**K**
Fak631059	LF	Laboratory to Fabrication	5	Portfolio examination: (**K** | **mP**) + **B***
		Circular Economy & Sustainable Raw Materials		
Fak624406	CRM	Critical Raw Materials	5	Portfolio examination: **mP** 2/5 + **P** 1/5 + (**sA** | **B**) 2/5
Fak230719	SPM	Sustainable Polymer Chemistry and Polymer Materials	5	**K** | **mP**
Fak627812	MS	Materials Selection across Materials Classes	5	Portfolio examination: **mP** 2/3 + **P** 1/3
Fak631060	SBI	Sustainable Business Innovation	5	**K** | **mP** | **P** | **sA**
		Digitalization in Materials Science		
Fak630738	MI	Materials Informatics	5	Portfolio examination: (**K** | **mP**) 3/5 + (**semA** | **sA**)* + (**K** | **semA**) 2/5
Fak627814	DSP	Data Science for Polymers	5	Portfolio examination: **K** + **B***
Fak630580	CMM	Computational Materials Modeling	5	**K** | **mP**
Fak631061	SPD	Simulation, Programming and Data Analysis	5	**mP**

CO code		Module area Module	CP	Examination
		Research module area	**12**	
Fak627815	RM1	Research Module I	6	Portfolio examination: **sA** 3/4 + **P** 1/4
Fak627816	RM2	Research Module II	6	Portfolio examination: **sA** 3/4 + **P** 1/4
		Master's Thesis	**30**	
Fak627817	MT	Master's Thesis – Digitalization & Sustainability in Materials Science & Engineering	30	**Master's thesis** 3/4 + **P** 1/4
		TOTAL	**120**	

Annex 2: Admission to the Programme, Qualifications

A university degree qualifies within the meaning of § 3 para. 1 no. 1 if it includes successful completion of examinations equivalent to the following examinations in a relevant academically oriented bachelor's programme in Materials Science and Engineering or Engineering Science and there are no substantial differences:

- Area 'Mathematics' (for example mathematics, numerical mathematics, statistics): 12 CP
- Area 'Natural Science Foundations' (for example physics, chemistry, biology): 15 CP
- Area 'Materials Foundations' (for example materials science, materials engineering) & 'Engineering Foundations' (for example mechanics, thermodynamics, process engineering, design engineering): 20 CP

Annex 3: Aptitude Assessment Process

1. Purpose of the Aptitude Assessment Process

[1]Pursuant to Art. 90 para. 1 sentence 2 BayHIG, qualification for the master's programme Digitalization & Sustainability in Material Science & Engineering requires, in addition to the requirements pursuant to § 3 para. 1 nos. 1 to 3, proof of aptitude in accordance with the following provisions. [2]The applicants' particular competencies should correspond to the broad occupational fields in Materials Science and Engineering or Engineering Science. [3]The individual aptitude parameters are:

- the ability to work academically and/or in a manner oriented towards fundamental principles and methods;
- existing specialist knowledge from the relevant first degree in Materials Science and Engineering, Engineering Science, or related subjects;
- the ability to solve complex and difficult problems.

2. Committee Responsible for the Aptitude Assessment Process

[1]A committee shall be responsible for preparing and conducting the aptitude assessment process. [2]The committee shall consist of the board of examiners pursuant to § 2 APSO and up to six additional full-time academic staff members who are authorized to conduct examinations and are involved in this programme. [3]§ 2 para. 1 sentence 4 APSO shall apply accordingly to the election of the up to six additional persons. [4]The chair of examiners shall also chair the aptitude assessment committee.

3. Process for Determining Aptitude

3.1 [1]The aptitude assessment process shall be conducted twice a year, in the summer and winter semesters. [2]The documents required for admission to the aptitude assessment process must be uploaded online via the University of Bayreuth application portal. [3]For the following winter semester, the documents must have been received electronically by the University of Bayreuth via the application portal by 15 June, and for the following summer semester by 15 January of an academic year (cut-off deadlines). [4]Documents pursuant to nos. 3.2.3 and 3.2.4 may be submitted subsequently by 15 July for the winter semester and by 15 February for the summer semester.

3.2 The following documents must be uploaded:

3.2.1 A cover letter in English or German containing a written statement of no more than two pages explaining the applicant's choice of the master's programme and setting out the competencies on the basis of which the applicant considers himself or herself particularly suited to the intended programme (see no. 5.1.1.1).

3.2.2 A tabular curriculum vitae of no more than two pages as supplementary information.

3.2.3 The certificate for the relevant first degree (e.g. bachelor's degree certificate) with Diploma Supplement. If the certificate for the relevant first degree is not yet available, a confirmation listing the individual grades for all examinations and coursework completed by the application deadline must be submitted. This documentation must cover partial examinations amounting to at least 150 credit points in total. A list of the modules in the relevant first degree for which no assessment documentation can yet be submitted must be enclosed, stating the expected examination dates.

3.2.4 Where available, evidence of relevant special qualifications pursuant to no. 5.1.1.1 (e.g. vocational training, internships, stays abroad, language skills).

3.2.5 Where applicable, a request for reasonable accommodations pursuant to § 12 APSO.

4. Admission to the Aptitude Assessment Process

4.1 Admission to the aptitude assessment process requires that the documents listed in no. 3.2 have been received by the University of Bayreuth via the application portal by the relevant deadline.

4.2 Applicants who meet the required conditions shall undergo the aptitude assessment process pursuant to no. 5.

4.3 Applicants who are not admitted shall receive a rejection notice; no. 6.2 shall apply accordingly.

5. Conduct of the Aptitude Assessment Process

5.1 First stage of the aptitude assessment process:

5.1.1 The committee responsible for conducting the aptitude assessment process shall assess, on the basis of the uploaded application documents, whether an applicant is suited to this master's programme on the basis of his or her demonstrated qualifications and the specific competencies described. Two members of the committee shall assess the documents independently on a scale from 0 to 10 points, where 0 is the lowest and 10 the highest attainable result. The committee shall make the assessment according to the following criteria:

5.1.1.1 The competencies demonstrated by the documents pursuant to nos. 3.2.1 and 3.2.4 shall be assessed with a maximum of 5.0 points. The assessment shall consider the extent to which the applicant's previous career demonstrates substantial prior knowledge or competencies in mathematics, materials and engineering science, and the natural sciences in the areas of chemistry, physics or biology, and the extent to which there is potential for interdisciplinary and international work. The content of the cover letter pursuant to no. 3.2.1 together with the evidence pursuant to no. 3.2.4 shall be assessed

according to the following criteria, with the maximum attainable points shown in brackets:

- linguistic expression and logical structure (max. 1 point);
- academic quality of the argumentation and links to specific research problems (max. 2 points);
- reasons for choosing the programme, with a clear presentation of prior knowledge and/or competencies (max. 2 points).

5.1.1.2 The subject-specific coursework and examinations from the relevant first degree shall be assessed with a maximum of 5.0 points. Achievements in mathematics, materials and engineering science, and the natural sciences (chemistry, physics or biology) shall be considered subject-specific. Non-subject-specific achievements may be taken into account if the competencies demonstrated by them indicate that the applicant can be expected to achieve the objectives of the programme. The awarding of points is described in greater detail in no. 9.

5.1.2 The applicant's score shall be calculated by adding the individual assessments (nos. 5.1.1.1 and 5.1.1.2) of the two committee members and dividing by two. The result shall be rounded to one decimal place.

5.1.3 Applicants who achieve at least seven points shall receive confirmation that they have passed the aptitude assessment process. Applicants with an overall assessment of fewer than five points have not passed the aptitude assessment process and shall receive a rejection notice; no. 6.2 shall apply accordingly.

5.2 Second stage of the aptitude assessment process:

5.2.1 The remaining applicants (five to fewer than seven points) shall be invited to an aptitude interview (second stage of the aptitude assessment process). The date of the aptitude interview shall be announced at least one week in advance. Anyone who does not appear at the scheduled date shall be deemed rejected; no. 6.2 shall apply accordingly. If the applicant is prevented from taking part in the aptitude interview for reasons beyond his or her control, a make-up date shall be scheduled upon substantiated request no later than two weeks before the start of lectures.

5.2.2 The aptitude interview shall be conducted individually for each applicant. The interview shall last at least 20 and no more than 30 minutes and is intended to show whether, on the basis of the applicant's knowledge and abilities, he or she can be expected to achieve the objectives of the programme. First, the interview shall assess academic-theoretical aptitude with regard to the requirements of the programme. The applicant must demonstrate the ability to address academic questions within the master's programme (25% of the assessment). Second, the applicant's prior

knowledge and/or competencies in the area of the master's programme shall be assessed. The applicant must demonstrate engagement with current research questions in Materials Science and Engineering, Engineering Science, or the natural sciences in the areas of chemistry, physics or biology (25% of the assessment). In particular, the applicant must be able to identify or derive structure-property relationships across different classes of materials, relationships between physical and chemical mechanisms, as well as kinetic and thermodynamic principles.

5.2.3 The aptitude interview shall be conducted by two members of the committee. Each member shall record the result of the aptitude interview on a grading scale from 1 to 5. When determining the grade, the subject-specific coursework and examinations pursuant to no. 5.1.1.2 shall in each case account for at least 50%. The arithmetic mean of the individual assessments shall be calculated and rounded to one decimal place. Applicants who achieve a grade of at least 'good' (2.5) shall be classified as suitable and shall receive confirmation that they have passed the aptitude assessment process. The remaining applicants have not passed the aptitude assessment process and shall receive a rejection notice; no. 6.2 shall apply accordingly.

5.2.4 A record of the aptitude interview shall be prepared, showing the date, duration and location of the assessment, the names of the committee members, the names of the applicants, the topics of the interview and the committee members' assessments, the overall result, and the principal reasons for the assessment. The principal reasons and topics may be listed in note form. The record shall be signed by the committee members present.

6. Determination and Notification of the Result

6.1 The aptitude assessment process shall be documented; in particular, the decisions of the committee pursuant to these Regulations and the overall result must be evident from the documentation.

6.2 [1]Applicants shall be notified in writing of the result of the aptitude assessment process. [2]Rejection notices shall include a rationale and information concerning how to appeal.

6.3 Admissions granted in the aptitude assessment process for the master's programme Digitalization & Sustainability in Materials Science & Engineering shall remain valid for all subsequent applications to the programme unless its content and objectives have changed so substantially that aptitude for the programme can no longer be demonstrated on the basis of an aptitude assessment process conducted at an earlier date.

7. Repeating the Process

Applicants who have not demonstrated aptitude for the master's programme Digitalization & Sustainability in Materials Science & Engineering may register for the aptitude assessment process one more

time.

8. Aptitude Assessment Process for Entry into Higher Semesters

For applicants wishing to enter a higher semester of study (students transferring from another higher education institution or lateral entrants), nos. 3 to 7 shall apply accordingly.

9. Performance Scale

The subject-specific coursework and examinations from the relevant first degree in mathematics, materials and engineering science, and the natural sciences (chemistry, physics or biology) (no. 5.1.1.2) shall be included in the assessment according to the following table:

Points	Performance profile
5.0 – 4.6 points	outstanding performance
4.5 – 3.5 points	performance considerably above average requirements
3.4 – 2.4 points	performance above average requirements
2.3 – 1.3 points	performance meeting average requirements
1.2 – 0.6 points	performance which, despite deficiencies, still meets the requirements

Executed on the basis of the resolution of the Senate of the University of Bayreuth dated 15 July 2026 and the approval of the President of the University of Bayreuth dated 29 July 2026, ref. A-3760.59 - I/1.

Bayreuth, 30 July 2026

UNIVERSITY OF BAYREUTH
THE PRESIDENT
[*seal*] [*signature*]
Professor Dr. Dr. h. c. Stefan Leible

These Regulations were deposited at the University on 30 July 2026.
The deposit was announced by posting at the University on 30 July 2026.
The date of announcement is 30 July 2026.