Degree Program and Examination Regulations for Bachelor's and Master's Degree Programs at the Department of Materials Science and Engineering at the Faculty of Engineering of Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) – FPO WW –

Dated August 7, 2024

Based on Section 9 (1) in conjunction with Section 80 (1)(1), Section 84 (2)(1), Section 88 (9), Section 90 (1)(2) and Section 96 (3) of the Bavarian Higher Education Act **BayHIG**, FAU enacts the following Degree Program and Examination Regulations:

Contents:

I. General Provisions

Section 39 Scope

[1]These degree program and examination regulations apply to Bachelor's and Master's degree programs at the Department of Materials Science and Engineering at the Faculty of Engineering at FAU leading to a Bachelor of Science (BSc) and Master of Science (MSc), specifically for the following degree programs:

1. Bachelor's degree program in Materials Science and Engineering,
2. Bachelor's degree program in Nanotechnology,
3. Bachelor's degree program in AI Materials Science and Engineering,
4. Master's degree program in Materials Science and Engineering and
5. Master's degree program in Nanotechnology.

[2]They complement the current version of the General Degree Program and Examination Regulations for Bachelor's and Master's Degree Programs and Other Study Programs within the meaning of Section 77 (5) **BayHIG** at the Faculty of Engineering at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) – **ABMPO/TF** –.

Section 40 Bachelor's Degree Programs, Degree Programs in Equivalent Subjects

(1) The Bachelor's degree programs in Materials Science and Engineering, Nanotechnology and AI Materials Science and Engineering comprise modules worth 180 ECTS credits distributed over six semesters, the Grundlagen- und Orientierungsprüfung (preliminary examination) and the Bachelor's examination, further details are stipulated in **Appendix 1** to **3**.

(2) The provisions in Section 28 (1)(2)(2) **ABMPO/TF** do not apply to degree programs in equivalent subjects.

Section 41 Master's Degree Programs, Start of Degree Program, Related Degree Programs, Teaching and Examination Language

(1) [1]The consecutive Master's degree programs in Materials Science and Engineering and Nanotechnology consist of modules worth 120 ECTS credits each. [2]These include modules in the core subjects, elective modules, the Master's thesis module including presentation and discussion and further compulsory modules.

(2) The master's degree programs may be started in the winter semester or the summer semester.

(3) The provisions in Section 34 (2)(2) **ABMPO/TF** do not apply to degree programs in equivalent subjects.

(4) [1]In deviation from Section 4 (5) **ABMPO/TF**, the teaching and examination language in the Master's degree program is English. [2]Individual teaching units and examinations in (compulsory) elective modules may be held in German. [3]This shall not affect the rest of Section 4 (5) **ABMPO/TF**.

Section 42 Admissions Committee for Master's Degree Programs

[1]For the Master's degree programs in Materials Science and Engineering and Nanotechnology, a Joint Admissions Committee is appointed according to Section 14 **ABMPO/TF**. [2]In deviation from Section 14 **ABMPO/TF**, this consists of one full-time university lecturer and one research associate each pursuant to Section 19 (1) **BayHIG** from every chair at the Department of Materials Science and Engineering at the Faculty of Engineering at FAU. [3]The chair of the admissions committee is held by a professor.

II. Special Provisions

1. Bachelor's Examination

Section 43 Grundlagen- und Orientierungsprüfung (GOP)

[1]The Grundlagen- und Orientierungsprüfung in the Bachelor's degree programs comprises the modules marked accordingly in **Appendix 1** to **3**. [2]The Grundlagen- und Orientierungsprüfung shall have been passed if the modules marked accordingly worth 30 ECTS credits have been passed.

Section 44 Scope and Structure of the Bachelor's Degree Programs

[1]All modules in the Bachelor's degree program are compulsory. [2]The Bachelor's degree program shall have been passed if all modules stipulated in **Appendix 1** to **3** worth 180 ECTS credits have been passed. [3]The distribution over the study semesters and the number of ECTS credits to be earned in the modules as well as the type and scope of the examinations are set forth in **Appendix 1** to **3**.

Section 45 Broadening Horizons in the Bachelor's degree programs in Materials Science and Engineering, Nanotechnology and AI Materials Science and Engineering

(1) [1]The learning outcome of module B21 (Broadening Horizons) of the Bachelor's degree programs in Materials Science and Engineering, Nanotechnology, and AI Materials Science and Engineering is for students to gain intercultural skills and practical work experience. [2]The aim is for students to use course content and gain more advanced knowledge in an (inter)national research environment. [3]The focus lies on planning, organizing and carrying out tasks independently (project). [4]Students can choose according to their own interests, taking into account the guidelines published in the module handbook, whether they want to include industrial internships, study stays abroad and/or activities as student assistants at universities, research institutions and/or in industry, each worth up to 15 ECTS credits, or language courses with a certificate worth 5 ECTS credits. [5]The specific learning outcome and the specific examination subjects of module 21 (Broadening Horizons) depend on the selection made in Sentence 4.

(2) [1]As a course achievement, a report must be submitted in which students present and reflect on their experiences in the respective chosen area. [2]The report shall be between 15 and 30 pages in length; further details can be found in the module handbook.

Section 46 Bachelor's Thesis

(1) [1]The Bachelor's thesis is intended to enable students to learn to solve research problems relating to materials science and engineering, nanotechnology, and AI materials science and engineering independently and document their evidence. [2]The thesis shall have a workload of approximately 300 hours to be completed within five months. [3]The results of the Bachelor's thesis shall be presented in a presentation with a maximum length of 30 minutes followed by a discussion. [4]The date of the presentation shall be determined by the supervisor at the latest by the date the Bachelor's thesis is due, and the student shall be informed of the date in good time. [5]A total of 15 ECTS credits shall be awarded for the Bachelor's thesis including the presentation.

(2) [1]The topic of the Bachelor's thesis shall be issued by a part-time or full-time university lecturer from the Department of Materials Science pursuant to Section 19 **BayHIG** who is employed at FAU as their main occupation pursuant to Section 53 (4) **BayHIG**. [2]The chair of the Examinations Committee shall decide on any exceptions at the student's prior written request.

(3) [1]The sixth semester is recommended for completing the Bachelor's thesis. [2]Admission to the Bachelor's thesis shall be governed by Section 31 (3)(2) **ABMPO/TF**.

2. Master's Examination

a) Master's degree program in Materials Science and Engineering

Section 47 Qualification for a Master's Degree Program in Materials Science and Engineering, Certificates, Admission Requirements

(1) [1]A subject-specific degree pursuant to Section 33 (1)(1) alt. 1 **ABMPO/TF** is a Bachelor's degree in Materials Science and Engineering or Nanotechnology pursuant to these degree program and examination regulations, or an equivalent degree from an institute of higher education in Germany or abroad from one of the relevant areas (Materials Science, Materials Science and Engineering, Nanomaterials and Nanotechnology). [2]Subject-related degrees that show no considerable differences in terms of qualification pursuant to Section 33 (1)(1) alt. 2 **ABMPO/TF** are Bachelor's or Diplom degrees in Chemistry, Physics, Mechanical Engineering, Process Engineering and degree programs with a broad focus on topics related to materials science and engineering, provided the following minimum content was covered:

1. at least 10 ECTS credits in mathematics
2. at least 20 ECTS credits in physics and chemistry
3. at least 10 ECTS credits in practical courses and IT
4. at least 20 ECTS credits in the foundations of materials science.

[3]In accordance with (5)(4) of the **Appendix to ABMPO/TF**, applicants with a subject-related degree or an equivalent degree as defined in sentence 2 shall only be admitted to the Master's degree program after passing an oral admission examination according to (3).

(2) [1]As stipulated in paragraph (2) sentence (6) no (3) of the **Appendix** to **ABMPO/TF**, applicants are required to provide additional proof of English language skills equivalent to at least Level B2 of the Common European Framework of Reference (CEFR) by submitting either relevant school reports or certificates issued by a language school or university. [2]Proof of language skills can in particular be provided by:

1. submitting a school leaving certificate or another certificate issued by the school providing evidence that English courses have been taken at school up until a level equivalent to B2 CEFR,
2. A certificate indicating that the applicant has successfully passed the Test of English as a Foreign Language (TOEFL), attaining at least 85 points in the iBT test, or
3. A certificate from the English Language Testing System (IELTS) with a grade of 5.0 or above; other possible alternatives for proving evidence of language proficiency are listed in the table of equivalence published by the FAU Language Centre.

[3]Proof of language proficiency does not need to be submitted if the applicant acquired their university entrance qualification or relevant undergraduate degree in English.

(3) Applicants shall be deemed as qualified for the Master's degree program in Materials Science and Engineering according to paragraph 5 (2)(2) of the **Appendix to ABMPO/TF** if they have passed the compulsory subject-related or degree-program specific modules B6, B7 and B8 from the Bachelor's degree program in Materials Science and Engineering according to these examination regulations with an average module grade of 3.0 or better.

(4)[1] In the oral admission examination according to (5)(3) et seq. of the **Appendix to ABMPO/TF**, applicants shall be evaluated according to the following criteria and weighting:

1. Subject-specific basic knowledge in materials science and materials processing (in particular material structures, mechanical, optical, electronic and magnetic properties of materials and characterization methods) (50 percent) and
2. Good knowledge of a field of specialization corresponding to the core subjects available in the Master's degree program; the applicant shall choose the core subjects to be discussed during the interview (50 percent).

[2]The choice of core subjects in the Master's degree program is not dependent on the choice made for the admission examination pursuant to no.2.

Section 48 Scope and Structure of the Master's Degree Program in Materials Science and Engineering

(1) [1]Pursuant to **Appendix 4**, the Master's degree program in Materials Science and Engineering consists of

1. Core subject 1 modules, consisting of one foundation module, one supplementary module and two elective modules (M1 to M4)
2. Core subject 2 modules, consisting of one foundation module and one supplementary module (M6, M7)
3. Core subject 3 modules, consisting of one foundation module and one supplementary module (M8, M9)
4. Core subject elective module (M5), that must be chosen from one of the three core subject areas
5. Elective modules (M10, M11)
6. as well as the academic project (M12), soft skills (M13) and Master's thesis with presentation (M14) modules.

[2]Modules M12 and M14 shall be taken in a core subject in which usually 25 ECTS credits have been achieved; the core subject elective module (M5) and modules M10 or M11 should be chosen accordingly. [3]Module M13 shall be taken in one of the three core subjects.

(2) [1]The type and scope of the examinations depend on the skills taught in the respective modules pursuant to (1). Details and the recommended distribution of modules across the standard duration of study are stated in **Appendix 2** and the module handbook. [2]The module handbook is published before the beginning of the semester in accordance with local practice.

(3) The Master's degree program shall have been passed once the student has passed all modules pursuant to **Appendix 4** and has acquired 120 ECTS credits.

Section 49 Core Subject Modules (M1 – M9)

(1) [1]The learning outcome of the core subject modules M1 to M9 is for students to deepen and expand their expertise (designing properties of materials and components and how these affect the resulting structure and specific manufacturing processes) in three essential special areas of materials science and engineering by applying scientific methodology in theory and laboratory practice. [2]Each Chair of the Department of Materials Science and Engineering offers a core subject, with the following special areas available for in-depth study:

1. General material properties

   [1]The focus of the foundation and supplementary module is on studying the fundamental relationships between microstructural properties and the resulting mechanical properties of different materials and material composites across length scales. In particular, students learn materials science fundamentals using applied examples from different material classes, such as high-temperature materials, intermetallic phases, light metals, and coating systems. The core subject consolidates material and physical fundamentals and expands expertise on basic concepts in materials and fracture mechanics, the effects of microstructure on mechanical properties, and modern simulation methods. [2]Furthermore, students learn the fundamentals of material fatigue and the essential deformation and damage processes of cyclic plasticity, as well as the basics of scanning probe microscopy and nanomechanics.

2. Materials science and engineering for metals

   [1]The focus of the foundation and supplementary module is on deepening students' knowledge of the fundamentals and technologies of metallic materials. [2]The foundation module covers the fundamentals of phase and microstructure transformation (e.g., in the material groups titanium, nickel-based, and copper alloys) and their relationships supported by simulations, alongside important process technologies (such as casting, forming, powder metallurgy, and joining) as well as material properties and testing. [3]The supplementary module focuses on the process and microstructure formation as well as the introduction of special (new) process technologies. [4]In terms of materials, the module explores steels, particularly high-strength steels and lightweight steel construction, as well as an introduction to the material groups of refractory metals, metallic glasses, composites and cellular metallic materials in connection with their specific manufacturing methods.

3. Glass and ceramics

   [1]The focus of the foundation and supplementary module is on exploring the physical-chemical properties of glasses and ceramics as well as their relevance in manufacturing and application. [2]The foundation module covers the properties of glasses and ceramics in equilibrium and non-equilibrium systems in terms of microstructure, physical properties (e.g., thermal, chemical, time-dependent), and phase diagrams and the resulting differences between the two material classes.

[3]In particular, high-temperature processes in polycrystalline ceramics (e.g., fundamentals of sintering, diffusion mechanisms, defects) and the possibility of microstructure control (e.g., sintering parameters, composition effects) are considered. [4]The application of ceramic materials under the influence of microstructure and the design for technical use as well as material testing and characterization convey the application relevance of glass and ceramics. [5]The supplementary module focuses on the practical implementation of different manufacturing and characterization methods of ceramic materials and material-related evaluation. [6]The functional and optical properties of glasses and ceramics are particularly addressed with regard to defect structures and doping.

4. Corrosion and surface technology

   [1]The focus of the foundation and supplementary module is on the teaching of technologies and characterization of surface modifications, calculation of corrosion problems, and fundamentals of electrochemistry with relevance to practical applications. [2]The foundation module covers the technologies for surface modification and functionalization in depth and is supplemented by case studies from application and research. [3]This is particularly important in the calculation of corrosion problems to deepen the knowledge of corrosion processes. [4]The methods and procedures of electrochemical processes form the basis for a deeper understanding of modern applications in energy technology (e.g., fuel cells, battery systems). [5]The supplementary module focuses on the practical deepening of the knowledge from the foundation module within the framework of corrosion engineering experiments, e.g., conducting electrochemical measurements, anodizing, and characterizing the high-temperature oxidation resistance of metals and alloys.

5. Polymer materials

   [1]The focus of the foundation and supplementary module is on the fundamentals, technology, characterization, and applications of polymer materials, polymer blends, and composites. [2]The foundation module covers processing technologies in depth and links them with mechanical engineering solutions. [3]Furthermore, model concepts for describing the viscoelastic behavior depending on time and temperature are considered and transferred to practical examples (e.g., polymer components, fibers, films). [4]The supplementary module focuses on the influence of scale on physical properties as well as the teaching of processes at interfaces in polymer material systems and the compatibility of different polymers. [5]Furthermore, complex model concepts for describing polymer properties (e.g., molecular weight dependence, phase diagrams) are addressed.

6. Materials in Electronics and Energy Technology

   [1]The focus of the foundation and supplementary module is on the crystalline structure of solids, crystal growth, and optical and electronic properties of semiconductors as well as their applications. [2]The foundation module links quantum mechanical fundamentals, charge transport, and the type of charge carriers with electrical/optical properties (e.g., resistance, defect density, pn-junction) in crystalline solids. [3]The technologies for the production (e.g., crystal growth from melt, solution, gas phase) of various semiconductor materials and their processing (e.g., oxidation, doping, lithography) into electronic components establish the practical application relevance (e.g., silicon-based semiconductors) also through practical experiments. [4]The supplementary module focuses on thin-film processes for manufacturing semiconductor contacts and devices (e.g., displays, photovoltaics, photodetectors). [5]Further module content includes transistor-based memory materials and energy harvesting technologies.

7. Biomaterials

   [1]The focus of the foundation and supplementary module is on biomaterials, their cell-material interaction, tissue engineering and regenerative medicine, and drug-delivery systems. [2]The foundation module defines biomaterials as implant materials and covers cell-material interaction over surfaces (e.g., surface chemistry, topography, functionalization) and the interface between biomaterials and body, as well as exploring these aspects through practical experiments.

   [3]The supplementary module focuses on biomaterials for tissue engineering through the use of (multifunctional) scaffolds (e.g., for bone and soft tissue) and practical implementation.

8. Materials simulation

   [1]The focus of the foundation and supplementary module is on simulation methods for different length scales and their mathematical fundamentals as well as implementation in algorithms. [2]The foundation module deepens the mathematical and numerical methods and conveys different simulation approaches (e.g., molecular dynamics, Monte Carlo, finite elements, phase-field theory). [3]The supplementary module focuses on atomistic simulation methods as well as continuum models for material simulation, supported by mathematical discretization schemes.

9. Micro and nanostructure research

   [1]The focus of the foundation and supplementary module is on the fundamentals and physical principles of scattering probe-material interaction and their application in studying process-structure-property relationships of materials down to the atomic scale. [2]The foundation module covers the physical principles of fast electrons, generating, deflecting and focusing them using electromagnetic fields, and their interaction with (nano)materials and in the detector. [3]Subsequently, various imaging (e.g., BF, DF, HRTEM, STEM), diffraction (e.g., ED, CBED), spectroscopy (e.g., EDXS, EELS, EFTEM), and 3D techniques (ET) as well as their application in current research topics are introduced. [4]Lectures are always complemented with practical exercises based on the material, where students can apply their knowledge using modern software. [5]The supplementary module focuses on the practical implementation of the learned content from the foundation module. In this context, various TEM, SEM, and X-ray methods are applied to diverse sample systems using state-of-the-art microscopes during a practical course.

[3]This should allow students to acquire skills of relevance to research. [4]The choice of three core subjects ensures that students acquire a broad and well-founded subject knowledge. [5]The learning outcome for the core subject modules is to give students the opportunity to choose their individual focus and tailor their profile in view of their future career and/or personal development. [6]The laboratory courses allow students to put the theory they have covered into practice.

(2) [1]Students must choose three core subjects. [2]For the first core subject, students shall select at least modules M1 to M4 (25 ECTS credits) from the modules offered by one Chair. [3]For the second core subject, students shall select modules M6 and M7 (15 ECTS credits) from the modules offered by a second Chair. [4]For the third core subject, students shall select modules M8 and M9 (15 ECTS credits) from the modules offered by a third Chair. [5]Due to the requirement to acquire specific subject knowledge pursuant to Section 4 (3) **ABMPO/TF**, modules may not overlap or be taken more than once. [6]Module M5 (5 ECTS credits) is chosen from the modules offered by the three Chairs in the core subjects and allows students to specialize further in a particular subject. [7]The choice of core subjects becomes binding at the latest once students are admitted for the first time to the examinations.

(3) [1]The core subject foundation modules M1, M6 and M8 generally consist of a lecture (4 SWS), a tutorial (2 SWS) and a laboratory course (2 SWS), or a lecture (4 SWS), a tutorial (2 SWS) and a seminar (2 SWS), or a combination of lecture, tutorial, laboratory course and seminar coming to a total of 8 SWS. [2]The core subject supplementary modules M2, M7 and M9 generally consist of one lecture (2 SWS) and one tutorial (2 SWS), or one lecture (1 SWS), one laboratory course (2 SWS) and one seminar (1 SWS), or one laboratory course (4 SWS). [3]The elective modules M3, M4 and M5 generally consist of one lecture (2 SWS) and one laboratory course (2 SWS) or one lecture (1 SWS), one tutorial (1 SWS) and one practical course (2 SWS). [4]Any deviations and the exact structure of the modules are stipulated in the module handbook.

(4) [1]The specific learning outcome and the specific examination subjects and the type and scope of the examination are dependent on the skills taught in the respective module pursuant to paragraph (1) and are stated in **Appendix 2** and the module handbook. [2]Examination forms for each foundation module may include written examination (90 min.), oral examination (30 min.), seminar achievement, or practical achievement pursuant to Section 6 (3) **ABMPO/TF**. [3]Examination forms for each core subject supplementary module (M2) and core subject elective module (M3-M9) may include written examination (45 min.), oral examination (15 min.), seminar achievement, or practical achievement pursuant to Section 7 (3) **ABMPO/TF**. [4]Section 7 (2)(3) **ABMPO/TF** stipulates that in justified exceptional circumstances, combinations of the individual achievements stated in sentence 2 or 3 may also be possible. [5]The module handbook is published before the beginning of the semester in accordance with local practice.

Section 50 Elective Modules (M10 – M11)

(1) [1]The overriding learning outcome of the compulsory elective modules M10 to M11 is for students to gain more advanced knowledge and expand their subject-related skills relevant to research in the area of materials science and engineering with specific reference to their chosen areas of specialization. [2]The choice of compulsory elective modules, in particular in combination with the choice of core subject modules M1 to M9, gives students the opportunity to tailor their profile in view of their future careers.

(2) [1]The elective modules worth 5 ECTS credits each may be chosen from those modules offered by the Department of Materials Science and from modules offered by different departments at the Faculty of Engineering. [2]The specific learning outcomes and examination subjects of the individual modules depend on the chosen module and are stated in the relevant **degree program and examination regulations** and the module handbook. [4]No module may be taken twice, see Section 4 (3) **ABMPO/TF**. [5]Foundation and supplementary modules in the core subjects may not be submitted as elective modules.

(3) [1]If the elective modules M10 and M11 are chosen from the Department of Materials Science and Engineering, they generally consist of a lecture (1 SWS), a tutorial (1 SWS), and a practical course (2 SWS) or a lecture (1 SWS), a tutorial (1 SWS), and a seminar (2 SWS) or a laboratory course (4 SWS). [2]Any deviations and the exact structure of the modules are stipulated in the module handbook.

(4) [1]Examination forms in elective modules offered by the Department of Materials Science may include written examination (90 or 45 min.), oral examination (15 or 30 min.), seminar achievement, or practical achievement pursuant to Section 7 (3) **ABMPO/TF**. [2]Section 7 (2)(3) **ABMPO/TF** stipulates that in justified exceptional circumstances,

combinations of the individual achievements stated in sentence 2 may also be possible. [3]The module handbook is published before the beginning of the semester in accordance with local practice.

(5) Notwithstanding (3) and (4), details of the type and scope of examinations and teaching units in modules imported from other degree programs shall be stipulated in the relevant **degree program and examination regulations** and the module handbook.

Section 51 Academic Project (M12)

(1) [1]The learning outcome of the Academic project module (M12) is for students to independently gather, assess, interpret and provide a clear and concise summary of scientifically and technologically relevant information on a research area of relevance for their Master's thesis. [2]The aim of the practical work is to enable students to put the knowledge they have gained from literature into practice. [3]The choice of the topic for the academic project therefore determines the topic of the Master's thesis.

(2) [1]The Academic project module usually consists of an advanced seminar (4 SWS) and self-study (8 SWS). [2]Any deviations and the exact structure of the modules are stipulated in the module handbook.

(3) [1]The specific learning outcome and the specific examination subjects and the type and scope of the examination are dependent on the skills taught in the respective module pursuant to (1) and are stated in the module handbook. [2] Students have to complete one graded seminar achievement for each module pursuant to Section 7 (3) **ABMPO/TF**, depending on the specific manner in which the module is taught. [3]The module handbook is published before the beginning of the semester in accordance with local practice.

Section 52 Soft Skills (M13)

(1) [1]The Soft Skills module generally consists of a seminar in presentation skills (3 SWS) and an excursion (1 SWS). [2]Any exceptions are detailed in the module handbook.

(2) [1]The learning outcome of the "Soft Skills" module is firstly to allow students to acquire relevant skills that will enable them to present and discuss scientific results and findings on a topic of the Master's degree program. [2]A second learning outcome is aimed at promoting personal and social skills through preparing, reporting on and presenting a topic relating to the subject for a specialist audience at a Master's level and in a manner tailored to suit the target group, as well as working under supervision in a group to develop and test subject-related applications and possibilities for implementation with respect to the chosen subject. [3]Thirdly, the choice of excursions allows students to tailor their profile in view of their career plans and/or their own personality. [4]Section 48 (1)(3) applies.

(3) [1]The specific learning outcomes and the specific examination subjects and the type and scope of the examination are dependent on the skills taught in the respective module pursuant to (1) and are stated in the module handbook. [2] Students have to complete one graded seminar achievement and an excursion achievement for each module pursuant to Section 7 (3) **ABMPO/TF**, depending on the specific manner in which the

module is taught. [3]The module handbook is published before the beginning of the semester in accordance with local practice.

Section 53 Master's Thesis, Admission Requirements

(1) [1]The requirements for admission to the Master's thesis (Module M14) shall be as follows:

1. Acquiring at least 60 ECTS credits in the Master's degree program
2. Submission of relevant certificates if admission to the Master's degree program was granted with conditions according to Section 33 (2)(2) **ABMPO/TF**.

[2]In justified, exceptional cases, the Examinations Committee shall be entitled to grant early admission to the Master's thesis.

(2) [1]30 ECTS credits shall be awarded for the Master's thesis including the presentation. [2]The Master's thesis module consists of the Master's thesis (27 ECTS credits) and a presentation followed by a discussion (3 ECTS credits). [3]The two graded parts of the examination shall be weighted as follows when determining the total grade for the module: Master's thesis (90%) and presentation with discussion 10%.

(3) [1]The Master's thesis is intended to demonstrate students' ability to solve scientific problems in the field of materials science and engineering independently. It shall usually deal with a scientific subject from one of the three core subjects. [2]The thesis shall have a workload of approximately 825 hours to be completed within six months. [3]Section 46 (2) shall apply accordingly. [4]The Master's thesis shall be written in English. [5]In justified exceptional cases, e.g., if the scientific language in the field of the Master's thesis topic is predominantly German, the Examinations Committee may allow the thesis to be written in German upon request.

(5) [1]In addition to the Master's thesis, students shall hold a presentation lasting approximately 30 minutes presenting the Master's thesis and its results, followed by a discussion. [2]The date of the presentation shall be determined by the supervisor at the latest by the date the Master's thesis is due, and the student shall be informed of the date in good time.

b) Master's degree program in Nanotechnology

Section 54 Qualification for a Master's Degree in Nanotechnology, Certificates, Admission Requirements

(1) [1]A subject-specific degree as specified in Section 33 (1)(1) **ABMPO/TF** is the Bachelor's degree in Nanotechnology according to these degree program and examination regulations or an equivalent degree in Nanotechnology from another university in Germany or abroad that leads to a qualification equivalent to the Bachelor's degree completed according to these degree program and examination regulations. [2]Subject-related degrees that show no considerable differences in terms of qualification pursuant to Section 33 (1)(1) alt. 2 **ABMPO/TF** shall be Bachelor's or Diplom degrees in Materials Science and Engineering, Physics, Chemistry or in degree programs with a focus on nanotechnology, provided the following minimum content was covered:

1. at least 10 ECTS credits in mathematics
2. at least 20 ECTS credits in physics and chemistry
3. at least 10 ECTS credits in laboratory courses and IT
4. at least 20 ECTS credits in the foundations of nanotechnology.

[3]In accordance with (5)(4) of the **Appendix to the ABMPO/TF**, applicants with a subject-related degree as defined in Section 33 (1)(1) alt. 2 **ABMPO/TF** or a degree as defined in Section 33 (2)(2) **ABMPO/TF** shall only be admitted to the Master's degree program after passing an oral admission examination according to paragraph (4).

(2) [1]As stipulated in Section (2)(6)(3) of the **Appendix to ABMPO/TF**, applicants are required to provide additional proof of English language skills equivalent to at least Level B2 of the Common European Framework of Reference (CEFR) by submitting either relevant school reports or certificates issued by a language school or university. [2]The following are considered suitable proof of language skills:

1. A school leaving certificate or another certificate issued by the school providing evidence that English courses have been taken at school up until a level equivalent to B2 CEFR
2. A certificate indicating that the applicant has successfully passed the Test of English as a Foreign Language (TOEFL), attaining at least 85 points in the iBT test, or the
3. International English Language Testing System (IELTS) 5.0 or above;

Other possible alternatives for proving evidence of language proficiency are listed in the table of equivalence published by the FAU Language Centre. [3]Proof of language proficiency does not need to be submitted if the applicant acquired their university entrance qualification or relevant undergraduate degree in English.

(3) Applicants shall be deemed as qualified for the Master's degree program in Nanotechnology according to paragraph 5 (2)(2) of the **Appendix to ABMPO/TF** if they have passed the compulsory subject-related or degree-program specific modules B6, B7 and B8 from the Bachelor's degree program in Nanotechnology according to these examination regulations with an average module grade of 3.0 or better.

(4) In the oral admission examination according to (5)(3) et seq. of the **Appendix to ABMPO/TF**, applicants shall be evaluated according to the following criteria and weighting:

1. Basic knowledge in materials science and engineering, physics and chemistry of condensed materials (in particular atomic structure, thermodynamic, optical, electronic and magnetic properties of materials as well as characterization methods) (50 percent)
2. Sound knowledge of nanotechnology, for example chemical materials processing or nano characterization methods (50 percent).

Section 55 Scope and Structure of the Master's Degree Program in Nanotechnology

(1) [1]Type and scope of the course and examination achievements are set out in **Appendix 2**. [2]The academic project and the Master's thesis (M12 and M14) shall be taken in a core subject in which usually 25 ECTS credits have been achieved. [3]Module M13 shall be taken in the core subject in order to explore the teaching content in more depth.

(2) The Master's degree program shall have been passed once the student has passed all modules pursuant to **Appendix 5** and has acquired 120 ECTS credits.

Section 56 Core Subject Modules (M6 – M9)

Section 49 applies accordingly for the core subject modules (M6 to M9) in the Master's degree program in Nanotechnology.

Section 57 Scientific-technical elective modules (M10 and M11)

(1) [1]The overriding learning outcome of the scientific-technical elective modules M10 and M11 is for students to expand their subject-related skills going beyond the core subject modules and gain more advanced knowledge in the various subject areas. [2]Students may choose from the modules offered by the Faculty of Engineering and from those offered by the Faculty of Sciences. [3]The choice of scientific-technical elective modules, in particular in combination with the core modules M6 to M9, gives students the opportunity to tailor their profile in view of their future careers. [4]The specific learning outcomes and examination subjects of the individual modules depend on the chosen module and are stated in the relevant **degree program and examination regulations** and the module handbook. [5]No module may be taken twice, see Section 4 (3) **ABMPO/TF**.

(2) [1]The scientific-technical elective modules from the Department of Materials Science and Engineering worth 5 ECTS credits each generally consist of one lecture (1 SWS), one tutorial (1 SWS), and one laboratory course (2 SWS) or one lecture (1 SWS), one tutorial (1 SWS), and one seminar (2 SWS), or one laboratory course (4 SWS). (5) [2]Any deviations from the provisions in sentence 1 and the module structure are set out in the module handbook.

(3) [1]The specific learning outcomes and the specific examination subjects and the type and scope of the examinations are dependent on the skills taught in the respective module pursuant to (1) and sentence 2 and are stated in the module handbook. [2]Examination forms in modules offered by the Department of Materials Science may include written examination (90 or 45 min.), oral examination (30 or 15 min.), seminar achievement, or practical achievement pursuant to Section 7 (3) **ABMPO/TF**. [3] Section 7 (2)(3) **ABMPO/TF** stipulates that in justified exceptional circumstances, combinations of the individual achievements stated in sentence 2 may also be possible. [4]The module handbook is published before the beginning of the semester in accordance with local practice.

(4) For modules imported from other departments and the Faculty of Sciences, the provisions stipulated in the relevant **degree program and examination regulations** or the module handbook will apply in deviation from (3) and (4).

Section 58 Academic Project (M12)

Section 51 applies for the academic project (M12) in the Master's degree program in Nanotechnology with the proviso that the academic project module usually comprises an advanced seminar (4 SWS) and self-study (4 SWS).

Section 59 Soft Skills (M13)

Section 52 applies accordingly for the soft skills module (M13) in the Master's degree program in Nanotechnology.

Section 60 Master's Thesis, Admission Requirements

[1]The Master's thesis in the Master's degree program in Nanotechnology is intended to demonstrate students' ability to solve scientific problems in the field of nanotechnology independently. It shall usually deal with a scientific subject from the core subject. [2]Furthermore, Section 53 shall apply accordingly.

III. Transitional and Final Provisions

Section 61 Legal Validity and Transitory Provisions

(1) [1]These degree program and examination regulations shall come into effect on October 1, 2024. [2]They shall apply to students starting one of the degree programs listed in Section 39 from the winter semester 2024/2025 onwards. [3]They shall also apply to all students who are already studying in accordance with the degree program and examination regulations for the Bachelor's Degree Program in Materials Science and Engineering and the Master's Degree Program in Materials Science and Engineering at the Faculty of Engineering of Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) **FPOMWT** dated July 13, 2023, as well as the Degree Program and Examination Regulations for the Bachelor's Degree Program in Nanotechnology and the Master's degree program in Nanotechnology at the Faculty of Engineering at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) – **FPONT** – dated July 13, 2023.

(2) At the same time, the degree program and examination regulations for the Bachelor's Degree Program in Materials Science and Engineering and the Master's Degree Program in Materials Science and Engineering at the Faculty of Engineering of Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) **FPOMWT** dated July 13, 2023, as well as the Degree Program and Examination Regulations for the Bachelor's Degree Program in Nanotechnology and the Master's degree program in Nanotechnology at the Faculty of Engineering at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) – **FPONT** – dated July 13, 2023 shall become invalid, with the exception of the provisions in Section 52 (2) **FPOMWT** and Section 51 (2) **FPONT**.

Appendix 1: Structure of the Bachelor's Degree Program in Materials Science and Engineering

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd sem.	4th sem.	5th sem.	6th sem.	
B1	**Materials and their structure I - Metallic materials (GOP)**	Materials and their structure	2	1			**7.5**	3.5						EA (WE, 90 min)
		Fundamentals of metallurgical technology	1	1				2.5						
		Supplements to materials and their structure		1				1.5						
B2	**Materials and their structure II - Inorganic and organic materials (GOP)**	Non-metallic inorganic materials	1	1			**10**		2.5					EA (WE, 90 min) + CA (LA)
		Organic materials	1	1					2.5					
		Exercises on non-metallic materials		2					2.5					
		Labworks for MWT I			2				2.5					
B3	**Materials science I - Mechanics and structural characterization**	Mechanical properties	2				**12.5**			2.5				EA (WE, 90 min) + CA (LA)
		Characterization and inspection of materials	1	1						2.5				
		Exercise on mechanical properties and characterization		2						2.5				
		Labworks for MWT II			4					5				
B4	**Materials science II - Functional properties of materials**	Properties and characterization of functional materials I	1	1			**12.5**				2,.			EA (WE, 90 min) + CA (LA)
		Properties and characterization of functional materials II	1	1							2.5			
		Exercises on characterization and properties		2							2.5			
		Labworks for MWT III			4						5			
B5	**Data acquisition and modeling**	Scientific computing	1	1			**10**				2.5			EA (WE, 90 min)
		Introduction to simulation methods	1	1						2.5				
		Measurement analytics and sensor technology	1	1						2.5				
		Jupyter notebooks in use for measurement analytics	1	1							2.5			
B6	**Applied materials science I - Materials with different bonding types**	General material properties	1	1			**7.5**					2.5		EA (WE, 90 min)
		Polymer materials	1	1								2.5		
		Materials science and engineering for metals	1	1								2.5		
B7	**Applied materials science II Structure and functions of materials A**	Glass and ceramics	1	1			**7.5**					2.5		EA (WE, 90 min)
		Materials in electrical engineering	1	1								2.5		

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd sem.	4th sem.	5th sem.	6th sem.	
		Micro and nanostructure research	1	1								2.5		
B8	**Applied materials Science III Structure and functions of materials B**	Materials simulation	1	1			**10**					2.5		EA (WE, 90 min) + CA (LA)
		Biomaterials	1	1								2.5		
		Corrosion and surface technology	1	1								2.5		
		Labworks for MWT IV			2							2.5		
B9	**Materials engineering I - Material cycles (GOP)**	Further processing of materials	1	1			**5**	2.5						EA (WE, 60 min)
		Material cycles and sustainability	1	1				2.5						
B10	**Materials engineering II - Thermodynamics & kinetics of materials**	Solid-state kinetics	1	1			**5**		2.5					EA (WE, 60 min)
		Solid state thermodynamics	1	1					2.5					
B11	**Materials engineering III - Interaction of materials and environment**	Materials in biological environments	1	1			**5**			2.5				EA (WE, 60 min)
		Corrosion of materials	1	1							2.5			
B12	**Materials engineering IV - Designing with materials**	Materials and design I	1	1			**5**				2.5			EA (WE, 60 min)
		Materials and design II	1	1							2.5			
B13	**Materials science III - Crystallography + material defects**	Crystallography	1	1			**7.5**			2.5				EA (WE, 90 min) + CA (LA)
		Material defects	1	1							2.5			
		Physical laboratory II (Structural physics)			2						2.5			
B14	**Statics and mechanics of materials**		3	4			**7.5**			7.5				EA (WE, 90 min)
B15	**Experimental physics I**		3	1			**5**	5						EA (WE, 90 min)
B16	**Experimental physics II**		3	1	2		**7.5**		7.5					EA (WE, 90 min) + CA (LA)
B17	**Mathematics for MWT 1 (GOP)**		4	2			**7.5**	7.5						EA (WE, 90 min) + CA (TA)
B18	**Mathematics for MWT 2**		4	2			**7.5**		7.5					EA (WE, 90 min) + CA (TA)
B19	**General and inorganic chemistry for MWT/NT**		4				**5**	5						EA (WE, 45 min)
B20	**Elective module from the university module catalog**		4				**5**					5		CA[1]
B21	**Broadening Horizons according to Section 45**						**15**						15	CA: see Section 45 (2)
B22	**Bachelor's thesis**	Bachelor's thesis					**15**						12	EA (Bachelor's thesis) + EA (presentation, 30 min plus discussion) (80 % + 20 %)
		Presentation											3	

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd sem.	4th sem.	5th sem.	6th sem.	
Total SWS and ECTS credits:			58	47	16	0	180	30	30	30	30	30	30	
			121											

[1] The type and scope of the examination depend on the specific manner in which the respective module is taught, see module handbook for details.

Key:
GOP Grundlagen- und Orientierungsprüfung; Preliminary examination
EA = graded examination achievement, see Section 7 (2)(10) **ABMPO/TF**.
CA = ungraded course achievement, see Section 7 (2) sentence 11 **ABMPO/TF**.
WE = written examination
TA = tutorial achievement
LA = laboratory achievement, see Section 7 (3) sentence 4 **AMBPO/TF** and module handbook
SA = seminar achievement, see Section 7 (3) sentences 7 and 8 **ABMPO/TF** and module handbook
ExA = Excursion achievement
BA = Bachelor's thesis

Appendix 2: Structure of the Degree Program in Nanotechnology

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd sem.	4th sem.	5th sem.	6th sem.	
B1	**Materials and their structure I - Metallic materials (GOP)**	Materials and their structure	2	1			**7.5**	3.5						EA (WE, 90 min)
		Fundamentals of metallurgical technology	1	1				2.5						
		Supplements to materials and their structure		1				1.5						
B2	**Materials and their structure II - Inorganic and organic materials (GOP)**	Non-metallic inorganic materials	1	1			**10**		2.5					EA (WE, 90 min) + CA (LA)
		Organic materials	1	1					2.5					
		Exercises on non-metallic materials		2					2.5					
		Labworks for NT I			2				2.5					
B3	**Materials science I - Mechanics and structural characterization**	Mechanical properties	2				**12.5**			2.5				EA (WE, 90 min) + CA (LA)
		Characterization and inspection of materials	1	1						2.5				
		Exercise on mechanical properties and characterization		2						2.5				
		Labworks for NT II			4					5				
B4	**Materials science II - Functional properties of materials**	Properties and characterization of functional materials I	1	1			**12.5**				2.5			EA (WE, 90 min) + CA (LA)
		Properties and characterization of functional materials II	1	1							2.5			
		Exercises on characterization and properties		2							2.5			
		Labworks for NT III			4						5			
B5	**Data acquisition and modeling**	Scientific computing	1	1			**10**				2.5			EA (WE, 90 min)
		Introduction to simulation methods	1	1						2.5				
		Measurement analytics and sensor technology	1	1						2.5				
		Jupyter notebooks in use for measurement analytics	1	1							2.5			
B6	**Applied materials science I - Materials with different bonding types**	General material properties	1	1			**7.5**					2.5		EA (WE, 90 min)
		Polymer materials	1	1								2.5		
		Materials science and engineering for metals	1	1								2.5		
B7	**Applied materials science II Structure and functions of materials A**	Glass and ceramics	1	1			**7.5**					2.5		EA (WE, 90 min)
		Materials in electrical engineering	1	1								2.5		

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd sem.	4th sem.	5th sem.	6th sem.	
		Micro and nanostructure research	1	1								2.5		
B8	**Applied materials Science III Structure and functions of materials B**	Materials simulation	1	1			**10**					2.5		EA (WE, 90 min) + CA (LA)
		Biomaterials	1	1								2.5		
		Corrosion and surface technology	1	1								2.5		
		Labworks for NT IV			2							2.5		
B9	**Nanotechnology I - Characterization (GOP)**	Nano I: Introduction to nanotechnology	1	1			**5**	2.5						EA (WE, 60 min)
		Nano II: Characterization	1	1				2.5						
B10	**Nanotechnology II - Thermodynamics & kinetics of materials**	Solid-state kinetics	1	1			**5**		2.5					EA (WE, 60 min)
		Solid state thermodynamics	1	1					2.5					
B11	**Nanotechnology III - Nanostructures**	Nano III: Materials	1	1			**5**			2.5				EA (WE, 60 min)
		Particles	1	1						2.5				
B12	**Nanotechnology IV - Semiconductors**	Nano devices, nano sensors	1	1			**5**				2.5			EA (WE, 60 min)
		Nano IV: Semiconductor devices	1	1							2.5			
B13	**Quantum mechanics for nanotechnology**	Quantum mechanics	4	2			**7.5**			7.5				EA (WE, 90 min)
B14	**Sold-state physics for nanotechnology**	Solid-state physics	4	2			**7.5**				7.5			EA (WE, 90 min)
B15	**Experimental physics I**		3	1			**5**	5						EA (WE, 90 min)
B16	**Experimental physics II**		3	1	2		**7.5**		7.5					EA (WE, 90 min) + CA (LA)
B17	**Mathematics for NT 1 (GOP)**		4	2			**7.5**	7.5						EA (WE, 90 min) + CA (TA)
B18	**Mathematics for NT 2**		4	2			**7.5**		7.5					EA (WE, 90 min) + CA (TA)
B19	**General and inorganic chemistry for MWT/NT**		4				**5**	5						EA (WE, 45 min)
B20	**Elective module from the university module catalog**		4				**5**					5		SL[1]
B21	**Broadening Horizons according to Section 45**						**15**						15	CA: see Section 45 (2)
B22	**Bachelor's thesis**	Bachelor's thesis					**15**						12	EA (Bachelor's thesis) + EA (presentation, 30 min plus discussion) (80 % + 20 %)
		Presentation											3	
Total SWS and ECTS credits:			**63**	**45**	**12**	**0**	**180**	**30**	**30**	**30**	**30**	**30**	**30**	
			120											

[1] The type and scope of the examination depend on the specific manner in which the respective module is taught, see module handbook for details.

Key:

GOP Grundlagen- und Orientierungsprüfung; Preliminary examination
EA = graded examination achievement, see Section 7 (2)(10) **ABMPO/TF**.
CA = ungraded course achievement, see Section 7 (2) sentence 11 **ABMPO/TF**.
WE = written examination
TA = tutorial achievement
LA = laboratory achievement, see Section 7 (3) sentence 4 **AMBPO/TF** and module handbook
SA = seminar achievement, see Section 7 (3) sentences 7 and 8 **ABMPO/TF** and module handbook
ExA = Excursion achievement
BA = Bachelor's thesis

Appendix 3: Degree program structure for the Bachelor's Degree Program AI Materials Science and Engineering

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3nd Sem	4th Sem	5th Sem	6th Sem	
B1	**Materials and their structure I - Metallic materials (GOP)**	Materials and their structure	2	1			**7.5**	3.5						EA (WE, 90 min)
		Fundamentals of metallurgical technology	1	1				2.5						
		Supplements to materials and their structure		1				1.5						
B2	**Materials and their structure II - Inorganic and organic materials (GOP)**	Non-metallic inorganic materials	1	1			**10**		2.5					EA (WE, 90 min) + CA (LA)
		Organic materials	1	1					2.5					
		Exercises on non-metallic materials		2					2.5					
		Labworks for AI materials technology I			2				2.5					
B3	**Materials science I - Mechanics and structural characterization**	Mechanical properties	2				**12.5**			2.5				EA (WE, 90 min) + CA (LA)
		Characterization and inspection of materials	1	1						2.5				
		Exercise on mechanical properties and characterization		2						2.5				
		Labworks for AI materials technology II			4					5				
B4	**Materials science II - Functional properties of materials**	Properties and characterization of functional materials I	1	1			**12.5**				2.5			EA (WE, 90 min) + CA (LA)
		Properties and characterization of functional materials II	1	1							2.5			
		Exercises on characterization and properties		2							2.5			
		Labworks for AI materials technology III			4						5			
B5	**Data acquisition and modeling**	Scientific computing	1	1			**10**				2.5			EA (WE, 90 min)
		Introduction to simulation methods	1	1						2.5				
		Measurement analytics and sensor technology	1	1						2.5				
		Jupyter notebooks in use for measurement analytics	1	1							2.5			
B6	**Applied materials science I - Materials with different bonding types**	General material properties	1	1			**7.5**					2.5		EA (WE, 90 min)
		Polymer materials	1	1								2.5		
		Materials science and engineering for metals	1	1								2.5		
B7		Glass and ceramics	1	1			**7.5**					2.5		EA (WE, 90 min)

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3nd Sem	4th Sem	5th Sem	6th Sem	
	Applied materials science II Structure and functions of materials A	Materials in electrical engineering	1	1								2.5		
		Micro and nanostructure research	1	1								2.5		
B8	**Applied materials Science III Structure and functions of materials B**	Materials simulation	1	1			**10**					2.5		EA (WE, 90 min) + CA (LA)
		Biomaterials	1	1								2.5		
		Corrosion and surface technology	1	1								2.5		
		Labworks for AI materials technology IV			2							2.5		
B9	**Seminar: Data science in research and industry (GOP)**	See **FPODataScience**					**5**	5						EA: See **FPODataScience**
B10	**Introduction to mathematical data analysis**	See **FPODataScience**					**5**		5					EA: See **FPODataScience**
B11	**Foundations of computer science (compact)**	see **FPOINF**					**5**			5				EA: see **FPOINF**
B12	**Compulsory elective module: Data science**	Compulsory elective module from the catalog of compulsory electives pursuant to Sections 43 and 44 **FPODataScience**, recommended: Parallel and functional programming					**5**			5				EA: See **FPODataScience**
B13	**Compulsory elective module: Foundations of machine learning[2]**	Introduction to Machine Learning or	2				**5**				(5)			EA (WE, 60 min)
		Machine Learning for Engineers I - Introduction to Methods and Tools or	2								(5)			
		Mathematical foundations of machine learning	2								(5)			
B14	**Machine learning in materials science**	Lecture + tutorial: Machine learning in characterization and manufacturing	2	2			**7.5**				5			EA (WE, 90 min)
		Lecture: Material genomics	2								2.5			
B15	**Experimental physics I**		3	1			**5**	5						EA (WE, 90 min)
B16	**Experimental physics II**		2	2	2		**7.5**		7.5					EA (WE, 90 min) + CA (LA)
B17	**Mathematics for data science 1 (GOP)**	See **FPODataScience**					**10**	10						EA: See **FPODataScience**
B18	**Mathematics for data science 2**	See **FPODataScience**					**10**		10					EA: See **FPODataScience**
B19	**Chemistry for material technology**		2				**2.5**			2.5				EA (WE, 45 min)
B20	**Elective module from the university module catalog**	Import from whole of FAU	4				**5**					5		CA[1]

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Distribution of workload per semester in ECTS credits						Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3nd Sem	4th Sem	5th Sem	6th Sem	
		(Recommended: AIBE, Mathematics, Computer Science, Materials Science)												
B21	**Broadening Horizons according to Section 45**						**15**						15	CA: see Section 45 (2)
B22	**Bachelor's thesis**	Bachelor's thesis					**15**						12	EA (Bachelor's thesis) + presentation, 30 min plus discussion) (80 % + 20 %)
		Presentation											3	
Total SWS and ECTS credits:			**63**	**40**	**12**	**0**	**180**	**27.5**	**32.5**	**30**	**30**	**30**	**30**	
			115											

[1] The type and scope of the examination depend on the specific manner in which the respective module is taught, see module handbook for details.
[2] Students must choose one of the three lectures on offer.

Key:
GOP Grundlagen- und Orientierungsprüfung; Preliminary examination
EA = graded examination achievement, see Section 7 (2) sentence 10 **ABMPO/TechFak**
CA = ungraded course achievement, see Section 7 (2) sentence 11 **ABMPO/TechFak**
WE = written examination
TA = tutorial achievement
LA = laboratory achievement, see Section 7 (3) sentence 4 **AMBPO/TechFak** and module handbook
SA = seminar achievement, see Section 7 (3) sentences 7 and 8 **ABMPO/TechFak** and module handbook
ExA = Excursion achievement
BA = Bachelor's thesis

Appendix 4: Degree program structure for Master's degree program in Materials Science and Engineering

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Workload per semester in ECTS credits				Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd Sem.	4th Sem.	
M1	**Core subject 1 – Foundation module (compulsory)[1]**		4	(0-4)	(0-4)	(0-2)	**10**	5	5			see Section 49 (4)
M2	**Core subject 1 – Supplementary module (compulsory)[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**	2	3			see Section 49 (4)
M3	**1. Elective module in materials science and engineering from core subject 1[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**	5				See Section 49 (4)
M4	**2. Elective module in materials science and engineering from core subject 1[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**		5			see Section 49 (4)
M5	**Elective module in materials science and engineering from one of the three core subjects[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**	5				see Section 49 (4)
M6	**Core subject 2 – Foundation module (compulsory)[1]**		4	(0-4)	(0-4)	(0-2)	**10**	5	5			see Section 49 (4)
M7	**Core subject 2 – Supplementary module (compulsory)[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**	2	3			see Section 49 (4)
M8	**Core subject 3 – Foundation module (compulsory)[1]**		4	(0-4)	(0-4)	(0-2)	**10**	5	5			see Section 49 (4)
M9	**Core subject 3 – Supplementary module (compulsory)[1]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**	2	3			see Section 49 (4)
M 10	**1. Elective subject (from Faculty of Engineering incl. Materials Science and Engineering)[2]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**			5		EA [2]
M 11	**2. Elective subject (from Faculty of Engineering incl. Materials Science and Engineering)[2]**		(0-2)	(0-2)	(0-4)	(0-2)	**5**			5		EA [2]
M 12	**Academic project[3]**	Literature research and methods				8	**15**			10		EA: SA[3]
		Advanced seminar				4				5		
M 13	**Soft Skills[4]**	Presentation techniques				3	**5**			4		EA [4] (SA+ExA)
		1 Excursion				1				1		
M	**Master's thesis**	Master's thesis					**30**				27	EA (MT) +

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS credits	Workload per semester in ECTS credits				Type and scope of the examination
			L	T	P	S		1st sem.	2nd sem.	3rd Sem.	4th Sem.	
14		Presentation									3	EA (Presentation 30 min plus discussion) (90 % + 10 %)
Total SWS and ETCS credits:			**12-28**	**0-28**	**0-44**	**16-38**	**120**	**31**	**29**	**30**	**30**	
			28-138									

[1] See Section 49, selection of the first core subject from the nine specializations, selection of the second core subject from the remaining eight specializations, and selection of the third core subject from the remaining seven specializations.
[2] see Section 50.
[3] see Section 51.
[4] see Section 52.

Key:
EA = graded examination achievement, see Section 7 (2)(10) **ABMPO/TF**.
CA = ungraded course achievement, see Section 7 (2) sentence 11 **ABMPO/TF**.
WE = written examination
O = oral examination
LA = laboratory achievement, see Section 7 (3) sentence 4 **AMBPO/TF** and module handbook
SA = seminar achievement, see Section 7 (3) sentences 7 and 8 **ABMPO/TF** and module handbook
MT = Master's thesis

Appendix 5: Structure of the Master's Degree Program in Nanotechnology

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS cred-its	Distribution of workload per semester in ECTS cred-its				Type and scope of the exami-nation
			L	T	P	S		1st Sem	2nd Sem	3rd sem.	4th sem.	
M1	**Nanocharacterization**	Electron microscopy	2				**10**	3				EA: (oral 30 min)
		Nanospectroscopy	2					3				
		Scanning electron microscopy / nanoindentation	2	1					4			
M2	**Laboratory course: Synthesis/charac-terization**				5		**5**	5				LA
M3	**Computational nanoscience**		2	2			**5**		3	2		EA (written examination, 45 min)
M4	**Top-down nanostructuring**	Nanoelectronics	2				**10**		3			EA: (oral 30 min)
		Photolithography	2	1				4				
		Plating technology	2					3				
M5	**Bottom-up nano synthesis / self-as-sembly**	Molecular nanostructures	2				**10**			3		EA: (oral 30 min)
		Nanotechnology of disperse sys-tems	2	1						4		
		Self-assembly on surfaces	2						3			
M6	**Core subject – foundational module**	see Section 56	4	(0-4)	(0-4)	(0-2)	**10**	5	5			see Section 56
M7	**Core subject – supplementary module**	see Section 56	(0-2)	(0-2)	(0-4)	(0-2)	**5**	5				see Section 56
M8	**1. Elective module in materials science and engineering from core subject**	see Section 56	(0-2)	(0-2)	(0-4)	(0-2)	**5**		5			see Section 56
M9	**2. Elective module in materials science and engineering from core subject**	see Section 56	(0-2)	(0-2)	(0-4)	(0-2)	5	3	2			see Section 56
M 10	**1. Elective module: Engineering or sci-ences (from Faculty of Engineering in-cluding Materials Science or Faculty of Sciences)**	see Section 57	(0-2)	(0-2)	(0-4)	(0-2)	**5**		5			CA, see Section 57
M 11	**2. Elective module: Engineering or sci-ences (from Faculty of Engineering in-cluding Materials Science or Faculty of Sciences)**	see Section 57	(0-2)	(0-2)	(0-4)	(0-2)	**5**			5		CA, see Section 57

No.	Module name	Teaching unit	SWS (semester hours)				Total ECTS cred-its	Distribution of workload per semester in ECTS cred-its				Type and scope of the exami-nation
			L	T	P	S		1st Sem	2nd Sem	3rd sem.	4th sem.	
M 12	**Academic project pursuant to Section 58**	Literature research and methods				4	**10**			5		EA: SA, see Section 58 (3)
		Advanced seminar				4				5		
M 13	**Soft skills pursuant to Section 59**	Presentation techniques				3	**5**			4		EA: SA + ExA, see Section 59 in conjunction with Section 52 (3)
		1 Excursion				1				1		
M 14	**Master's thesis**	Master's thesis					**30**				27	EA (MT) + EA (Presentation 30 min and discussion) (90 % + 10 %)
		Presentation									3	
Total SWS and ETCS credits:			**24 - 34**	**5 - 19**	**5 - 29**	**12 - 24**	**120**	**31**	**30**	**29**	**30**	
			46-106									

Key:
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