Cooperation project NAWI Graz

Curriculum for the master's degree programme in

Advanced Materials Science

Curriculum 2016 in the 2018 Version

This curriculum was approved by the Senate of the University of Graz in the meeting dated 07.03.2018 and by the Senate of Graz University of Technology in the meeting dated 12.03.2018.

The study programme is organised as a combined study programme (§ 54e UG) of the University of Graz (Uni Graz) and Graz University of Technology (TU Graz) in the context of "NAWI Graz". This study programme is legally based on the Universities Act of 2002 (UG) and on the provisions of the Statutes of Uni Graz and TU Graz as amended.

(Please note: The English version of this document is a courtesy translation. Only the German version is legally binding.)

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§ 1 General provisions

The engineering sciences master's degree programme in Advanced Materials Science comprises four semesters. The total scope of the programme is 120 ECTS credit points, according to § 54 para. 3 UG.

The master's degree programme in Advanced Materials Science is exclusively held in English according to § 63a para. 8 UG.

Graduates of this programme are awarded the university degree of "Diplom-Ingenieurin"/"Diplom-Ingenieur", abbreviated: "Dipl.-Ing." or "DI". The international equivalent of this university degree is "Master of Science", abbreviated: "MSc".

§ 2 Object of study programme and qualification profile

(1) Object of study programme

The master's degree programme in Advanced Materials Science provides students with an education in this branch of science, with in-depth knowledge of the basics of natural sciences, and with knowledge of and skills in engineering sciences. Particular focus is placed on interdisciplinary education and training, on promoting a critical view, and on considering materials and their properties comprehensively and from several different perspectives.

(2) Qualification profile and skills

The master's degree in Advanced Materials Science is awarded to students who have demonstrated the following knowledge, skills and competencies.

Knowledge and understanding

After completing the master's degree programme successfully, graduates have learnt the basics of manufacturing, processing, characterising, modelling and applying materials. Graduates have extended their in-depth knowledge of one of the following specialisations:

- Metals and Ceramics;
- Semiconductor Processing and Nanotechnology, or
- Biobased Materials

In particular, graduates of the master's degree programme in Advanced Materials Science have acquired the following competencies:

- a broad knowledge of the fundamental principles of materials science and how to apply them technologically, as well as sound knowledge of the materials, methods and strategies of materials science;

- expertise developed by carrying out research work that is documented in writing;

- an understanding of the most important research interests of their area of study, and

- experience in working on interdisciplinary scientific/technological problems.

Application of knowledge and understanding

Graduates of the master's degree programme in Advanced Materials Science are able to apply their theoretical knowledge. Specifically, they are able to:

- define and interpret the characteristics, limits, terminologies and schools of thought of their field;

- apply general scientific and technological methods and models;

- adapt familiar concepts for manufacturing a wide range of materials, develop new technological methods and apply theoretical models;

- prepare regulations as part of an experiment, describe the relevant set-up and perform all the necessary steps independently;

- solve multidisciplinary scientific/technical assignments independently and creatively using an engineering approach to apply knowledge of materials science experimentally and theoretically;

- select and apply suitable methods to solve a problem, and interpret their result;

- develop solutions based on the interdisciplinary studies in multidisciplinary cooperation and communication in project teams with graduates of other degree programmes, such as Physics, Chemistry, Mechanical Engineering or Mathematics, and

- assess the risks involved in handling and using materials and products and regarding processes.

Making assessments

Graduates of the master's degree programme in Advanced Materials Science are able to

- review and improve methods and technologies studied;
- solve problems and carry out scientific investigations;
- weigh up arguments, assumptions, abstract concepts and data against each other in order to answer a complex question, and
- take the societal, social and ethical effects into account in their specialist or scientific activities.

Communicative and social competencies

Graduates are able to

- apply modern communication and presentation techniques;
- write scientific texts, and
- communicate information, ideas, problems and solutions in front of audiences of specialists or non-specialists.

Organisational competencies

Graduates of this degree programme

- can use learning strategies that enable them to acquire knowledge independently and have developed an awareness of the importance of continuously keeping their knowledge and skills up to date, and
- are able to work both independently and in a team.

(3) Demand for and relevance of the study programme for science and on the job market

This master's degree programme prepares students for a future profession as a materials scientist in natural sciences and technology. Graduates have learned how to complete a wide range of complex tasks in industry, research and public institutions, and to perform their activities responsibly and with critical knowledge and understanding. The master's degree programme also provides students with the requirements for independent scientific work as part of a doctoral programme.

§ 3 Admission requirements

(1) Admission to a master's degree programme requires a subject-related bachelor's degree of a university or university of applied sciences or another equivalent degree of a recognised Austrian or foreign post-secondary educational institution (§ 64 para. 5 UG).

(2) This master's degree programme provides an in-depth education in the field of advanced materials science for graduates of a natural sciences or engineering sciences bachelor's degree programme that has a connection with materials science but does not focus primarily on the field of materials science. The master's degree programme in Advanced Materials Science builds upon the content of one of the bachelor's degree programmes *Mechanical Engineering and Business Economics* or *Mechanical Engineering*, *Chemistry*, *Physics*, *Chemical and Process Engineering* or *Environmental Systems Sciences/Natural Sciences – Technology* offered at Uni Graz or TU Graz. Graduates of these study programmes[1] and graduates of the study programmes listed in Annex VI fulfil the admission requirements for the master's degree programme in Advanced Materials Science.

(3) Graduates of other study programmes may be admitted to the master's degree programme in Advanced Materials Science if they provide proof that they have acquired equivalent knowledge of the content taught in the core subjects of the bachelor's degree programmes listed in item (2).

(4) If the degrees are generally equivalent and only certain supplementary qualifications are required for full equivalence, additional courses and examinations of the bachelor's degree programmes listed in para. 2 with a maximum scope of 30 ECTS credit points may be prescribed in order to obtain full equivalence. The recognition of possible additional qualifications to be obtained is permitted for the elective modules according to § 8 up to the amount of 10 ECTS credit points, as well as the free-choice subject according to § 9 up to the amount of 12 ECTS credit points.

(5) In order to obtain an overall scope of 300 ECTS credit points for the graduate and postgraduate study programmes together, students shall not be permitted to assign courses in the master's programme which they have already completed as part of their bachelor's degree and which were part of their qualification for the master's degree programme.

[1] For graduates of the bachelor degree programme Environmental System Sciences / Natural Sciences Technology, Version 2017, who have not completed the elective module I.2 Chemical Technology of that degree programme, the special provision mentioned in annex VI applies.

§ 4 Structure and organisation of the study programme

(1) The master's degree programme in Advanced Materials Science with a workload of 120 ECTS credit points comprises four semesters. A total of 89 ECTS credit points are assigned to the courses, 12 of which are assigned to the free-choice subject. 30 ECTS credit points are awarded for the master's thesis and 1 ECTS credit point is awarded for the master's degree examination.

Module/subject	ECTS
Introduction Module 1A-1E	11-14
Module 2: Fundamentals of Materials Science	10
Module 3: Materials Characterization and Materials Laboratory	10
Specialisation:[1] Metals and Ceramics (Modules 4A-4C) / or Semiconductor Processing and Nanotechnology (Modules 5A-5C) / or Biobased Materials (Modules 6A-6C) Module A: Theory and Application Module B: Laboratory Module C: Elective subject	 15 6 12
General Electives and Soft Skills	9-12[2]
Free-choice subject	12
Master's degree seminar	1
Master's thesis	30
Master's degree examination	1
Total	**120**

[1] A specialisation must be chosen and completed.
[2] Dependent on the workload of the introduction module to be completed. The sum of the ECTS credit points from the elective subject *General Electives and Soft Skills* and the introduction module must be 23.

(2) All achievements to be obtained by the students are assigned ECTS credit points. These ECTS credit points are used to determine the relative weight of the workload of the individual academic achievements; the workload of one year must comprise 1500 hours and 60 ECTS credit points are awarded for this workload. The workload comprises the self-study part and the semester hours. One semester hour corresponds to 45 minutes per study week of the semester.

§ 5 Types of courses

(1) **Lectures (VO)*:** Lectures serve as an introduction to the methods of the subject and for the teaching of an overview and specialised knowledge of accepted scientific findings in the field, the current state of research and the specific research areas of the subject.

(2) **Lectures with integrated exercises (VU)*:** Comprise the teaching of an overview, specialised knowledge and practical skills. These are courses with continual assessment.

(3) **Exercises (UE)*:** Exercises must correspond to the practical aims of the study programme and are designed to solve specific tasks. These are courses with continual assessment.

(4) **Laboratory courses (LU)***: Laboratory courses provide knowledge and practice of experimental techniques and skills. These are courses with continual assessment.

(5) **Seminars (SE)*:** Seminars are designed as independent scientific work and scientific discussion of this work, for which a topic must be elaborated in writing and presented orally. A discussion on this topic must be held. These are courses with continual assessment.

(6) **Projects (PT)*:** In projects, experimental, theoretical and/or design applied work is carried out, or small research papers are written, taking into account all the necessary steps. Projects are completed with a written paper that is part of the assessment.

* The types of courses stated in the Statute (Uni Graz) or Guidelines (TU Graz) of the two universities shall apply. See § 1 para. 3 of the Statute of Uni Graz or the Guidelines for the types of courses of the Curricula Committee of the TU Graz Senate dated 06.10.2008 (published in the University Gazette of TU Graz dated 03.12.2008).

For the types of courses listed below, the maximum group sizes are as follows:

1. The maximum group size for exercise-based courses (UE) and exercise components of lectures with integrated exercises (VU) is 30 students.
2. The maximum group size for laboratory courses (LU) is 6 students.
3. The maximum group size for seminars (SE) is 25 students.
4. The maximum group size for projects (PT) is 15 students.

§ 6 Guidelines for the allocation of places on courses

(1) If the number of students registered for a course exceeds the number of available places, parallel courses are to be provided. If necessary, these parallel courses may also be provided during the semester break.

(2) If it is not possible to offer a sufficient number of parallel courses (groups), the students are to be admitted to the course according to the following priority ranking:

a. Students who are required to complete the course according to their curriculum.
b. The sum of the successfully completed courses of the respective study programme (total ECTS credit points).
c. The date (early date has priority) of the fulfilment of the participation requirement.
d. Students who have already been placed on a waiting list or who have to repeat the course are to be given priority on the next course.
e. The further ranking is made according to the grade of the examination or the average grade of the examinations (weighted on the basis of the ECTS credit points) of the respective course(s) that are specified as the participation requirement.
f. Students who do not need to complete such courses in order to fulfil their curriculum are only considered based on the number of free places. It is possible to be included on a separate waiting list. The above-mentioned provisions shall apply accordingly.

(3) Students who complete a part of their studies at the universities participating in NAWI Graz in the context of mobility programmes are given priority for up to 10% of the available places.

§ 7 Course content and curriculum

The individual courses of this master's degree programme and their allocation to the examination subjects (modules or elective subjects) are indicated hereinafter. The knowledge, methods or skills to be provided in the modules are described in more detail in Annex II. The semester allocation is a recommendation and ensures that the sequence of courses builds optimally on previous knowledge and that the workload of an academic year does not exceed 60 ECTS credit points. Annex I and § 8 below contain the allocation of the courses to the participating universities.

Master's degree programme in Advanced Materials Science								
Module subject	**Course**	**Type of course**	**SSt**	**ECTS**	**Semester incl. ECTS**			
					I	**II**	**III**	**IV**
Module 1A: Introduction module for students with Bachelor programme Chemistry								
	Basic Laboratory for Advanced Materials Science	LU	2.67	2	2			
	Introduction to Solid State Physics	VO	2	3	3			
	Introduction to Materials Science	VO	2	3	3			
	Introduction to Modelling and Simulation[1]	VU	2	3	3			
	Mathematics for Advanced Materials Science[2]	VU	2	2	2			
	Total			**13**	**13**			
[1:] 2/3 SSt/lecture component, 1/3 SSt/exercise component [2:] 1/2 SSt/lecture component, 1/2 SSt/exercise component								
Module 1B: Introduction module for students with Bachelor programme Physics								
	Basic Laboratory for Advanced Materials Science	LU	2.67	2	2			
	Introduction to Materials Science	VO	2	3	3			
	Applied Chemistry I	VO	1.33	2	2			
	Applied Chemistry II	VO	1.33	2	2			
	Analytical Chemistry	VO	2	3	3			
	Total			**12**	**12**			
Module 1C: Introduction module for students with Bachelor programme Mechanical Engineering								
	Basic Laboratory for Advanced Materials Science	LU	2.67	2	2			
	Introduction to Solid State Physics	VO	2	3	3			
	Atomic Physics – Quantum Mechanics	VO	1.33	2	2			
	Applied Chemistry I	VO	1.33	2	2			
	Applied Chemistry II	VO	1.33	2	2			
	Analytical Chemistry	VO	2	3	3			
	Total			**14**	**14**			
Module 1D: Introduction module for students with Bachelor programme Chemical Engineering								
	Basic Laboratory for Advanced Materials Science	LU	2.67	2	2			
	Introduction to Solid State Physics	VO	2	3	3			
	Introduction to Materials Science	VO	2	3	3			
	Atomic Physics – Quantum Mechanics	VO	1.33	2	2			
	Applied Chemistry II	VO	1.33	2	2			
	Total			**12**	**12**			

Module/ subject	Course	Type of course	SSt	ECTS	Semester incl. ECTS			
					I	II	III	IV
Module 1E: Introduction module for students with Bachelor programme Environmental Systems Sciences/Natural Sciences – Technology								
	Basic Laboratory for Advanced Materials Science	LU	2.67	2	2			
	Introduction to Solid State Physics	VO	2	3	3			
	Introduction to Materials Science	VO	2	3	3			
	Introduction to Modelling and Simulation[3]	VU	2	3	3			
	Total			**11**	**11**			
[3]: 2/3 SSt/lecture component, 1/3 SSt/exercise component								

Module 2: Fundamentals of Materials Science								
	Introduction to Solid State Chemistry for Advanced Materials Science	VO	1.33	2	2			
	Materials Production and Processing	VO	2	3			3	
	Modelling and Simulation for Advanced Materials Science[4]	VU	2	2		2		
	Physical Properties of Materials	VO	2	3	3			
	Total			**10**	**5**	**2**	**3**	
[4]: 2/3 SSt/lecture component, 1/3 SSt/exercise component								
Module 3: Materials Characterization and Materials Laboratory								
	Materials Laboratory	LU	4	4		4		
	Materials Characterization I	VO	1.33	2	2			
	Materials Characterization II	VO	1.33	2	2			
	Materials Characterization III	VO	1.33	2	2			
	Total			**10**	**6**	**4**		

Specialisation: Metals and Ceramics Module 4A: Theory and Application								
	Plasticity and Forming Processes	VO	2.66	4		4		
	Corrosion and Corrosion Protection of Metallic Materials	VO	2	3			3	
	Functional Materials I	VO	2	3			3	
	Functional Materials II	VO	0.66	1		1		
	High-performance Materials and Composites	VO	2.66	4		4		
	Total			**15**		**9**	**6**	
Specialisation: Metals and Ceramics Module 4B: Laboratory								
	Laboratory Course Metals and Ceramics	LU	6	6			6	
	Total			**6**			**6**	

Module/subject	Course	Type of course	SSt	ECTS	Semester incl. ECTS			
					I	II	III	IV
Specialisation: Semiconductor Processing and Nanotechnology Module 5A: Theory and Application								
	Microelectronics and Micromechanics	VO	2	3		3		
	Organic Semiconductors	VO	2	3		3		
	Modelling and Simulation of Semiconductors[5]	VU	2	3		3		
	Surface Science	VO	2	3			3	
	Nanostructures and Nanotechnology	VO	2	3		3		
	Total			**15**		**12**	**3**	
[5]: 2/3 SSt/lecture component, 1/3 SSt/exercise component								
Specialisation: Semiconductor Processing and Nanotechnology Module 5B: Laboratory								
	Laboratory Course Semiconductor Processing and Nanotechnology	LU	6	6			6	
	Total			**6**			**6**	
Specialisation: Biobased Materials Module 6A: Theory and Application								
	Introduction to Biophysics and Biochemistry	VO	2	3		3		
	Biocompatible Materials	VO	2	3			3	
	Soft Matter Physics	VO	2	3		3		
	Physical and Chemical Characterization of Biopolymers	VO	2	3			3	
	Biological and Biobased Materials	VO	2	3		3		
	Total			**15**		**9**	**6**	
Specialisation: Biobased Materials Module 6B: Laboratory								
	Laboratory Course Biobased Materials	LU	6	6			6	
	Total			**6**			**6**	

Module: Master's degree seminar								
	Master's degree seminar[6]	SE	1	**1**				**1**
Total for compulsory modules				**53-56**	**22-25**	**15-18**	**12-15**	**1**
Specialisation module: Elective subject				**12**				
General Electives and Soft Skills				**9-12**				
Total for the elective modules				**21-24**				
[6]: This course is assessed as "successful participation" or "unsuccessful participation".								
Free-choice subject				12				
Master's thesis				30				30
Master's degree examination				1				1
Overall total				**120**	**30**	**30**	**28**	**32**

Abbreviations: LU: laboratory course; SE: seminar; SSt: semester hours; VO: lecture; VU: lecture with integrated exercises

§ 8 Catalogues of electives

For the elective subject of the chosen specialisation module, courses with a workload of 12 ECTS credit points from the catalogue of the chosen specialisation module must be completed.

For the elective subject *General Electives and Soft Skills*, courses with a workload of 9-12 ECTS credit points must be completed (dependent on the introduction module to be completed). These courses may be chosen from any of the catalogues listed below and from the compulsory module *Theory and Application* of the two specialisation modules not chosen. Soft skills with a workload of 3 to 4 ECTS credit points must be chosen. Students are recommended to choose corresponding courses from the catalogue of electives *Soft Skills* below or courses in foreign languages. After consultation with the officer responsible for study matters, other relevant courses may also be chosen as soft skills.

A maximum of one Project Laboratory may be completed for the master's degree programme in Advanced Materials Science.

If the workload of the courses completed for the elective subject of the chosen specialisation module is higher or lower than 12 by one ECTS credit point, the workload for the elective subject *General Electives and Soft Skills* may be amended to balance this.

Metals and Ceramics **Module 4C: Elective subject**							
	Course	**Type of course**	**SSt**	**ECTS**	**Semester allocation[7]**	**Uni Graz**	**TU Graz**
	Project Laboratory	PT	8	6	S/W	x	x
	Structural Transformation and Diffusion in Materials[8]	VU	3	3	S		x
	Joining Technology	VO	2	3	W		x
	Werkstoffkunde Stahl für Advanced Materials Science[9]	VO	1.33	2	W		x
	Failure Analysis[8]	VU	2	2	S		x
	Structurally Complex Materials	VO	2	3	W		x
	Electrical Engineering Materials	VO	2	3	S		x
	Electro-chemical Surface Refinement	VO	2	3	W		x
	Advanced 2D and 3D Nanoanalysis	VU	2	3	S		x
	Fracture Mechanics for Advanced Materials Science	VO	1.33	2	W		x
	Surface Science	VO	2	3	W	x	
	Laboratory Exercises in Computer Supported Measurement Techniques for Advanced Materials Science	LU	2	3	W		x
	Materials Selection	VU	2	3	W		x

	Materials and the Environment[8]	VU	2	2	W		x
	Introduction to Solid State Physics, Exercise	UE	1	1	W		x
	Topics in Metals and Ceramics	VO	2	3	S/W	x	x

[8]: 2/3 SSt/lecture component, 1/3 SSt/exercise component
[9]: This lecture is held in German language.

Semiconductor Processing and Nanotechnology Module 5C: Elective subject							
	Course	**Type of course**	**SSt**	**ECTS**	**Semester allocation[7]**	**Uni Graz**	**TU Graz**
	Project Laboratory	PT	8	6	S/W	x	x
	Electron Transport in Mesoscopic Systems	VO	2	3	S		x
	Structuring of Materials Surfaces and Functional Nanofabrication[10]	VU	2	2	W		x
	Physics of Semiconductor Devices	VO	2	3	W		x
	Solid State Spectroscopy	VO	2	3	S		x
	Thin Film Science and Processing	VO	2	3	S		x
	Surface Chemistry	VO	2	3	S		x
	IC Design Project Management and Quality	VO	1	1.5	S		x
	High Resolution Electron Microscopy	VO	2	3	S		x
	Vacuum Technology	VO	2	3	W		x
	Introduction to Solid State Physics, Exercise	UE	1	1	W	x	x
	Nano Optics	VO	2	3	S	x	
	Scanning Probe Techniques	VO	2	3	S	x	
	Synchrotron Radiation Techniques	VO	2	3	W	x	
	Nano- and Quantum Magnetism	VO	2	3	W	x	
	Spectroscopy	VO	2	3	W	x	
	Light Engineering	VO	2	3	W		x
	X-ray and Neutron Scattering	VO	2	3	S		x
	Topics in Semiconductor Processing and Nanotechnology	VO	2	3	S/W	x	x

[10]: 2/3 SSt/lecture component, 1/3 SSt/exercise component

Biobased Materials Module 6C: Elective subject							
	Course	**Type of course**	**SSt**	**ECTS**	**Semester allocation[7]**	**Uni Graz**	**TU Graz**
	Project Laboratory	PT	8	6	S/W	x	x
	Intermolecular Forces in Hybrid Materials	VO	1.33	2	W	x	
	Renewable Resources – Chemistry and Technology I	VO	1.33	2	S	x	
	Environmental Chemistry and Technology	VO	2,66	4	W	x	
	Biophysical Methods	VO	2	3	W	x	
	Biophysical Methods	LU	3	3	S	x	
	Advanced Biophysics and Biochemistry	VO	2	3	W	x	
	Structure and Matter – Scattering Methods	VO	2	3	S		x
	Tissue Engineering	VO	2	3	W		x
	Biophotonics	VO	2	4	S	x	
	Computational Biomechanics[11]	VU	4	5,5	S		x
	Physical Chemistry I: Structure and Matter	VO	3	4	W	x	
	Elemental Mass Spectrometry	VO	1.33	2	S	x	
	Introduction to Simulation of Polymeric Materials	VO	0.66	1	S		x
	Soft Matter Microscopy	VO	2	3	S		x
	Milli and Micro Fluid Mechanics	VU	2	2	S		x
	Topics in Biobased Materials	VO	2	3	S/W	x	x
[11:] 2/3 SSt/lecture component, 1/3 SSt/exercise component							

[7]: S: summer semester, W: winter semester, S/W: offered in both semesters

Abbreviations: LU: laboratory course; SSt: semester hours; UE: exercise; VO: lecture; VU: lecture with integrated exercises

Soft skills
Courses with a workload of 3 to 4 ECTS credit points must be chosen. “Soft skills” comprise multidisciplinary knowledge and skills, such as communication, organisation, presentation, foreign languages, computer science and legal matters. The teaching of these skills, which are important for students’ careers, completes the subject-based education. A list of the courses approved by the officer responsible for study matters is available. After consultation with the officer responsible for study matters, other appropriate courses may also be recognised as soft skills. A foreign language course (German for non-native German speakers, English for native German speakers) is strongly recommended.

§ 9 Free-choice subject

(1) The courses to be completed as part of the free-choice subject in the master's degree programme in Advanced Materials Science are designed to provide individual emphasis and further development of the students. They can be freely selected from the courses offered by any recognised Austrian or foreign universities as well as any Austrian universities of applied sciences and university colleges for education. Annex III contains a recommendation of eligible courses and subjects.

(2) If no ECTS credit points are assigned to a free-choice course, one ECTS credit point is awarded for every semester hour (SSt) of this course. If such courses are lecture-type courses (VO), they are assigned 1.5 ECTS credit points for each semester hour.

(3) There is also the possibility of completing a vocational (subject-relevant) internship as part of the free-choice subject for a maximum of 8 weeks as full-time employment (this corresponds to a maximum of 12 ECTS credit points). This internship shall be approved by the officer responsible for study matters and should be a meaningful addition to the study programme. Completion of the vocational (subject-relevant) internship shall be verified by the employer with whom the internship was carried out.

§ 10 Admission to courses/examinations

(1) Admission to the master's examination before a committee requires proof of the positive assessment of all examination results according to § 4 above and the positive assessment of the master's thesis.

(2) Admission to courses is subject to the following prerequisites:

Course	**Course requirements**
Laboratory Course Metals and Ceramics	Basic Laboratory for Advanced Materials Science
Laboratory Course Semiconductor Processing and Nanotechnology	Basic Laboratory for Advanced Materials Science
Laboratory Course Biobased Materials	Basic Laboratory for Advanced Materials Science

§ 11 Master's thesis

(1) The master's thesis is proof of the student's capability to perform scientific research and development tasks independently and with academic grounding as far as content and methodology are concerned. The scope of work of the master's thesis must enable students to finish their thesis within a period of six months.

(2) Before a student starts work on their master's thesis, it must be registered via the responsible dean's office with the involvement of the officer responsible for study matters. The topic, the area of expertise of the topic and the supervisor as well as the institute must be stated.

(3) The topic of the master's thesis must be assignable to the chosen specialisation. The officer responsible for study matters shall decide on exceptions.

(4) 30 ECTS credit points are awarded for the master's thesis.

(5) The master's thesis is to be submitted for evaluation in printed and in electronic form.

§ 12 Examination regulations

(1) Courses are evaluated individually.

a. Examinations for courses held as lectures (VO) shall cover the complete content of the course. The examinations are in writing or orally, or orally and in writing.
b. For courses held as lectures with integrated exercises (VU), exercise-based courses (PT, UE), laboratory courses (LU) and seminar-type courses (SE), a student's performance is continually assessed on the basis of that student's contributions and/or through accompanying tests. The assessment must always consist of at least two examinations.

(2) Examinations with positive results are to be assessed as "very good" (1), "good" (2), "satisfactory" (3) or "sufficient" (4); those with negative results are to be assessed as "insufficient" (5). If this type of assessment is not possible or is inappropriate, the positive assessment must be assessed as "successful participation" and the negative assessment must be assessed as "unsuccessful participation".

(3) If an examination subject (module or elective subject) includes separate examinations for the relevant courses, the overall subject grade is to be determined by:

a. multiplying the grade of each examination result in connection with the subject with the ECTS credit points of the corresponding course;
b. adding the values calculated according to lit. a);
c. dividing the result of the addition by the sum of the ECTS credit points of the courses, and
d. rounding the result of the division to a whole-numbered grade if required. The grade must be rounded up if the decimal place exceeds 0.5. Otherwise, the grade must be rounded down.
e. A positive subject grade can only be awarded if every individual examination result is positively assessed.
f. Courses which are exclusively assessed by successful/unsuccessful participation shall not be included in this calculation according to lit. a to d.

(4) The master's examination before a committee consists of:

- the presentation of the master's thesis (maximum duration: 20 minutes),
- the defence of the master's thesis (oral examination), and
- an examination on the chosen specialisation.

The examination subjects are determined by the officer responsible for study matters of the university to which the student is admitted on a proposal by the candidate. The total duration of the final examination before a committee is generally 60 minutes and shall not exceed 75 minutes.

(5) The master's examination senate consists of the supervisor of the master's thesis and two further members nominated by the officer responsible for study matters after hearing the candidate's suggestion. The senate is chaired by a member of the examination senate who is not the supervisor of the master's thesis. The members of the examination senate may not all be members of a single faculty.

(6) The overall grade of the examination before a committee is determined by the examination senate, considering all parts of the examination.

§ 13 Degree certificate

(1) The study programme is completed by passing a master's thesis and a master's examination before a committee according to § 12 para. 4 above.

(2) A degree certificate shall be issued for successful completion of the study programme. The degree certificate for the master's degree programme in Advanced Materials Science contains

a) a list of all modules according to § 7 above and their assessments;
b) the title and the assessment of the master's thesis;
c) the assessment of the final examination before a committee;
d) the entirety of the ECTS credit points for the free-choice subject according to § 9 above, and
e) the overall assessment.
The overall classification of the degree programme is to read 'pass' if every module as well as the master's thesis and the master's examination were positively assessed. This overall classification is to read 'pass with distinction', if neither a module, the master's thesis nor the master's examination were assessed with an assessment worse than 'good' and at least half of the assessments (modules, master's thesis, master's examination) possess a grade of 'very good'.

§ 14 Transitional provisions

(1) Students of the NAWI master's degree programme in Advanced Materials Science, who are subject to the curriculum in the 2016 version when the changes to the curriculum come into effect on 1 October 2018, will be subject to this 2018 version from 1 October 2018.

(2) Classifications, from courses to elective modules, which were completed before this version of the curriculum came into effect, retain their validity.

§ 15 Legal validity

This curriculum 2016 in the 2018 Version shall come into effect on 1 October 2018.

Versions of the curriculum:

Curriculum	Version	UNI Graz, TU Graz online abbreviations	University Gazette Uni Graz	University Gazette TU Graz
2016	2018	511, MAS	14.03.2018, 23.b issue, 35	14.03.2018, 11b issue, 3
2016			23.03.2016, 25.b issue	23.03.2016, 12b. issue, 9

Annex to the curriculum for the master's degree programme in Advanced Materials Science

Annex I: Curriculum

The courses marked 1A, 1B, 1C, 1D, 1E are the subject of the introduction module to be completed (Introduction module for students with Bachelor programme (1**A**) Chemistry, (1**B**) Physics, (1**C**) Mechanical Engineering, (1**D**) Chemical Engineering, (1**E**) Environmental Systems Sciences/Natural Sciences – Technology).

The courses of the specialisation to be completed are indicated with the corresponding module number (Specialisation Metals and Ceramics: 4A, 4B, Semiconductor Processing and Nanotechnology: 5A, 5B, Biobased Materials: 6A, 6B).

	SSt	Type	ECTS	Uni Graz a)	TU Graz a)
1st semester					
Basic Laboratory for Advanced Materials Science	2.67	LU	2	X	X
Introduction to Solid State Physics 1A,1C,1D,1E	2	VO	3	X	X
Introduction to Materials Science 1A,1B,1D,1E	2	VO	3		X
Introduction to Modelling and Simulation 1A,1E	2	VU	3		X
Mathematics for Advanced Materials Science 1A	2	VU	2		X
Applied Chemistry I 1B,1C	1.33	VO	2		X
Applied Chemistry II 1B,1C,1D	1.33	VO	2		X
Analytical Chemistry 1B,1C	2	VO	3		X
Atomic Physics – Quantum Mechanics 1C,1D	1.33	VO	2	X	X
Materials Characterization I	1.33	VO	2		X
Materials Characterization II	1.33	VO	2		X
Materials Characterization III	1.33	VO	2	X	X
Introduction to Solid State Chemistry for Advanced Materials Science	1.33	VO	2		X
Physical Properties of Materials	2	VO	3		X
Elective courses & free-choice subject			5-8 b)	X	X
Total for 1st semester			30		
2nd semester					
Materials Laboratory	4	LU	4		X
Modelling and Simulation for Advanced Materials Science	2	VU	2		X
Plasticity and Forming Processes 4A	2.66	VO	4		X
Functional Materials II 4A	0.66	VO	1		X
High-performance Materials and Composites 4A	2.66	VO	4		X
Microelectronics and Micromechanics 5A	2	VO	3		X
Organic Semiconductors – Fundamentals and Applications 5A	2	VO	3		X
Modelling and Simulation of Semiconductors 5A	2	VO	3		X
Nanostructures and Nanotechnology 5A	2	VO	3		X
Introduction to Biophysics and Biochemistry 6A	2	VO	3	X	
Soft Matter Physics 6A	2	VO	3		X
Biological and Biobased Materials 6A	2	VO	3		X
Elective courses & free-choice subject			12	X	X
Total for 2nd semester			27-30		

3rd semester					
Materials Production and Processing	2	VO	3		X
Corrosion and Corrosion Protection of Metallic Materials 4A	2	VO	3		X
Functional Materials I 4A	2	VO	3		X
Laboratory Course Metals and Ceramics 4B	6	LU	6		X
Laboratory Course Semiconductor Processing and Nanotechnology 5B	6	LU	6	X	X
Surface Science 5A	2	VO	3	X	
Physical and Chemical Characterization of Biopolymers 6A	2	VO	3		X
Biocompatible Materials 6A	2	VO	3		X
Laboratory Course Biobased Materials 6B	6	LU	6	X	X
Elective courses & free-choice subject			16	X	X
Total for 3rd semester			28-31		
4th semester					
Master's degree seminar	1	SE	1	X	X
Master's thesis			30	X	X
Master's degree examination	1		1	X	X
Total for 4th semester			32		
Overall total ECTS credit points			120		

a) Allocation of the course to the participating universities; both universities are indicated if the course is offered by both universities jointly, in parallel or alternately.

b) Dependent on the introduction module to be completed

Abbreviations: LU: laboratory course; SE: seminar; SSt: semester hours; VO: lecture; VU: lecture with integrated exercises

Annex II:

Module descriptions

Module 1A	**Introduction module for students with Bachelor programme Chemistry**
ECTS credit points	13
Subject content	• Basic experimental methods in the fields of physics and mechanical engineering • Basics of solid-state physics and materials science • Advanced mathematical concepts and basics of modelling and simulation
Learning outcomes	After completing the course, students are able to • use basic experimental techniques of the complementary fields of physics and mechanical engineering; • understand the most important models and concepts of solid-state physics and materials science; • understand advanced mathematical concepts and apply them to modelling and simulation problems, and • understand and classify other disciplinary approaches and views.

Teaching and learning activities and methods	Lecture, partly with integrated exercises, laboratory course
Frequency with which the module is offered	Every academic year

Module 1B	**Introduction module for students with Bachelor programme Physics**
ECTS credit points	12
Subject content	• Basic experimental methods in the fields of chemistry and mechanical engineering • Basics of applied and analytical chemistry and materials science
Learning outcomes	After completing the course, students are able to • use basic experimental techniques of the complementary fields of chemistry and mechanical engineering; • understand the most important models and concepts of applied and analytical chemistry and materials science, and • understand and classify other disciplinary approaches and views.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 1C	**Introduction module for students with Bachelor programme Mechanical Engineering**
ECTS credit points	14
Subject content	• Basic experimental methods in the fields of physics and chemistry • Basics of solid-state physics, atomic and quantum physics, and applied and analytical chemistry
Learning outcomes	After completing the course, students are able to • use basic experimental techniques of the complementary fields of physics and chemistry; • understand the most important models and concepts of solid-state physics, atomic and quantum physics, and applied and analytical chemistry, and • understand and classify other disciplinary approaches and views.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 1D	**Introduction module for students with Bachelor programme Chemical Engineering**
ECTS credit points	12
Subject content	• Basic experimental methods in the fields of physics, chemistry and mechanical engineering

	• Basics of solid-state physics, atomic and quantum physics, organic chemistry and materials science
Learning outcomes	After completing the course, students are able to • use basic experimental techniques of the complementary fields of physics, chemistry and mechanical engineering; • understand the most important models and concepts of solid-state physics, atomic and quantum physics, organic chemistry and materials science, and • understand and classify other disciplinary approaches and views.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 1E	**Introduction module for students with Bachelor programme Environmental Systems Sciences/Natural Sciences – Technology**
ECTS credit points	11
Subject content	• Basic experimental methods in the fields of physics and mechanical engineering • Basics of solid-state physics and materials science • Basics of modelling and simulation
Learning outcomes	After completing the course, students are able to • use basic experimental techniques of the complementary fields of physics and mechanical engineering; • understand the most important models of solid-state physics and materials science; • understand advanced mathematical concepts and apply them to modelling and simulation problems, and • understand and classify other disciplinary approaches and views.
Teaching and learning activities and methods	Lecture, partly with integrated exercises, laboratory course
Frequency with which the module is offered	Every academic year

Module 2	**Fundamentals of Materials Science**
ECTS credit points	10
Subject content	• Basics of solid-state chemistry, such as solid-state synthesis, structure-property relationships, defect chemistry and transport processes • Basics of manufacturing processes and processing methods for various classes of materials (metals, ceramics, polymers) • Physical properties of materials (electrical, optical, magnetic, thermal properties) • Advanced concepts and solution methods for modelling materials
Learning outcomes	After completing the course, students are able to • understand and apply the most important concepts and models of solid-state chemistry;

	• describe the most important manufacturing processes and processing methods and understand the relationship between the process and the material property; • understand and describe the basics of the physical properties of materials, and • formulate a specific materials science problem mathematically and translate it into an algorithm.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 3	**Materials Characterization and Materials Laboratory**
ECTS credit points	10
Subject content	• Basic experimental methods of manufacturing and characterising materials • Basics of thermal and thermomechanical characterisation, of electron and probe microscopy and of spectroscopic methods (diffraction and scattering methods, surface spectroscopy, hyperfine structure methods) • Applying the methods to specific problems from the practice of materials science
Learning outcomes	After completing the course, students are able to • apply basic methods of manufacturing and characterising materials and assess the results; • understand the concepts and experimental requirements of the characterisation methods, and • select suitable methods for a specific problem.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 4A: Specialisation	**Metals and Ceramics: Theory and Application**
ECTS credit points	15
Subject content	• Basics of plastic deformation of metals and the associated forming processes • Corrosion and corrosion protection of materials • Basics of electroceramics, energy materials, superconductors and magnetic materials • Metallic and ceramic structural materials
Learning outcomes	After completing the course, students are able to • understand forming processes and their effects on the material properties; • understand and apply concepts and models of corrosion and corrosion protection; • describe functional materials and their technological application; • explain the properties and applications of structural high-performance materials, and • select and apply modern synthesis and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Lecture

Frequency with which the module is offered	Every academic year

Module 4B: Specialisation	**Metals and Ceramics: Laboratory**
ECTS credit points	6
Subject content	• Laboratory courses on the synthesis and characterisation of metallic and ceramic materials
Learning outcomes	After completing the course, students are able to • select and apply modern synthesis and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Laboratory course
Frequency with which the module is offered	Every academic year

Module 4C: Specialisation	**Metals and Ceramics: Elective subject**
ECTS credit points	12
Subject content	• Selected topics of the processing and characterisation of metallic and ceramic materials • Selected topics of materials science (functional materials, structural materials, surface technology) • Laboratory courses on computer-aided measurement technology and advanced synthesis and characterisation methods
Learning outcomes	After completing the course, students are able to • understand and apply selected processing and characterisation methods; • understand and apply complex material concepts, and • select and apply advanced synthesis and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Lecture, lecture and exercise, laboratory course
Frequency with which the module is offered	Every academic year

Module 5A: Specialisation	**Semiconductor Processing and Nanotechnology: Theory and Application**
ECTS credit points	15
Subject content	• Basic processes of Si-planar technology, oxidation, epitaxy, lithography, etching, preparation steps of semiconductor devices and micromechanics devices • Basics of the manufacturing processes and processing methods for various classes of materials (metals, ceramics, polymers) • Physical properties of materials (electrical, optical, magnetic, thermal properties) • Advanced concepts and solution methods for modelling materials
Learning outcomes	After completing the course, students are able to • understand and apply the most important concepts and models of solid-state chemistry;

	• describe the most important manufacturing processes and processing methods and understand the relationship between the process and the material property; • understand and describe the basics of the physical properties of materials, and • formulate a specific materials science problem mathematically and translate it into an algorithm.
Teaching and learning activities and methods	Lecture, laboratory course
Frequency with which the module is offered	Every academic year

Module 5B: Specialisation	**Semiconductor Processing and Nanotechnology: Laboratory**
ECTS credit points	6
Subject content	• Laboratory courses on the manufacture and characterisation of semiconductors and nanomaterials • Seminar on selected topics of semiconductor technology and nanotechnology
Learning outcomes	After completing the course, students are able to • select and apply modern manufacturing and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Laboratory course, seminar
Frequency with which the module is offered	Every academic year

Module 5C: Specialisation	**Semiconductor Processing and Nanotechnology: Elective subject**
ECTS credit points	12
Subject content	• Selected topics of semiconductor physics and nanophysics • Selected topics of the characterisation of semiconductor materials and nanomaterials • Advanced methods of the design and manufacture of semiconductor devices • Laboratory courses on advanced synthesis and characterisation methods
Learning outcomes	After completing the course, students are able to • understand selected properties of semiconductor materials and nanomaterials; • understand and apply complex design concepts for semiconductor devices, and • select and apply advanced manufacturing and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Lecture, lecture and exercise, laboratory course
Frequency with which the module is offered	Every academic year

Module 6A: Specialisation	Biobased Materials: Theory and Application
ECTS credit points	15
Subject content	• Basics of biochemistry, biophysics and soft matter physics • Methods of characterising biological and biobased materials, particularly biopolymers • Hierarchical structure and function of biological and biobased materials • Use of biocompatible materials in medical applications
Learning outcomes	After completing the course, students are able to • grasp interdisciplinary problems in the field of biobased materials; • communicate in an interdisciplinary environment in physics, chemistry, materials science, biology and medicine, and • understand, evaluate and classify approaches and views from other scientific disciplines.
Teaching and learning activities and methods	Lecture, group work, seminars
Frequency with which the module is offered	Every academic year

Module 6B: Specialisation	Biobased Materials: Laboratory
ECTS credit points	6
Subject content	• Laboratory courses on the synthesis and characterisation of biological and biobased materials
Learning outcomes	After completing the course, students are able to • select and apply modern synthesis and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Laboratory course
Frequency with which the module is offered	Every academic year

Module 6C: Specialisation	Biobased Materials: Elective subject
ECTS credit points	12
Subject content	• Selected topics of the processing and characterisation of biological and biobased materials • Advanced methods of biophysics and biochemistry • Laboratory courses on advanced synthesis and characterisation methods
Learning outcomes	After completing the course, students are able to • understand and apply selected processing and characterisation methods; • understand and apply complex material and design concepts, and • select and apply advanced synthesis and characterisation methods for specific material physics problems.
Teaching and learning activities and methods	Lecture, lecture and exercise, laboratory course
Frequency with which the module is offered	Every academic year

Module:	General Electives and Soft Skills
ECTS credit points	9-12
Subject content	• Additional qualifications that are desirable for students and are both subject-specific and not subject-specific
Learning outcomes	After completing the courses, students are able to • use their potential in specialist, social, communicative and creative areas more effectively and to develop their skills.
Teaching and learning activities and methods	Lecture, exercises, seminars
Frequency with which the module is offered	Every academic year

Annex III:

Recommended courses for the free-choice subject

Free-choice courses can be freely chosen from the courses offered at any recognised Austrian and foreign universities as well as any Austrian universities of applied sciences and university colleges for education according to § 9 of this curriculum.
In order to broaden students' basic knowledge in the subjects of this study programme, courses in foreign languages, social competence, technology assessment and women's and gender studies are recommended. In particular, we would like to refer students to the courses offered by the TU Graz service department Languages, Key Competencies and In-House Training or treffpunkt sprachen – Centre for Language, Plurilingualism and Didactics of Uni Graz, the Centre for Social Competence of Uni Graz, the Transfer Initiative for Management and Entrepreneurship Basics, Awareness, Training and Employability (TIMEGATE) of Uni Graz as well as the Inter-University Research Centre for Technology, Work and Culture (IFZ).

In addition, the following course is recommended:

Course	Type of course	SSt	ECTS	Semester allocation
REACH seminar	SE	2	2	S

Abbreviation: SSt: semester hours

Annex IV:

Equivalence list

Courses for which the equivalence or recognition is defined in this part of the Annex to the curriculum do not require separate recognition by the officer responsible for study matters. Individual recognition awarded by official decision from the officer responsible for study matters according to § 78 UG is also possible.

An equivalence list defines the equivalence of successfully completed courses of this curriculum and of the previous curriculum. This equivalence applies in both directions, that is, successfully completed courses of the previous curriculum may be credited in this curriculum and successfully completed courses of this curriculum may be credited in the previous curriculum.

Courses that are the same with regard to name and type, the number of ECTS credit points and the number of semester hours are considered to be equivalent, and are thus not explicitly listed in the equivalence list.

Curriculum 2016 in the 2018 version	LV-Type	SSt	ECTS	Master's degree programme in Advanced Materials Science offered at TU Graz (curriculum 2012)	LV-Type	SSt	ECTS
Basic Laboratory for Advanced Materials Science	LU	2.67	2	Integrative Laboratory for Advanced Materials Science	LU	2.67	2
Introduction to Modelling and Simulation	VU	2	3	Modelling and Simulation for Advanced Materials Science	VO	1.33	2
Materials Laboratory	LU	4	4	Basic Laboratory Materials and Seminar to Basic Laboratory Materials	LU SE	4 1	3 1
Modelling and Simulation for Advanced Materials Science	VU	2	2	Modelling and Simulation for Advanced Materials Science	UE	1	1
Master's degree seminar	SE	1	1	Seminar Advanced Materials Science	SE	1	1
Laboratory Course Metals and Ceramics	LU	6	6	Laboratory Course Metals and Ceramics and Seminar Metals and Ceramics	LU SE	5 1	5 1
Organic Semiconductors	VO	2	3	Organic Semiconductors – Fundamentals and Applications	VO	3	4
Modelling and Simulation of Semiconductors	VU	2	3	Modelling and Simulation of Semiconductors	VO	1.33	2
Surface Science	VO	2	3	Surface Chemistry	VO	2	3

Curriculum 2016 in the 2018 version	LV-Type	SSt.	ECTS	NAWI master's degree programme in Advanced Materials Science (Curriculum 2016)	LV-Type	SSt.	ECTS
Organic Semiconductors	VO	2	3	Organic Semiconductors – Fundamentals and Applications	VO	2	3
Soft Matter Microscopy	VO	2	3	Microscopy of Polymers	VO	2	3
High Resolution Electron Microscopy	VO	2	3	Structure Characterization by High Resolution Electron Microscopy	VO	2	3
Advanced 2D and 3D Nanoanalysis	VU	2	3	Electron Microscopy in Materials Science	VO	2	3
Structuring of Materials Surfaces and Functional Nanofabrication	VU	2	2	Microscopy and Nanostructuring of Surfaces	VU	2	2
Nano Optics	VO	2	3	Nano - Optics	VO	2	4
Scanning Probe Techniques	VO	2	3	Scanning probe microscopy techniques	VO	2	4
Synchrotron Radiation Techniques	VO	2	3	Synchrotron radiation techniques	VO	2	4
Nano- and Quantum Magnetism	VO	2	3	Basic of magnetism in reduced dimensions	VO	2	4
Spectroscopy	VO	2	3	Spectroscopy	VO	2	4
X-ray and Neutron Scattering	VO	2	3	X-Ray Physics	VO	2	3
Biophysical Methods	VO	2	3	Methods in Biophysics	VO	2	3
Biophysical Methods	LU	3	3	Methods in Biophysics	LU	3	3
Biophotonics	VO	2	3	Biophotonics	VO	2	4
Computational Biomechanics	VU	4	5.5	Computational Biomechanics	VU	4	4
Laboratory Course Semiconductor Processing and Nanotechnology	LU	6	6	Laboratory Course Semiconductor Processing and Nanotechnology und Laboratory Course Semiconductor Processing and Nanotechnology	LU SE	5 1	5 1
Project Laboratory	PT	8	6	Project Laboratory	LU	8	6

Recognition list

For students of the master's degree programme in Advanced Materials Science offered at TU Graz (curriculum 2012) who have chosen the specialisation Polymer Science and Technology, the following provisions shall apply for the recognition of courses:

Students who do **not** opt for this curriculum may replace courses of the master's degree programme in Advanced Materials Science offered at TU Graz (curriculum 2012) with courses from the curriculum for Technical Chemistry according to the following table.

Course from the master's degree programme in Advanced Materials Science offered at TU Graz (curriculum 2012)	Type	SSt	ECTS	May be replaced with course from the curriculum for Technical Chemistry 2014	Type	SSt	ECTS
Macromolecular Materials and Technologies I	VO	2	3	Materials and Materials Technologies I	VO	2	3
Macromolecular Materials and Technologies II	VO	1.33	2	Materials and Materials Technologies II	VO	2	3
Macromolecular Materials and Technologies III	VO	1.33	2	Macromolecular Materials and Materials Technologies III – Composite Materials	VO	1.33	2
Laboratory Course Macromolecular Chemistry and Technology and Seminar Macromolecular Chemistry and Technology	LU SE	5 1	5 1	Laboratory Course Technical Chemistry II	LU	5	5
Surface and Thin Film Physics	VO	2	3	Surface Science	VO	2	3
Elective courses				After consultation with the officer responsible for study matters, elective courses that are no longer offered may be replaced with other courses.			

Abbreviations: LU: laboratory course; SE: seminar; SSt: semester hours; UE: exercise; VO: lecture; VU: lecture with integrated exercises

Annex V:

Glossary of the names used, which are different in the statutes and guidelines of both universities

Name in this curriculum (NAWI Graz)	Name at Uni Graz	Name at TU Graz
module	Modul	Fach/Modul
SSt (semester hour)	KStd.	SSt.
elective subject	Gebundes Wahlfach	Wahlfachkatalog
free-choice subject	Freie Wahlfächer	Freifach

Annex VI

Admission to the study programme

According to § 3 of this curriculum, graduates of the bachelor's degree programmes in Physics, Chemistry, Environmental Systems Sciences/Natural Sciences – Technology, Mechanical Engineering, Mechanical Engineering and Business Economics, and Chemical and Process Engineering offered at TU Graz or Uni Graz are admitted to this programme without any further prerequisites, as part of an admission procedure if necessary.

Special provision for graduates of the bachelor degree programmes Environmental System Sciences / Natural Sciences Technology and Electrical Engineering

Graduates of the bachelor degree programme *Environmental System Sciences / Natural Sciences Technology*, Version 2017, who in the course of those degree programmes did not complete the elective module I.2 *Chemical Technology*, must complete the Laboratory Course (LU, 6 SSt, 4 ECTS credit points) *Chemical Synthesis, Transformation and Mechanisms* from that module within module 1E (introduction module), as well as the Lecture (VO, 2.25 SSt, 3 ECTS credit points) *Inorganic Chemical Technology* from that module within the elective subject *General Elective and Soft Skills*. For those students, the amount of module 1E increases to 4 ECTS credit points and reduces the amount of the elective subject *General Elective and Soft Skills* to 4 ECTS credit points.

Graduates of the bachelor's degree programme in Electrical Engineering offered at TU Graz are admitted to this programme as part of an admission procedure if necessary, whereby the degree programme must be completed subject to the following special provisions:

1. The following introduction module with a workload of 17 ECTS credit points must be completed. In this case, the workload for the elective subject *General Electives and Soft Skills* is reduced to 6 ECTS credit points.

Module: Introduction module for students with Bachelor programme Electrical Engineering						
		Type	**SSt**	**ECTS**		
	Basic Laboratory for Advanced Materials Science	LU	2.67	2		
	Introduction to Solid State Physics	VO	2	3		
	Introduction to Materials Science	VO	2	3		
	Atomic Physics – Quantum Mechanics	VO	1.33	2		
	Applied Chemistry I	VO	1.33	2		
	Applied Chemistry II	VO	1.33	2		
	Analytical Chemistry	VO	2	3		
	Total:			**17**		

Abbreviations: LU: laboratory course; SE: seminar; SSt: semester hours; UE: exercise; VO: lecture; VU: lecture with integrated exercises

2. The courses Thermodynamik für USW (2 VO, 3 ECTS) and Thermodynamik für USW (1 UE, 2 ECTS) with a total workload of 5 ECTS credit points from the bachelor's degree programme in Environmental Systems Sciences/Natural Sciences – Technology must be completed. These courses are assigned to the compulsory module *Fundamentals of Materials Science*, the workload of which is thereby increased to 15 ECTS credit points. The workload for the free-choice subject is reduced to 7 ECTS credit points.