Curriculum for the master's degree programme

Geosciences

Curriculum 2018

This curriculum was approved by the Senate of the University of Graz in the meeting dated 7 March 2018 and the Senate of Graz University of Technology in the meeting dated 12 March 2018.

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

This scientific master's degree programme is, pursuant to § 54e of the Universities Act (UG), established as a joint degree programme between the University of Graz and Graz University of Technology as part of "NAWI Graz." This degree programme is legally based on the Universities Act of 2002 (UG) and on the provisions of the Statute of TU Graz as amended.

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I General provisions

§ 1 Object of degree programme and qualification profile

The scientific master's degree programme in geosciences comprises four semesters. The total scope of the programme is 120 ECTS credit points pursuant to § 54 para. 3 UG.

The master's degree programme will be taught as a foreign-language degree programme in English pursuant to § 63a para. 8 UG.

Graduates of this programme are awarded the university degree of "Master of Science", abbreviated as "MSc."

(1) Object of degree programme

This English-language master's degree programme in geosciences at the University of Graz and TU Graz provides the student with an in-depth, scientific education in the field of classical and applied geosciences. The programme follows the principle of research-led teaching and thus benefits, in particular, from the synergetic pooling of the expertise of the University of Graz and TU Graz in the NAWI Graz Geocenter. The range of offered courses focuses on the geoscientific disciplines represented at the NAWI Graz Geocenter: geology; palaeontology and stratigraphy; petrology and geochemistry; mineralogy and hydrogeochemistry; hydrogeology and engineering geology. As a result, the programme covers a particularly broad range of subjects in which the students are able to set their own individual focal points with modules that they, in part, have freely selected. In addition to developing in-depth theoretical knowledge, emphasis is also placed on opportunities to acquire practical, social and media skills.

(2) Qualification profile and skills

Graduates will have received a broad academic education in the geosciences. Depending on their individual areas of focus, they will also have acquired in-depth, theoretical knowledge and practical skills in various disciplines within the geosciences. Acquiring theoretical knowledge will prepare graduates to conduct high-quality, structured academic research. Through practical field and laboratory exercises, courses, seminars, and excursions, they will also have learned to develop concepts for the investigation of geogenic systems and resources, to recognise natural hazards and environmental risks, and to find answers to questions arising in the field of materials science.

In order to acquire these skills, graduates will have built upon the knowledge they received in an academically relevant bachelor's programme to obtain an in-depth education in the disciplines of geology; palaeontology and stratigraphy; petrology and geochemistry; mineralogy and hydrogeochemistry; hydrogeology; and engineering geology. This research-led programme is both theory- and practice-oriented, and reflects the current state of scientific scholarship. Moreover, the students have the opportunity to pursue their various academic interests in more depth by selecting their own courses.

Graduates of the master's degree programme in geosciences possess the intellectual and practical skills listed below. These skills will enable them to continue their studies independently, e.g. as part of a PhD/Doctoral degree programme:

- An in-depth knowledge of geology; palaeontology and stratigraphy; petrology and geochemistry; mineralogy and hydrogeochemistry; hydrogeology; and engineering geology
- Excellent command of the various work and analysis techniques for the aforementioned areas of the geosciences
- Independent planning and carrying out of scientific and application-oriented projects according to the current state of scientific and technological scholarship
- Ability to apply acquired theoretical knowledge in a universally and interdisciplinary manner
- Ability to critically examine existing approaches to problems and to develop alternative approaches.
- Willingness to develop new strategies, considering and assessing current research results
- Ability to use modern information technologies
- Awareness of the possible ethical, social, and economic effects of the subject area
- Ability to work in a team and social skills

(3) Demand for and relevance of the programme for academia and the job market

The master's degree programme in geosciences prepares students for a scientific career in all subsections of the geosciences and also serves as pre-employment training for demanding roles in such areas as the construction industry, geotechnics, environmental and resources management, water management, the materials industry, and the chemical industry. Graduates of the master's degree programme in geosciences will go on to pursue high-level careers in basic research and applied research at universities and other institutions, as well as for museums, public offices, the industrial sector, and engineering companies that specialise in geotechnics. The interdisciplinary scientific training they receive, together with individually set geoscientific foci, opens up a wide range of employment opportunities for graduates in an economy and a society that are constantly changing. In doing so, the programme takes into consideration the flexible needs of the job market.

II General requirements

§ 2 Admission requirements:

(1) Admission to a master's degree programme requires a subject-related bachelor's degree from a university or university of applied sciences or another equivalent degree from a recognised Austrian or foreign post-secondary educational institution (§ 64 para. 3 UG).

(2) The master's degree programme in geosciences builds upon the content of the bachelor's degree programmes in geosciences and earth sciences offered as

part of NAWI Graz. Graduates of these programmes fulfil the admission requirements for the master's degree programme in geosciences.

(3) If the degrees are generally equivalent and only certain supplementary qualifications are required for full equivalence, additional courses and examinations from the bachelor's degree programme in geosciences with a maximum scope of 30 ECTS credit points may be prescribed in order to obtain full equivalence. Up to a maximum of 5 ECTS credit points of these additional qualifications may be recognized for the free-choice subject pursuant to § 10.

(4) In order to obtain an overall scope of 300 ECTS credit points for the graduate and postgraduate degree programmes together, students shall not be assigned 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.

§ 3 Allocation of ECTS credit points

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 (corresponding to a workload of 25 hours per ECTS credit point). The workload comprises the self-study part and the semester hours. One semester hour corresponds to 45 minutes per study week of the semester.

§ 4 Organisation of the degree programme

The master's degree programme in geosciences with a workload of 120 ECTS credit points comprises four semesters and is divided into modules (including compulsory modules, elective modules, free-choice subjects, the master's thesis and master's examination) as follows:

	ECTS
Compulsory module A: Geosciences	12
Compulsory module B: Applied geosciences	11
Compulsory module C: Preparation for master's thesis	6
6 Elective modules (each comprising 8 to 10 ECTS)	54
Free-choice subjects	6
Master's thesis	30
Master's examination	1
Total	120

§ 5 Types of courses

(1) Lecture (VO)*: Lectures serve as an introduction to the methods of the subject and provide 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)*: These lectures 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 degree 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 constructive, applied work is carried out, or short research papers are written, taking into account all necessary steps. Projects are completed with a written paper that is part of the assessment.

(7) Classes (KS) [only University of Graz]*: These are classes in which the students work on the course content together with the teaching staff in an experience- and application-oriented way. These classes can also be held outside of the main location of study. These are courses with continual assessment.

(8) Excursions (EX)*: Excursions help to exemplify and consolidate the taught content. The geoscientific course content is presented outside of the university and is usually connected with field surveys. Excursions require the completion of reports and may also include oral presentations by the students on the course content. Excursions may be carried out both within Austria and abroad.

* The types of courses stated in the Chapter “Study Law” of the Statute (University of Graz) or Guideline (TU Graz) of the two universities shall apply.

§ 6 Group sizes

For the following course types, the maximum number of participants (group size) is as follows:

(1) For exercises (UE) and for exercise components of lectures with integrated exercises (VU), the maximum group size is 25.

(2) For laboratory courses (LU), the maximum group size is 6.

(3) For projects (PT) and classes (KS), the maximum group size is 15.

(4) For seminars (SE), the maximum group size is 25.

(5) For excursions (EX), the maximum group size is 15.

For the course "Advanced Field Methods in Structural Geology (Mapping)" (KS) in the elective module D1, the maximum group size is 10. For the course "Hydrogeochemical Modelling" (UE) in the elective module G2, the maximum group size is 15.

§ 7 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 when the participation requirement was fulfilled (earlier date takes priority);
d. Students who have already been placed on a waiting list or who must repeat the course are to be given priority for the next course.
e. 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 abovementioned 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.

III Course and curriculum

§ 8 Modules, courses and semester allocation

The individual courses of this master's degree programme and their allocation to the compulsory and elective modules are listed below. The knowledge, methods or skills to be taught in the modules are described in more detail in Annex I. 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 II and § 9 contain the allocation of the courses to the participating universities.

Geosciences master's degree programme								
Module	**Course (LV)**	**LV**			**Semester incl. ECTS**			
		SSt	**Type**	**ECTS**	**I**	**II**	**III**	**I**
Compulsory module A: Geosciences								
A.1	Tectonics	2	VO	3	3			
A.2	Biosphere's Role in Earth System	2	VO	3	3			
A.3	Petrology of Lithospheric Processes	2	VO	3	3			
A.4	Geoscience Excursion[1]	3	EX	3		3		
Subtotal for compulsory module A		**9**		**12**	**9**	**3**	**0**	**0**
Compulsory module B: Applied Geosciences								
B.1	Engineering Geologic Investigation	2	VO	3	3			
B.2	Applied Hydrogeology	2	VO	3	3			
B.3	Mineralogy and Aqueous Geochemistry	2	VO	3	3			
B.4	Workshop in Geosciences[1]	2	VU/KS	2	2			
Subtotal for compulsory module B		**8**		**11**	**11**	**0**	**0**	**0**
Compulsory module C: Preparation for Master's Thesis								
C.1	Practical Training[1]	1	LU/PT	4			4	
C.2	Master Seminar	2	SE	2			2	
Subtotal for compulsory module C		**3**		**6**	**0**	**0**	**6**	**0**
Total for the compulsory modules:		**20**		**29**	**20**	**3**	**6**	**0**
6 Elective modules (each comprising 8 to 10 ECTS)								
Total for the elective modules according to § 9				**54**	**10**	**24**	**20**	**0**
Master's thesis				**30**			**1**	**29**
Master's examination				**1**				**1**
Free-choice subjects according to § 10				**6**		**3**	**3**	
Overall total				**120**	**30**	**30**	**30**	**30**

[1] These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.

§ 9 Elective modules: Catalogues of courses

For elective modules, students must complete courses with a total workload of 54 ECTS credit points from 6 elective modules, with the workload from each module comprising 8-10 ECTS credit points. Courses must be selected from 4 to 6 specialist elective modules (see § 9 para. 1). If 4 specialist elective modules are selected, then one general elective module (see § 9 para. 2) and one interdisciplinary elective module (see § 9 para. 3) must be completed. If 5 specialist elective modules are selected, either one general elective module or one interdisciplinary elective module must be completed. If 6 specialist elective modules are selected, neither a general elective module nor an interdisciplinary elective module is to be completed.

(1) Specialist elective modules

For specialist elective modules, courses with a workload of 8 to 10 ECTS credit points each must be completed out of the following course catalogues.

Elective Module D1: Geology I							
Course (LV)	SSt.	LV Type	ECTS	Semester allocation WS	SS	Uni Graz	TU Graz
Advanced Structural Geology (Microtectonics, Rheology, Quantification)**	3	KS	3	3		x	
Advanced Field Methods in Structural Geology (Mapping)**	3	KS	3		3	x	
Geodynamics of the Lithosphere	2	VO	3	3		x	
Tectonic Modelling*	2	VO/KS	3	3		x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module D2: Geology II							
Course (LV)	SSt.	LV Type	ECTS	Semester allocation WS	SS	Uni Graz	TU Graz
Deep Fluids and Fluid-Rock Interaction in the Lithosphere**	2	KS	3		3	x	
Neotectonics and Tectonic Geomorphology**	2	VO	3		3	x	
Tectonics of Sedimentary Basins	2	KS	3		3	x	
Selected Topics in Geology and Tectonics*	2	KS	3	3		x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module E1: Palaeontology and Palaeoenvironment							
Course (LV)	SSt.	LV Type	ECTS	Semester allocation WS	SS	Uni Graz	TU Graz
Palaeoceanography and Palaeoclimatology	2	VO	3	3		x	
Proxy Data in Palaeoenvironmental Analyses	2	VU	2		2	x	
Advanced Field Methods in Sedimentology	2	KS	2		2	x	
Selected Topics in Palaeontology and Palaeoenvironment*	2	KS	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.

Elective Module E2: Palaeontology and Stratigraphy							
Course (LV)	SSt.	LV Type	ECTS	Semester allocation WS	SS	Uni Graz	TU Graz
Stratigraphic Field Methods	3	KS	3	3		x	
Ecosystems Through Time	2	KS	2	2		x	
Advanced Field and Laboratory Methods in Palaeontology	2	KS	2	2		x	
Selected Topics in Palaeontology and Stratigraphy*	2	KS	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.

Elective Module F1: Petrology							
Course (LV)		LV		Semester allocation		Uni Graz	TU Graz
	SSt.	**Type**	**ECTS**	**WS**	**SS**		
Petrological Modelling**	2	KS	3		3	x	
Petrography Lab**	2	KS	2	2		x	
Theoretical Petrology**	2	VU	2	2		x	
Petrological Field Methods	3	KS/EX	3		3	x	
Selected Topics in Petrology*	2	KS	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module F2: Geochemistry							
Course (LV)		LV		Semester allocation		Uni Graz	TU Graz
	SSt.	**Type**	**ECTS**	**WS**	**SS**		
Isotope Geochemistry**	2	VO	3	3		x	
Geochronological Methods**	2	VU	2		2	x	
Electron Microprobe Analysis**	2	KS	2	2		x	
Analytical Methods in Geochemistry and Petrology	2	KS	2		2	x	
Workshop in Geochemistry and Petrology*	2	KS/SE	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module G1: Applied Mineralogy							
Course (LV)		LV		Semester allocation		Uni Graz	TU Graz
	SSt.	**Type**	**ECTS**	**WS**	**SS**		
Applied Mineralogy**	2	VU	2	2			x
Mineral Precipitation/Dissolution Experiments**	3	LU	3	3			x
Clay Mineralogy	1.33	VO	2	2			x
Biomineralization	1.33	VO	2	2			x
Geothermal Energy	1.33	VO	2		2		x
Archaeometry	1.33	VO	2	2			x
Selected Topics in Mineralogy/Applied Mineralogy*	2	VU/UE	2		2		x

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module G2: Aqueous Geochemistry and Stable Isotopes							
Course (LV)		LV		Semester allocation		Uni	TU
	SSt.	Type	ECTS	WS	SS	Graz	Graz
Low Temperature Geochemistry**	2	VO	3	3			x
Environmental Isotope Proxies**	1.5	VU	2	2			x
Hydrogeochemical Modelling**	2	UE	2		2		x
Water Analyses and Characterization	2	LU	2		2		x
Aqueous Geochemistry Practical Field Course	2	EX	2		2		x
Selected Topics in Aqueous Geochemistry and Stable Isotopes*	2	VU/UE	2		2		x

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module H1: Quantitative Hydrogeology							
Course (LV)		LV		Semester allocation		Uni	TU
	SSt.	Type	ECTS	WS	SS	Graz	Graz
Subsurface Flow and Transport Processes**	2	VU	3	3		x	
Groundwater Modelling**	2	KS	2	2		x	
Groundwater and Well Hydraulics**	2	KS	2		2	x	
Selected Topics in Groundwater and Soil Hydrology*	2	VU/KS	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module H2: Alpine Hydrogeology							
Course (LV)		LV		Semester allocation		Uni	TU
	SSt.	Type	ECTS	WS	SS	Graz	Graz
Alpine Aquifers **	2	VO	3	3		x	
Alpine Hydrogeology Field Course**	2	KS	2		2	x	
Hydrogeological Tracer Methods**	2	KS	2	2		x	
Selected Topics in Alpine Hydrogeology*	2	KS/SE	2		2	x	

* These courses are offered with a descriptive subtitle. Courses with a different subtitle shall be classified as different courses.
** Completion of these courses is compulsory.

Elective Module I1: Engineering Geology I (Investigations, Data Sets and Modelling)							
Course (LV)		LV		Semester allocation		Uni	TU
	SSt.	Type	ECTS	WS	SS	Graz	Graz
Rock Mass Characterization**	2	VO	3		3		x
Field Methods of Rock Mass Characterization**	2	EX	2	2			x
Engineering Geological Laboratory Methods**	1	VU	1	1			x
Modelling in Engineering Geology	2	VU	2	2			x
GIS and Remote Sensing for Geoscientists	2	UE	3	3			x
Probability and Statistics in Civil Engineering	2	VU	3		3		x
Geomorphology and Geology of the Quaternary	1.5	VU	1.5		1.5		x
Applied Geophysics	2	VO	3	3			x

** Completion of these courses is compulsory.

Elective Module I2: Engineering Geology II (Geologic Hazards)							
Course (LV)		LV		Semester allocation		Uni Graz	TU Graz
	SSt.	Type	ECTS	WS	SS		
Engineering Geologic Mapping**	3	EX	3		3		x
Engineering Geologic Field Excursion**	4	EX	4		4		x
Landslides and Slope Processes	2	VO	3	3			x
Geotechnical Earthquake Engineering	2	VU	3		3		x
Fundamentals of Grouting	2	VO	3	3			x

** Completion of these courses is compulsory.

Elective Module I3: Engineering Geology III (Geotechnical Engineering)							
Course (LV)		LV		Semester allocation		Uni Graz	TU Graz
	SSt.	Type	ECTS	WS	SS		
Rock Mechanics and Tunneling**	2	VO	3		3		x
Soil Mechanics**	2	VO	3		3		x
Rock Mechanics & Tunneling	1	UE	1		1		x
Rock Mechanics Laboratory	0.5	VO	0.75		0.75		x
Rock Mechanics Laboratory	2	UE	2		2		x
Soil Mechanics Laboratory Course	0.5	VO	0.75		0.75		x
Soil Mechanics Laboratory Course	1	UE	1		1		x
Geotechnical Monitoring	2.75	VU	3.5	3.5			x

** Completion of these courses is compulsory.

(2) General elective module

General elective modules are courses with a workload of 8 to 10 ECTS credit points each that may be selected from the following courses:

- Courses from the catalogues of specialist elective modules (see § 9 para. 1), if not already completed in the chosen specialist elective modules;
- The course entitled "Workshop in Geosciences" (compulsory module B), if not already completed in compulsory module B;
- Courses entitled "Special/Selected Topics in Geosciences (subtitle)," for which one semester hour generally corresponds to 1.5 ETCS credit points. These courses are offered with a descriptive subtitle for 1-3 semester hours for VO courses and/or 1-2 semester hours for UE courses. Courses with a different subtitle shall be classified as different courses.

(3) Interdisciplinary elective module

Interdisciplinary elective modules are courses with a workload of 8 to 10 ECTS credit points that may be selected from the following courses.

- Geoscientific courses which were completed as part of study periods abroad and which differ in terms of content from the courses of the compulsory modules, upon request to the officer responsible for study matters (see also § 13 para. 1);
- Courses designed to improve foreign language skills (English or German) with a workload of 3 ECTS credit points;
- Courses from the following master's degree programmes at the University of Graz or TU Graz:

- Advanced Material Science
- Applied Physical Geography and Mountain Research
- Chemie
- Technical Chemistry
- Geodäsie
- Geospatial Technologies
- Geotechnical and Hydraulic Engineering
- Ecology and Evolutionary Biology
- Environmental System Sciences/Climate Change and Environmental Technology

Courses taken from degree programmes other than those listed here may be approved, upon request, by the officer responsible for study matters, who shall decide on exceptions.

(4) Specialisations

Upon the student's request, a maximum of two of the following specialisations can be shown on the master's degree certificate, provided that the specialist elective modules listed below (see § 9 para. 1) have been completed:

- **Geology**: Modules D1, D2
- **Palaeontology and Stratigraphy** Modules E1, E2
- **Petrology and Geochemistry**: Modules F1, F2
- **Mineralogy and Hydrogeochemistry**: Modules G1, G2
- **Hydrogeology**: Modules H1, H2
- **Engineering Geology**: Modules I1, I2, I3

§ 10 Free-choice subjects

(1) The courses to be completed as part of the free-choice subject in the master's degree programme in geosciences are designed to allow students choose the topics they would like to focus on as well as to help promote student development. 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 recommendations for free-choice courses.

(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) Students also have the possibility to complete a vocational internship or short study periods abroad as part of the free-choice subject pursuant to § 13.

§ 11 Master's thesis

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

(2) The topic of the master's thesis must be taken from one of the compulsory or elective modules. The officer responsible for study matters shall decide on exceptions.

(3) 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.

(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 Registration requirements for courses/examinations

Admission to the master's degree examination before a committee requires proof of the positive assessment of all examination results according to §§ 8 to 9 above as well as proof of the positive assessment of the master's thesis.

§ 13 Study periods abroad and internship

(1) Recommended studies abroad

Students are recommended to complete a semester abroad during their degree programme. The third semester of this master's degree programme is particularly worth considering for a semester abroad. In the case of equivalence, modules or courses completed during the study abroad period shall be recognised by the officer responsible for study matters. Students are referred to § 78 para. 5 UG (prenotification) for the recognition of examinations completed during study abroad periods.

In addition, an application may be submitted to the officer responsible for study matters to have achievements from shorter study abroad periods, such as active participation in international summer or winter schools, recognised as part of the free-choice subject.

(2) Internship

Students are recommended to complete a vocational internship as part of the free-choice subject.

In this context, every working week in full-time employment shall correspond to 1.5 ECTS credit points. Active participation in a scientific event shall also be valid

as an internship. The internship shall be approved by the officer responsible for study matters and should be a meaningful addition to the degree programme.

IV Examination regulations and degree certificate

§ 14 Examination regulations

Courses are evaluated individually.

(1) Examinations for courses held as lectures (VO) cover the complete content of the course. Examinations are held exclusively orally, exclusively in writing, or as a combination of orally and in writing.

(2) For courses held as lectures with integrated exercises (VU), exercises (UE), laboratory courses (LU), projects (PT), seminars (SE), classes (KS), and excursions (EX), a student's performance is assessed continually on the basis of that student's contributions and/or through accompanying tests. The assessment must always consist of at least two examinations.

(3) 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).

(4) If a module includes separate examinations for the relevant courses, the overall module grade is to be determined by:

a. multiplying the grade of each examination result in connection with the module with the ECTS credit points of the corresponding course;

b. adding the values calculated according to item 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 module grade can only be awarded if every individual examination result is positively assessed.

f. Courses which are assessed exclusively by successful/unsuccessful participation shall not be included in the calculation described in items a. to d. above.

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

- the presentation of the master's thesis (maximum duration 15 minutes);
- the defence of the master's thesis (oral examination);
- an examination from the module to which the master's thesis is assigned, and
- an examination from another module according to § 8.

The modules are proposed by the candidate and determined by the officer responsible for study matters at the university to which the student is admitted. The total duration of the master's degree examination before a committee is generally 60 minutes and must not exceed 75 minutes.

(6) The master's examination committee 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.

(7) The grade of the examination before a committee is determined by the examination committee.

(8) In order to assist students in completing their degrees in a timely manner, courses with continual assessment must allow students to submit, supplement or repeat partial course requirements, in any case at least one partial course requirement to be determined by the course director, by no later than four weeks after the course has ended. If the registration period for a course that builds upon the content of this course ends within this time frame, this possibility must be extended until the end of the registration period. Laboratory courses are excluded from this regulation.

(9) For registration and deregistration as well as for examination procedures, the provisions of the statute of each university tasked with holding the relevant examination shall apply. If an examination is held jointly by both universities, information shall be published in the online system on which statute will apply. The regulations shall apply for lectures (selective examination) and for courses with continual assessment.

§ 15 Degree certificate

(1) The master's degree programme is completed by attaining a positive assessment for the courses from all the compulsory and elective modules, the free-choice subject, the master's thesis and the master's degree examination before a committee.

(2) A degree certificate shall be issued for successful completion of the degree programme. The degree certificate for the master's degree programme in geosciences contains:

a. a list of all modules (examination subjects) according to § 4 (including the ECTS credit points) 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 § 10 above, and

e. the overall assessment. The overall assessment of the degree programme shall be deemed as "passed" if each module as well as the master's thesis and the master's degree examination before a committee have been positively assessed. The overall assessment of the degree programme shall be deemed as "passed with distinction" if all of the modules as well as the master's thesis and the master's degree examination before a committee have been given a

grade of "good" or higher and at least half of the assessments (modules, master's thesis, master's degree examination before a committee) have been given a grade of "very good".

V Legal validity and transitional provisions

§16 Legal validity

This curriculum 2018 (UNIGRAZonline abbreviation 18W, TUGRAZonline abbreviation 18U) shall come into effect on 1 October 2018.

§ 17 Transitional provisions

When this curriculum comes into effect on 1 October 2018, students in the master's degree programme *Earth Sciences* (curriculum 2013) are entitled to complete their degree programme within 6 semesters according to the provisions of the curriculum from 2013. If the degree programme is not completed by 30 September 2021, students are subject to the version of the curriculum for the master's degree programme *Geosciences* which is valid at that time. Students are entitled to voluntarily opt for the new curriculum at any time within the admission periods. To this end, a written irrevocable declaration must be submitted to the officer responsible for study matters.

Annex to the curriculum for the master's degree programme in geosciences

Annex I

Module descriptions

Module A:	Geosciences
ECTS credit points	12
Subject content	Understanding of the processes and the interaction of processes that form/formed the Earth. This involves teaching the relationship between of the Earth's spheres – core, mantle, crust, biosphere, hydrosphere and atmosphere – from various geoscientific points of view.
Learning outcomes	Students, upon completion of the module, will be able to: • understand the dynamic relationships between lithosphere, biosphere and atmosphere; • generate and logically interpret geo-scientifically relevant data; • practically apply the theoretical knowledge they have acquired; and • contribute to issues relevant to society.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, analysis of practical, subject-specific examples in excursions (EX)
Prerequisites	No prerequisites
Frequency with which the module is offered	Every academic year

Module B	Applied Geosciences
ECTS credit points	11
Subject content	Characterisation and assessment of soils, minerals, rocks and mountains from the point of view of engineering geology, hydrogeology, and mineralogical geochemistry, and within the context of issues and topics relevant to society such as natural hazards, material development, the quantity and quality of water resources, and the impact of construction projects on the environment.
Learning outcomes	Students, upon completion of the module, will be able to: • define parameters in terms of engineering geology, hydrogeology and mineralogical geochemistry, and classify them according to their significance to practical issues relevant to the environment; • select suitable research methods for given engineering-geological, hydrogeological, hydrogeochemical and mineralogical issues, and design suitable exploration programmes; • present analysis data and exploration results, and interpret them in relation to overarching issues; and • apply their acquired skills to familiarise themselves independently with comprehensive, practical issues in the areas of natural hazards, material development, water resources and environmental protection.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, presentations linked with discussions and independent analysis of subject-specific issues in classes (KS) or lectures with integrated exercises (VU)
Prerequisites	A basic knowledge of engineering geology, hydrogeology, mineralogy, and hydrogeochemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module C	Preparation for Master's Thesis
ECTS credit points	6
Subject content	Application-oriented teaching and independent consolidation of working methods in groups which correspond to the discipline relevant to the master's thesis. Research of literature on current research topics as well as evaluation and discussion in seminar presentations on the state of current research.
Learning outcomes	Students, upon completion of the module, will be able to: • apply the methods necessary to complete their master's thesis; • understand the topic of their master's thesis within the context of the state of current research; • define the underlying research question of their master's thesis; and • research and evaluate specialist literature; • present and discuss research results.
Teaching and learning activities and methods	Interactive teaching of knowledge and methodologies in projects (PT), laboratory courses (LU) or seminars (SE)
Prerequisites	Prior knowledge which corresponds to the compulsory modules A and B as well as the elective modules into which the topic of the master's thesis can be categorised.
Frequency with which the module is offered	Every academic year

Module D1:	Geology I
ECTS credit points	8 to 10
Subject content	Knowledge of the tectonic processes within the lithosphere and the forces, stress and deformations that lead to these processes.
Learning outcomes	Students, upon completion of the module, will be able to: • deal with geological and structural questions in terms of both quality and quantity; • produce tectonic models taking into consideration the material characteristics of the crust and mantle; and • apply the acquired knowledge to scientific and practical issues.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, interactive classes (KS)
Prerequisites	Prior knowledge equivalent to the course “Tectonics” from Module A is recommended.
Frequency with which the module is offered	Every academic year

Module D2:	Geology II
ECTS credit points	8 to 10
Subject content	Knowledge of the processes that form structural basins, the dynamic development of the Earth's topography as well as the interaction between fluid and solid phases in the lithosphere.
Learning outcomes	Students, upon completion of the module, will be able to: • understand the processes that form structural basins and apply this knowledge to practical issues; • understand geomorphological processes and the interplay between fluid and solid phases in the lithosphere; and • apply the acquired skills to social and economic issues.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, interactive classes (KS)
Prerequisites	Prior knowledge equivalent to the course "Tectonics" from Module A is recommended.
Frequency with which the module is offered	Every academic year

Module E1:	Palaeontology and Palaeoenvironment
ECTS credit points	8 to 10
Subject content	Reconstruction of palaeoceanographic and palaeoclimatological development through the Earth's history and its significance for the Earth as an overall system. Advanced field methods for collecting primary data from sedimentary rocks as the basis for palaeoenvironmental reconstructions. Presentation of a variety of proxy data and their physicochemical and biological background for palaeoenvironmental reconstruction and simple numerical modelling.
Learning outcomes	Students, upon completion of the module, will be able to: • understand palaeoclimatological and palaeoceanographic processes and their feedback mechanisms with the other components of the Earth as a system; • generate primary data from the results of field work with sedimentary rocks that can be used as the basis for a deeper understanding of palaeoenvironmental reconstructions; • develop an in-depth understanding of various sedimentological, biological, geochemical and geophysical proxy data and their application in palaeoenvironmental reconstructions; • apply simple numerical models based on proxy data to the quantification of palaeoenvironmental reconstructions; and • present and discuss results based on palaeontological data and palaeoenvironmental reconstructions.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; presentation- and application-oriented lectures with integrated exercises (VU) and interactive classes (KS)
Prerequisites	A basic knowledge of palaeontology, biology, mathematics, physics and chemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	At least every other year

Module E2:	Palaeontology and Stratigraphy
ECTS credit points	8 to 10
Subject content	Advanced field and laboratory methods for collecting primary data from sedimentary rocks using sedimentological and palaeontological as well as stratigraphic methods. Processing rock and fossil materials using various sedimentological, palaeontological and stratigraphic laboratory methods. Demonstration of the significance of the variety of field and laboratory methods for the collection and palaeoecological interpretation of fossils and their application within stratigraphy. Teaching of complex ecological relationships between actualistic-palaeontological field and laboratory methods and the reconstruction of palaeoecosystems through the Earth's history.
Learning outcomes	Students, upon completion of the module, will be able to: • independently apply a wide range of field and laboratory methods in order to carry out palaeoecological and stratigraphic interpretations; • transfer field and laboratory data into various stratigraphic systems in order to develop an integrated stratigraphy; • understand and model various mathematic, chemical and physical methods in order to achieve a high-resolution stratigraphy; • develop an in-depth understanding of palaeoecological relationships and the function of extant ecosystems and palaeoecosystems; and • present and discuss complex results based on sedimentological, palaeontological and stratigraphic data.
Teaching and learning activities and methods	Interactive classes (KS)
Prerequisites	A basic knowledge of palaeontology, biology, mathematics, physics and chemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	At least every other year

Module F1:	Petrology
ECTS credit points	8 to 10
Subject content	Thermodynamic modelling of petrological processes, theoretical principles and practical application. Practical course in optical microscopy with rocks with an emphasis on the recognition and interpretation of mineral and reaction textures in various types of igneous and metamorphic rock. Advanced field methods at sites used as educational examples, with an emphasis on petrographic mapping and sampling strategies as well as the interactive teaching of petrological concepts. Various in-depth aspects of petrology are discussed in “Special Topics in Petrology”.
Learning outcomes	Students, upon completion of the module, will be able to: • understand the principles of thermodynamics and apply them to petrological calculations; • model petrological processes thermodynamically in the lithosphere; • recognise and interpret mineral textures and mineral parageneses in petrographic thin sections (optical microscopy); • confidently identify rocks on site as well as in mapping/sampling from a petrological point of view; and • understand petrological concepts with the help of sites used as educational examples.
Teaching and learning activities and methods	Presentation- and application-oriented lectures with integrated exercises (VU), interactive classes (KS) and excursions (EX)
Prerequisites	A basic knowledge of petrology, mineralogy and geology commensurate with a bachelor’s degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module F2:	Geochemistry
ECTS credit points	8 to 10
Subject content	Geochemical development of the Earth's crust and mantle, presentation and interpretation of geochemical data and modelling of processes. Using isotope systems for geochemical and geochronological issues. Analytical methods in petrology and geochemistry: electron-beam- and x-ray-based analytics, mass spectrometric methods, sample preparation, sample processing and practical work in the chemistry laboratory. Various in-depth aspects of geochemistry are discussed in the workshop in Geochemistry and Petrology.
Learning outcomes	Students, upon completion of the module, will be able to: • understand melting and crystallisation processes in the lithosphere and the significance of the main composition, trace composition and rare earth element composition of rocks; • apply theoretical concepts and model geochemical processes; • understand the significance and changing of the isotopic composition of rocks; • determine the age of metamorphic, igneous and sedimentary rocks: application, interpretation and limitation; • understand the basics of analytical issues in chemistry, from sampling to the interpreted diagram; and • independently use routine instruments for analysis in geochemistry and petrology (microprobes, XRF analytics, Raman spectroscopy, [laser ablation] inductively coupled plasma mass spectrometry).
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, interactive lectures with integrated exercises (VU) and classes (KS), discussions and presentations in seminars (SE)
Prerequisites	A basic knowledge of geochemistry, petrology, mineralogy and chemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module G1	Applied Mineralogy
ECTS credit points	8 to 10
Subject content	Applied aspects of mineralogy with regard to refractory materials, glass, ceramics, binding agents, etc. as well as characteristics, use of natural deposits, and conditions under which deposits are formed. Mineralogical and geochemical characterisation of natural and synthetic minerals and rocks. Carrying out laboratory experiments on the new formation and the dissolution of minerals; solid and solution analysis. Biomineralisation processes (e.g. bones, shells), including (palaeo-) environments, chemical and bionic aspects; geothermal energy and deep groundwater flow; development, characteristics and applications of clay minerals for environmentally relevant and geotechnical issues. Exploitation of geothermal energy through deep drilling. Examination of archaeological materials, e.g. their origin, trade routes, production, dating. Analysis of solid phases (e.g. XRD, XRF, LA-ICP-MS, DTA) and solutions (e.g. ICP-OES, IC, ICP-MS). Experimental setups for mineral synthesis/alteration.
Learning outcomes	Students, upon completion of the module, will be able to: • independently address issues from the field of applied mineralogy; • better understand mechanisms and kinetics in the formation and decay of minerals in natural and synthetic systems; • develop and implement of experimental approaches to solve problems in applied mineralogy; • independently conduct mineralogical and chemical analyses of solid phases and solutions; • classify clay mineral groups as well as their development, characteristics and applications; and • evaluate the occurrence and use of geothermal energy.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; presentation- and application-oriented lectures with integrated exercises (VU), application-oriented exercises (UE) and laboratory courses (LU)
Prerequisites	A basic knowledge of mineralogy, (hydro-) geochemistry and mathematics commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module G2	Aqueous Geochemistry and Stable Isotopes
ECTS credit points	8 to 10
Subject content	Geochemical and isotopic parameters and environmental factors in aquatic environments. Evaluation of saline formation water, seawater, pore water and groundwater (e.g. quality, origin, use); in-depth knowledge of redox processes, isotope fractionation, trace element signatures, adsorption phenomena, etc. with regard to the mobilisation, transport and refixation of components (e.g. pollutants, biogenic activity). Sampling and preparation of water samples and precipitates on site. Analysing dissolved components and stabile isotopes in the laboratory. Evaluation, presentation and interpretation of data regarding hydrochemical modelling (e.g. PHREEQC). Use of stabile isotopes and element signatures from forensics for the evaluation of (palaeo-) environments. Practical issues from natural, applied and environmentally relevant fields. On-site sampling and documentation. Water analyses (EC, pH, Eh, O_2, TOC, spectroscopy, IR-MS)
Learning outcomes	Students, upon completion of the module, will be able to: • evaluate the formation and contamination mechanisms of water; • carry out case studies taking into consideration natural and anthropogenic influences; • carry out water sampling, documentation, and field and laboratory analyses; • characterise and interpret the solution composition with regard to water quality, origin and use; and • use stabile isotopes and trace elements to understand processes (e.g. water-rock reactions, climate/environmental factors, mixtures, evaporation, karst formation, degassing effects).
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; interactive lectures with integrated exercises (VU), application-oriented exercises (UE) and excursions (EX)
Prerequisites	A basic knowledge of hydrogeology, mathematics, physics and chemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module H1	Quantitative Hydrogeology
ECTS credit points	8 to 10
Subject content	Flow and transport processes in the soil and in groundwater: significance, definition and quantitative, mathematic description of the processes. Selected analytical solutions of flow and transport equations and their application, e.g. for geohydraulic issues and the prediction of the spreading of heat and pollutants in the subsurface. Numerical groundwater modelling: theoretical principles and practical approaches.
Learning outcomes	Students, upon completion of the module, will be able to: • define essential flow and transport processes in the soil and in groundwater and classify them according to their significance to hydrogeological issues; • understand relationships between the subsurface conditions and the observable flow and transport phenomena; • practically apply analytic solutions and numerical solution methods for flow and transport equations both independently and in a team; • critically interpret model results in light of the underlying assumptions; and • present and discuss results from quantitative hydrogeological investigations in a suitable form.
Teaching and learning activities and methods	Presentation- and application-oriented lectures with integrated exercises (VU) and interactive classes (KS)
Prerequisites	A basic knowledge of hydrogeology, mathematics, physics and chemistry commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module H2	Alpine Hydrogeology
ECTS credit points	8 to 10
Subject content	Analysis of spring and groundwater in alpine catchment areas: definition, characterisation and quantitative, mathematical description of flow processes, significance for the discharge patterns of alpine catchment areas and lower-lying river systems. Theoretical principles of the most important field methods, particularly tracer methods and their practical implementation and evaluation in order to characterise the discharge patterns of alpine bodies of groundwater, especially when used for water management issues related to sustainable use and protection of groundwater as a resource.
Learning outcomes	Students, upon completion of the module, will be able to: • define and characterise alpine bodies of groundwater and classify them according to their significance to hydrogeological/water management issues; • understand relationships between the subsurface conditions (geological structure) and the observable discharge patterns of spring waters from alpine aquifers; • quantify and interpret the run-off patterns of various alpine bodies of groundwater both independently and in a team; • carry out the most important terrain methods for this, from the planning to the quantitative evaluation, both independently and in a team; and • present and discuss results from quantitative hydrogeological investigations in a suitable form.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions, interactive classes (KS) and discussion-based seminars (SE)
Prerequisites	A basic knowledge of geology and hydrogeology commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module I 1	Engineering Geology I (Investigations, Data Sets and Modelling)
ECTS credit points	8 to 10
Subject content	Collection, interpretation, and representation of geologic data sets in the context of engineering geologic investigations. Statistical properties and uncertainty related to data sets collected in the field and laboratory environments. Classification and characterization of rock masses and geomorphology for engineering purposes, applied geophysical investigation methods, 3D rock mass modelling, and presentation/analysis of geologic data in a Geographical Information System (GIS) framework.
Learning outcomes	Students, upon completion of the module, will be able to: • independently collect and evaluate field and laboratory data related to the engineering behaviour of rock masses; • identify and interpret alpine geomorphological features that are pertinent to geologic hazards and geotechnical construction; • understand the principles of engineering geophysical investigation methods and determine their range of applications; • evaluate statistical properties of geologic data sets and quantify their uncertainty; • develop 3D engineering rock mass models on the basis of collected field data; and • represent and analyse complex digital geologic data sets in a GIS framework.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; presentation- and application-oriented lectures with integrated exercises (VU), application-oriented exercises (UE) and excursions (EX)
Prerequisites	Knowledge of geology commensurate with a bachelor's degree in geosciences is required.
Frequency with which the module is offered	Every academic year

Module I 2	Engineering Geology II (Geologic Hazards)
ECTS credit points	8 to 10
Subject content	Identification, interpretation, representation, and analysis of alpine geologic hazards and Quaternary surficial processes. Primary focus is on soil and rock slope stability evaluation and analysis procedures, seismic hazard characterization, and ground improvement technologies. Field investigation methods, analysis and design procedures, and remediation approaches are covered.
Learning outcomes	Students, upon completion of the module, will be able to: • identify, represent, and interpret alpine Quaternary geologic features and hazards on the basis of field observations, documentation and mapping; • prepare professional-quality engineering geologic maps and cross sections; • identify and evaluate slope failure modes developed in different types of soils and rock masses, and perform basic analyses concerning soil and rock slope stability; • formulate the geotechnical approach to seismic hazard characterization, and perform fundamental geotechnical engineering earthquake analyses related to site response, landslides, retaining walls and underground structures; and • determine the optimal grouting materials and injection procedures for a broad array of geotechnical construction and remediation techniques.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; presentation- and application-oriented lectures with integrated exercises (VU), application-oriented exercises (UE) and excursions (EX)
Prerequisites	Geological or civil engineering knowledge commensurate with a bachelor's degree in geosciences as well as basic knowledge of engineering statics/dynamics and soil/rock mechanics are required
Frequency with which the module is offered	Every academic year

Module I 3	Engineering Geology III (Geotechnical Engineering)
ECTS credit points	8 to 10
Subject content	Fundamentals of geotechnical engineering, including rock mechanics, soil mechanics, tunnel engineering, geotechnical monitoring and engineering measurement techniques.
Learning outcomes	Students, upon completion of the module, will be able to: • understand and apply the theoretical basics of soil mechanics and have the capability to evaluate key soil parameters; • apply basic rock engineering characterization and design methods, and discriminate applicable tunnel construction methods on the basis of geological site conditions and anticipated ground behaviour; • understand the operating principles of different sensors for the precise measurement of position, deformation, tilt, stress, strain, and vibrations; and identify appropriate engineering measurement techniques for monitoring dams, tunnels, foundations and slopes.
Teaching and learning activities and methods	Lectures (VO) based around presentations and discussions; presentation- and application-oriented lectures with integrated exercises (VU), application-oriented exercises (UE)
Prerequisites	Geological or civil engineering knowledge commensurate with a bachelor's degree in geosciences as well as basic mathematical are required.
Frequency with which the module is offered	Every academic year

Annex II

Study schedule

Semester 1	SSt.	Type	ECTS	Uni[Graz]	TU[Graz]
A.1 Tectonics	2	VO	3	X	
A.2 Biosphere's Role in Earth System	2	VO	3	X	
A.3 Petrology of Lithospheric Processes	2	VO	3	X	
B.1 Engineering Geologic Investigation	2	VO	3		X
B.2 Applied Hydrogeology	2	VO	3	X	
B.3 Mineralogy and Aqueous Geochemistry	2	VO	3		X
B.4 Workshop in Geosciences	2	VU/KS	2	X	X
Elective modules			10	X	X
Semester 1 total			30		
Semester 2					
A.4 Geoscience Excursion	3	EX	3	X	X
Elective modules			24	X	X
Free-choice subject			3	X	X
Semester 2 total			30		
Semester 3					
C.1 Practical Training	1	LU/PT	4	X	X
C.2 Master Seminar	2	SE	2	X	X
Elective modules			20	X	X
Free-choice subject			3	X	X
Master's thesis			1	X	X
Semester 3 total			30		
Semester 4					
Master's thesis			29	X	X
Master's degree examination			1	X	X
Semester 4 total			30		
Total ECTS credit points overall			120		

[1]: 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.

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 § 10 of this curriculum.

In order to broaden students' basic knowledge in the modules of this degree 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 at the University of Graz; the Centre for Social Competence at the University of Graz; the Inter-University Research Centre for Technology, Work and Culture (IFZ); and the "Transfer Initiative for Management- and Entrepreneurship-Grundlagen (Basics), Awareness, Training and Employability" ("TIMEGATE" for short) at the University of Graz.

Annex IV

Equivalence list

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

The equivalence list defines the equivalence of successfully completed courses from this curriculum with successfully completed courses from the previous curriculum. This equivalence applies in both directions, i.e. 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 as well as number of ECTS credit points or number of semester hours are considered to be equivalent, and are therefore not listed explicitly in the equivalence list.

This curriculum for 2018				**Previous curriculum for 2013**			
Course	**Type**	**SSt.**	**ECTS**	**Course**	**Type**	**SSt.**	**ECTS**
Tectonics	VO	2	3	Tektonik und Rheologie	KS	3	3
Biosphere's Role in Earth System	VO	2	3	Biosphärengekoppelte Stoffkreisläufe	VO	2	3
Petrology of Lithospheric Processes	VO	2	3	Petrologie der Lithosphäre	VO	2	3
Geoscience Excursion	EX	3	3	Geländeübungen und Exkursionen im In-/Ausland	EX	3	3
Applied Hydrogeology	VO	2	3	Angewandte Hydrogeologie	VO	2	3
Mineralogy and Aqueous Geochemistry	VO	2	3	Wasser-Gestein-Wechselwirkung	VO	2	3
Workshop in Geosciences	VU/KS	2	2	Bodengenese *or* Stratigraphie *or* Workshop in Earth Sciences	VO VO KS	1 2 3	1,5 3 3
Master Seminar	SE	2	2	Geowissenschaftliches Seminar	SE	1	1
Advanced Structural Geology (Microtectonics, Rheology, Quantification)	KS	3	3	Quantifizierung tektonischer und metamorpher Prozesse	KS	3	3
Advanced Field Methods in Structural Geology (Mapping)	KS	3	3	Gelände/Laborübungen zur Strukturgeologie und Petrolgie	KS	3	3

This curriculum for 2018				Previous curriculum for 2013			
Course	**Type**	**SSt.**	**ECTS**	**Course**	**Type**	**SSt.**	**ECTS**
Geodynamics of the Lithosphere	VO	2	3	Geodynamik der Lithosphäre	VO	2	3
Tectonic Modelling *or* Petrological Modelling	VO/KS KS	2 2	3 3	Modellierung in den Erdwissenschaften	VU	2	2
Deep Fluids and Fluid-Rock Interaction in the Lithosphere	KS	2	3	Krustenfluide und Flüssigkeitseinschlüsse	KS	2	2
Tectonics of Sedimentary Basins	KS	2	3	Keine Gleichwertigkeit			
Neotectonics and Tectonic Geomorphology	VO	2	3	Neotektonik	VO	2	3
Selected Topics in Geology and Tectonics *or* Selected Topics in Petrology	KS KS	2 2	3 2	Ausgewählte Kapitel Geologie -Petrologie-Mineralogie	VO	2	3
Palaeoceanography and Palaeoclimatology	VO	2	3	Paläoozeanographie und Paläoklimatologie	VO	2	3
Proxy-data in Palaeoenvironmental Analyses	VU	2	2	Proxy-Daten in der Erdgeschichte	VO	2	3
Advanced Field Methods in Sedimentology	KS	2	2	Kartierkurs Sedimente	KS	3	3
Selected Topics in Palaeontology and Palaeoenvironment	KS	2	2	Ausgewählte Kapitel der Geobiologie und Paläökologie	VO	2	3
Stratigraphic Field Methods	KS	3	3	Stratigraphische Geländemethoden	KS	3	3
Ecosystems Through Time	KS	2	2	Ökosysteme in der Erdgeschichte	VO	2	3
Advanced Field and Laboratory Methods in Palaeontology	KS	2	2	Paläontologische Gelände-/Labormethoden	KS	3	3
Selected Topics in Palaeontology and Stratigraphy	KS	2	2	Aktuopaläontologie *or* Fossillagerstätten	KS KS	2 4	2 4
Petrography Lab	KS	2	2	Gesteinsmikroskopie	KS	2	2
Theoretical Petrology	VU	2	2	Theoretische Petrologie	VO	2	3
Petrological Field Methods	KS/EX	3	3	Kartierkurs	KS	3	3
Isotope Geochemistry	VO	2	3	Isotopengeologie	VO	2	3
Geochronological Methods	VU	2	2	Isotopengeochemische und geochronologische Methoden	KS	2	2
Electron Microprobe Analysis	KS	2	2	Elektronenmikroskopie und Elektronenstrahlmikroanalytik	KS	3	3
Analytical Methods in Geochemistry and Petrology	KS	2	2	Gesteinsanalytik	VU	2	2
Workshop in Geochemistry and Petrology	KS/SE	2	2	Keine Gleichwertigkeit			
Applied Mineralogy	VU	2	2	Angewandte Aspekte der Mineralogie und Petrologie	VO	3	4,5
Biomineralization	VO	1.33	2	Biomineralisation	VO	1	1.5
Mineral Precipitation/Dissolution Experiments	LU	3	3	Experimentelles Laborpraktium	LU	3	3

This curriculum for 2018				Previous curriculum for 2013			
Course	**Type**	**SSt.**	**ECTS**	**Course**	**Type**	**SSt.**	**ECTS**
Clay Mineralogy	VO	1.33	2	Clay Minerals	VO	2	3
Geothermal Energy	VO	1.33	2	Geothermie	VO	1	1.5
Archaeometry	VO	1.33	2	Archäometrie	VO	2	3
Low Temperature Geochemistry	VO	2	3	Aquatic Geochemistry	VO	2	3
Environmental Isotope Proxies *or* Hydrogeological Tracer Methods	VU KS	1.5 2	2 2	Isotopes and Tracers in Aquatic systems	VU	2	2
Hydrogeochemical Modelling	UE	2	2	Hydrogeochemical modelling	VU	2	2
Water Analyses and Characterization	LU	2	2	Wasseranalytik und -charakterisierung	VU	2	2
Aqueous Geochemistry Practical Field Course	EX	2	2	Hydrogeochemisches Geländepraktikum	EX	2	2
Subsurface Flow and Transport Processes	VU	2	3	Transportprozesse im Grundwasser	VO	2	3
Groundwater Modelling	KS	2	2	Grundwassermodellierung	KS	3	3
Groundwater and Well Hydraulics	KS	2	2	Geohydraulische Methoden	KS	2	2
Selected Topics in Groundwater and Soil Hydrology	VU/KS	2	2	Bodenphysik	VU	2	2
Alpine Aquifers	VO	2	3	Kluft- und Karstgrundwasserleiter	VO	2	3
Alpine Hydrogeology Field Course	KS	2	2	Hydrogeologisches Geländepraktikum	KS	4	4
Selected Topics in Alpine Hydrogeology	KS/SE	2	2	Keine Gleichwertigkeit			
Rock Mass Characterization	VO	2	3	Gebirgscharakterisierung	VO	2	3
Field Methods of Rock Mass Characterization	EX	2	2	Geländemethoden zur Gebirgscharakterisierung	EX	2	2
Engineering Geological Laboratory Methods	VU	1	1	Engineering Geological Lab Methods	VU	1	1
Modelling in Engineering Geology	VU	2	2	Ingenieurgeologische Modellierung	VU	2	2
GIS and Remote Sensing for Geoscientists	UE	2	3	GIS und Fernerkundung	UE	2	2
Applied Geophysics	VO	2	3	Angewandte Geophysik	VO	2	3
Rock Mechanics and Tunnelling	VO	2	3	Felsmechanik und Tunnelbau	VO	2	3
Soil Mechanics	VO	2	3	Bodenmechanik	VO	2	3
Rock Mechanics and Tunnelling	UE	1	1	Felsmechanik und Tunnelbau	UE	1	1
Rock Mechanics Laboratory	VO	0.5	0.75	Felsmechanik Labor	VO	0.5	0.75
Rock Mechanics Laboratory	UE	2	2	Felsmechanik Labor	UE	2	2
Soil Mechanics Laboratory Course	VO	0.5	0.75	Bodenmechanik Labor	VO	0.5	0.75

This curriculum for 2018				Previous curriculum for 2013			
Course	**Type**	**SSt.**	**ECTS**	**Course**	**Type**	**SSt.**	**ECTS**
Soil Mechanics Laboratory Course	UE	1	1	Bodenmechanik Labor	UE	1	1
Geotechnical Monitoring	VU	2.75	3.5	Geomesstechnik	VU	2.75	3.5

Annex V

Glossary

Glossary of the terms used which differ in the statutes and guidelines of both universities

Name in this curriculum (NAWI Graz)	Name at Uni Graz	Name at TU Graz
SSt. (semester hour)	KStd.	SSt.
Elective module	Gebundenes Wahlfach	Wahlfach
Free-choice subject	Freie Wahlfächer	Freifach