Note:
The following curriculum is a consolidated version. It is legally non-binding and for informational purposes only.
The legally binding versions are found in the respective University of Innsbruck Bulletins (in German).

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Complete version from 1 October 2019
Curriculum for the
Master's Programme Earth Science
at the Faculty of Earth and Atmospheric Sciences
of the University of Innsbruck

§ 1 Qualification profile

The Master's Programme of Geosciences is aimed at graduates of the Bachelor's Degree Earth and Atmospheric Sciences and Austrian and international students with a comparable bachelor's degree. This pedigree qualification affords a basic training in Earth Sciences with the ability to focus in geology and mineralogy-petrology, reflecting the current developments in core areas of geosciences in an international context. Students learn the meaning of scientific research at the highest level - including goal and results-oriented approaches - and in the course of their master thesis, will learn how to independently manage a project, regardless of the chosen major subject.

The career fields for graduates of the Master's Programme Geosciences are diverse, ranging from a scientific career, to careers in construction, the environmental sector, the detection of raw materials, or the mining and chemical industries.

§ 2 Length and Scope

(1) The Master's Programme Geosciences comprises 120 ECTS credits. This corresponds to a duration of study of four terms.

(2) In the Master's Programme in Earth Sciences, six compulsory modules and eight elective modules (see §6) must be passed.

§ 3 Entry requirements

The entry requirements for the Master's Programme Geosciences are a technically relevant bachelor's degree, a technically relevant bachelor's degree from an university of applied sciences, or another equivalent degree from an accredited domestic or foreign post-secondary educational institution.

§ 4 Types of courses and number of participants

(1) Lecture (VO):

Lectures introduce students to the main areas of the subject matter and its applicable methods, with particular reference to essential facts and key doctrines in the field. In addition, lectures cover special research areas and give attention to the latest advances in scientific development.

Number of participants: 200

(2) Tutorial (UE)

Tutorial courses are evaluative. Aspects of the subject are covered as examples in the form of practical work, case reviews, short presentations and homework discussions. They complement the lectures, with a deeper examination of the subject matter.

Number of participants: 20

(3) Lecture/tutorial (VU)

The lecture/tutorial is an integrated evaluative course, where lectures and tutorials are closely linked with one another. The tutorials cover key issues and their solutions, in accordance with the scientific objectives of the master's programme regarding professional practice.

Number of participants: 20

(4) Field trip/tutorial (EU)

The field trip/tutorial is evaluative, and covers study topics in the field. In doing so, students will learn the appropriate methods to meet the demands of defined practical challenges and problems.

Number of participants: 20 (in difficult terrain: 12)

(5) Seminar (SE)

Seminars are evaluative courses comprised of scientific discussion. Participants must contribute in written and oral form, which will be evaluated on its technical and methodical merits, as well as the quality of presentation.

Number of participants: 15

§ 5 Modules (Title, Type, Description, Course Content)

(1) Mandatory modules

1.

Module 1. Regional Geology (2) *Objective* Students develop a sound knowledge of regional geology.	**7.5 ECTS credits**
Geology of Tyrol, VO1 *Content* This lecture discusses current research on the geology of the state of Tyrol, including South Tyrol.	2.5
Extra-Alpine Geology, VO1 *Content* This lecture examines the geological structure of selected areas outside the Alps.	2.5
Geoscientific field trip, EU2 *Content* These field trips deepen the acquired theoretical knowledge in regional geology.	2.5

2.

Module 2. Analytical Techniques (1) *Objective* Students learn the basic applications of important geoanalytical laboratory methods, including their faults and limitations.	**7.5 ECTS credits**

Analytical Techniques (1), VO2 *Content* In this lecture, the theoretical basics of selected analytical methods will be explored. **Analytical Techniques (1),** UE2 *Content* In this tutorial, students will learn about methods in practice through the use of case studies.	4.0 3.5

3.

Module 3. Tectonics *Objective* Students learn about geodynamic processes and are able to interpret and apply them in context, starting from plate tectonics down to a submicroscopic scale.	**7.5 ECTS credits**
Plate tectonics, VO2 *Content* The lecture provides an understanding of plate tectonics and plate boundaries, incorporating fundamental concepts in addition to the latest research. **Microstructure**, VU2 *Content* This course covers the deformation behaviour of rock-forming minerals as well as their microstructure and texture.	4.0 3.5

4.

Module 4. Metamorphic and Magmatic Rocks *Objective* Students develop basic theoretical and practical knowledge of the petrology of metamorphic and magmatic rocks.	**7.5 ECTS credits**
Metamorphic rocks, VO2 *Content* This lecture provides an overview of the field of the petrology of metamorphic rocks. **Magmatic rocks**, VO2 *Content* This lecture provides an overview of the field of the petrology of magmatic rocks. **Geoscientific field trip**, EU1 *Content* These field trips deepen the acquired theoretical knowledge about the formation and deposits of magmatic and metamorphic rocks.	3.5 2.5 1.5

5.

5.	**Compulsory Module: Preparation of the Master's Thesis**	**h**	**ECTS-Credits**
	Agreement on the topic, the scope and the form of the Master's Thesis on the basis of a brief summary of the contents (abstract) as well as agreement on the work processes and the study progress. Planning of an appropriate time frame for the completion of the Master's Thesis.	-	7.5
	Total	**-**	**7.5**

	Learning Outcomes: After successful completion of this module, the students will be able to write a brief summary of the content of the planned Master's Thesis (abstract), to outline an anticipated schedule and to conclude a written Master's Thesis agreement.
	Prerequisites: none

5a.

Module 5a. Master's Thesis Defense *Objective* After having written their own thesis on a major topic from the subject which meets the criteria of good scientific practice, the students will be able to defend their conclusions in the form of a oral presentation.	**2.5 ECTS credits**
Thesis Defense *Content* The master's thesis is presented and defended before a committee in a public lecture.	2.5

(2) Elective Modules

1.

Module 6. Applied Geology (2) *Objective* The students gain advanced practical knowledge in practical geology enabling them to tackle challenges in geological engineering and hydrogeology.	**7.5 ECTS credits**
Hydrogeology (2), VO1 *Content* This course covers selected aspects of hydrogeology and gives the state of research in this area.	2.0
Hydrogeology (2), UE1 *Content* The tutorials deepen the basic theoretical concepts introduced in the lecture.	1.0
Geological Engineering (2), VO2 *Content* This course covers selected aspects of geological engineering and examines current state of research in this area.	4.0
Geological Engineering (2), EU1 *Content* The tutorials deepen the basic theoretical concepts introduced in the lecture.	0.5

2.

Module 7. Palaeontology *Objective* Students are taught to identify and interpret macro and microscopic fossils.	**7.5 ECTS credits**
Biostratigraphy, VU2 *Content* The course focuses on the application of index fossils in the biostratigraphy of alpine deposits.	4.0

Micropalaeontology, VU2 *Content* This course aims to develop knowledge of important groups of microfossils and their detection.	3.5

3.

Module 8. Quaternary Geology *Objective* Students will develop a sound knowledge of Quaternary climate and environmental changes, identifying sediments and landforms that were formed by these changes and ascribing them to individual processes.	**7.5 ECTS credits**
Quaternary Geology & Palaeoclimatology, VO2 *Content* This lecture covers the evidence for Quaternary climate change, exploring the causes and effects through the use of various marine and terrestrial climate archives. **Quaternary Tutorial**, VU2 *Content* Through introductory theory and subsequent practice, students learn about Quaternary field techniques with an emphasis on profile recording and mapping.	4.0 3.5

4.

Module 9. Sedimentary Geology (1) *Objective* Students gain a sound knowledge of the macro and microscopic treatment of common carbonate rocks and siliciclastic sediments and rocks. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Carbonates, VU2 *Content* This course covers the formation, diagenesis and microfacies of carbonate rocks. **Clastics**, VU2 *Content* This course deals with the sedimentation, diagenesis, and petrography of siliciclastic sediments and sedimentary rocks.	4.0 3.5

5.

Module 10. Sedimentary Geology (2) *Objective* Students learn about the formation of marine and terrestrial sediments, and are able to interpret them through the application of sequence stratigraphy. *Requirements* Positive assessment in module 9	**7.5 ECTS credits**

Facies, VO2 *Content* This course explores the environmental imprint of the various conditions and processes of sedimentation. **Sequence stratigraphy**, VO1 *Content* This course provides the basic concepts and applications of sequence stratigraphy in sedimentary geology. **Geoscientific field trip**, EU1 *Content* Students deepen their acquired theoretical basic knowledge in the field.	4.0 2.0 1.0

6.

Module 11. Geographical Information Systems (GIS) *Objective* Students are able to enter, manage and interpret relevant geological data into a geographical information system.	**7.5 ECTS credits**
Introduction to geographical information systems, VU4 *Content* This course provides the basics of GIS as students familiarise themselves with practical geological applications.	7.5

7.

Module 12. Geotechnics *Objective* Students master the basics of soil and rock mechanics.	**7.5 ECTS credits**
Introduction to soil mechanics, VU2 *Content* This course explores the basic principles behind the technological and mechanical properties of soil. **Introduction to rock mechanics**, VU2 *Content* This course explores the basic principles behind the technological and mechanical properties of rocks.	4.0 3.5

8.

Module 13. Geophysics *Objective* Students learn to interpret geophysical information through an understanding of the major geophysical concepts and methods.	**7.5 ECTS credits**
Geophysics, VO3 *Content* This course covers the theory behind the major fields in geophysics (e.g. seismics, gravimetry, geoelectrics, geomagnetics). **Geophysics**, UE1 *Content* Students practice common geophysical working methods in the field.	6.0 1.5

9.

Module 14. Experimental Petrology *Objective* Students become acquainted with the major techniques applied in the field of experimental petrology. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Experimental Petrology, VO3 *Content* This lecture provides a foundation in experimental high-pressure equipment (hydro-thermal system, piston-cylinder apparatus, multianvil apparatus). **Experimental Petrology**, UE1 *Content* Students exercise experimental techniques in this tutorial.	6.0 1.5

10.

Module 15. Theoretical Petrology *Objective* Students acquire a basic knowledge of theoretical petrology. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Basic knowledge of Theoretical Petrology, VO2 *Content* This lecture covers the thermodynamic basics of minerals and geochemical processes. **Geothermobarometry**, VO2 *Content* This lecture looks at the quantification of physico-chemical processes in rocks (e.g. phase equilibria).	4.0 3.5

11.

Module 16. Crystallography *Objective* Students learn to identify and interpret structural data through an understanding of the structure of crystals and materials. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Crystallography, VO3 *Content* Students learn the basics of crystallography and crystal structure analysis. **Crystallography**, UE1 *Content* Students learn to independently conduct simple crystal structure analysis.	6.0 1.5

12.

Module 17. Systematic Mineralogy *Objective* Students learn about the chemical composition, crystal structure and processes of naturally occurring minerals. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Silicates, VO3 *Content* This lecture examines the chemical compositions and crystal structures of the major rock-forming silicates.	6.0
Non-Silicates, VO1 *Content* The lecture examines the chemical compositions and crystal structures of the major rock-forming non-silicates.	1.5

13.

Module 18. Applied Mineralogy *Objective* Students learn about the most important mineral and synthetic raw materials and their formation processes. *Requirements* Positive assessment in module 16 and 17	**7.5 ECTS credits**
Mineral materials and raw materials, VO3 *Content* An introduction to the most important mineral materials and raw materials (natural and synthetic) including their applications.	6.0
Mineral materials and raw materials, UE1 *Content* This tutorial provides a practical understanding (through calculations and field trips) of the synthetic processes, and the technical applications of mineral materials and raw materials.	1.5

14.

Module 19. Material Sciences *Objective* Students learn the technical basics of important solid mineralogical systems.	**7.5 ECTS credits**
Inorganic Materials, VO3 *Content* This course examines the substance groups of inorganic glasses, ceramic materials and binders.	6.0
Inorganic Materials, UE1 *Content* This tutorial provides a deeper understanding of the lecture content through the use of calculation examples and experiments.	1.5

15.

Module 20. Geochronology and Isotope Geochemistry *Objective* Students become skilled in the basics of isotope geochemistry, learning the geological applications of stable and radiogenic isotopes. *Requirements* Positive assessment in module 2, 3 and 4	**7.5 ECTS credits**
Radiogenic Isotopes, VO2 *Content* This course provides common isotope systems used in geological dating and petrology (e.g. K-Ar, Ar-Ar, Rb-Sr, U-Pb, Sm-Nd, fission track). **Stable Isotopes**, VU2 *Content* This course covers the stable isotopes of H, O, C and S and their application in solving geological and environmental issues.	3.5 3.0

16.

Module 21. Analytical Techniques (2) *Objective* Students learn the basic theory and applications of important geoanalytical laboratory methods, including their faults and limitations. *Requirements* Positive assessment in module 2	**7.5 ECTS credits**
Analytical Techniques (2), VO2 *Content* This lecture examines the theoretical basics of selected analytical methods. **Analytical Techniques (2),** UE2 *Content* In this tutorial, students will learn about methods in practice through the examination of case studies.	6.0 1.5

17.

Module 22. Basics of Global Change and Risk Research Learning target Students grasp the basic theoretical and practical concepts of the human-environment relationship, and can apply them to issues of global change and risk research.	**7.5 ECTS credits**

Basics of the Human-Environment Relationship in the Global Change and Risk Research, VO2 *Content* An examination of the different theoretical approaches to the human-environment relationship. Using selected examples, this lecture will demonstrate how these approaches can be implemented in the context of specific issues affecting global change and risk research, including those of gender.	3.5
Aspects of the human-environment relationship, SE2 *Content* In this seminar selected aspects of global change and risk in the human-environment relationship are discussed in-depth and evaluated, both verbally and in writing.	4.0

18.

Module 23. Geography of Mountain Regions Learning target Students gain a direct understanding of the human-environment relations in mountain systems, along with the ability to transfer basic environmental and social principles to different regions.	**7.5 ECTS credits**
Basics of Mountain Region Research, VO2 *Content* This lecture considers both the environmental and cultural elements of mountain research, encompassing environmental processes, climatic characteristics and height variations of vegetation and its uses, as well as height limits, settlement regions and economy, population trends and the cultural characteristics of mountain regions, including internal and external correlations.	3.5
Comparative Geography of Mountain Regions, VO2 *Content* Global mountain regions are compared using selected thematic examples.	4.0

19.

Module 24. Ice and Climate Learning target Students are introduced to the earth's climate system, with particular reference to the cryosphere.	**7.5 ECTS credits**
Physical Glaciology, VO2 *Content* This course looks at the energy and water cycles between atmosphere and cryosphere, the mass balance and movement of glaciers and polar ice sheets (in measurements and models), equilibrium quantities and their response to climate change, and basic hydro-meteorological models of basins.	3.5
Physical Climatology, VO2 *Content* An introduction to the climatic regions of the earth, atmospheric circulation, hydrosphere and cryosphere, the ocean, biochemical cycles, aerosols, volcanoes and	4.0

climate, energy balance, the greenhouse effect, and the role of the sun as an energy source.	

20.

Module 25. Extended Gender Aspects Learning target Students are familiar with the current approaches in gender-issue research and are able to apply them in regards to sustainability, in anthropological as well as natural scientific disciplines and in the field.	**7.5 ECTS credits**
Gender Issues in Spatial Planning, VO2 *Content* This course covers current and developing approaches to gender research. The focus will be on theoretical planning issues, in particular on gender implications of urban, regional, technical, and above all environmental planning. Additionally, feminist ethics are considered in relation to spatial planning.	4.0
Gender Issues in Regional Development and Planning, UE2 *Content* This course examines selected aspects of gender research, particularly in relation to regional and urban development, as well as ecological and environmental planning. Additionally, the results of natural scientific feminist and gender research are considered in relation to spatial planning.	3.5

§ 6 Elective Modules

Part of the academic requirement of the Master's Programme in Geosciences must comprise eight elective modules. This part of the academic requirement consists of

(1) seven interrelated modules for specialisation, which must be chosen from the fields of
   a. geology (modules 6, 7, 8, 9, 10, 11 and 13)
   b. mineralogy and petrology (modules 14, 15, 16, 17, 18, 20 und 21) and

(2) one module
   a. from modules 12 or 19
      or
   b. from modules 22 or 23 from the Master's Programme in Geography: Global Change - Regional Sustainability
      or
   c. module 24 from the Master's Programme in Atmospheric Sciences
      or
   d. from module 25

§ 7 Master's Thesis

A Master's Thesis corresponding to 20 ECTS-Credits must be written.The master's thesis is a scientific work which serves as proof of the students' ability to work independently on a topic from a specialised geoscientific field. The topic must be chosen in prior agreement with the course tutor.

§ 8 Participation Restrictions

For courses (tutorial, lecture/tutorial, field trip/tutorial and seminar) with a limited number of participating students, selection is determined as follows:

(1) Students are preferred if non-inclusion would prolong the duration of their studies.

(2) If criterion (1) is insufficient to regulate the admission to a course, students for whom the course is part of a mandatory module are preferred to students for whom the course is part of an elective module.

If criteria (1) and (2) are insufficient to regulate the admission to a course, the existing places will be decided by lot.

§ 9 Examination regulations

(1) The performance evaluation of a module is determined by course examinations.

(2) Courses of the type VO (lecture) are subject to a written examination. In seminars, the success of the seminar paper, an oral presentation and class participation will be evaluated. For all other evaluative courses the tutor will determine the examination method at the beginning of the course.

(3) The master's thesis must be defended to a examining committee. The Master's Thesis Defense comprises a presentation of the main findings of the master's thesis, a public discussion and the cross-examination of the committee members.

(4) If modules/courses from other Master studies are held in the Faculty of Earth and Atmospheric Sciences or in other faculties, the corresponding examination regulation is valid. This applies to modules 22, 23 and 25 from the Master's Programme in Geography: Global Change - Regional Sustainability of the Faculty of Earth and Atmospheric Sciences and module 24 from the Master's Programme Atmospheric Sciences of the Faculty of Earth and Atmospheric Sciences.

(5) The compulsory module "Preparation of the Master's Thesis" is evaluated by the supervisor of the Master's Thesis based on an abstract. Positive evaluation reads "participated with success", negative evaluation "participated without success".

§ 10 Academic degree

The graduates of the Master's Programme Geosciences are awarded the academic degree of "Master of Science ", abbreviated as "MSc".

§ 11 Assignment of the programme

The Master's Programme Geosciences is assigned to the natural scientific studies.

§ 12 Coming into force

(1) The curriculum comes into force on October 1st, 2007.

(2) The changes of the curriculum acc. to the version of the University of Innsbruck Bulletin of 28 June 2019, Issue 66, No. 583 come into effect on 1 October 2019 and are to be applied to all students.

Annex 1: Recognition of examinations

Positive examination results from the Geosciences diploma at the University of Innsbruck (curriculum published in the Bulletin on April 3rd in 2003) are recognised as equivalent for the Master's Programme in Geosciences in accordance with § 78, paragraph (1), University Act 2002.

Master's Programme in Geosciences			**Diploma Studies in Geosciences Curriculum of April 3rd in 2003**	
Module 1: Regional Geology (2)				
Geology of Tyrol	VO 1		Geology of Tyrol	VO 2
Extra-Alpine Geology	VO 1		Geology of extra-alpine Europe	VO 1
Geoscientific field trip	EU2		Geological-palentological field trip	EB2
Module 2: Analytical Techniques (1)				
Analytical Techniques (1)	VO 2		Mineralogical-petrological working methods	UE9
Analytical Techniques (1)	UE2			
Module 3: Tectonics				
Plate tectonics	VO 2		Structural Geology	VO 2
Microstructure	VU 2		Tutorials for Structural Geology	UE2
Module 4: Metamorphic & Magmatic Rocks				
Magmatic Rocks	VO 2		Petrology of Magmatic Rocks	VO 3
Metamorphic rocks	VO 2		Petrology of Metamorphic Rocks	VO 3
Geoscientific field trip	EX1		Mineralogical-petrological field trip	EB1
Module 6: Applied Geology (2)				
Hydrogeology (2)	VO 1		From the elective course Geological Engineering and Hydrogeology	VU 5
Hydrogeology (2)	UE1			
Geological Engineering (2)	VO 2			
Geological Engineering (2)	EU1			
Module 7: Palaeontology				
Biostratigraphy	VU 2		Biostratigraphy and Index Fossils	VO 2
Micropalaeontology	VU 2		Tutorials for Biostratigraphy and Index Fossils	UE2
Module 8: Quaternary Geology				
Quaternary Geology & Palaeoclimatology	VO 2		From the elective course Quaternary Geology	VU 4
Quaternary Tutorial	VU 2			
Module 9: Sedimentary Geology (1)				
Carbonates	VU 2		Introduction to Sedimentology I (Carbonates)	VO 1
			Sedimentological Tutorials I (Carbonates)	UE1
Clastics	VU 2		Introduction to Sedimentology II (Clastics)	VO 1
			Sedimentological Tutorials II (Clastics)	UE1

Module 14: Experimental Petrology				
Experimental Petrology	VO 3		Experimental Petrology	VO 1
Experimental Petrology	UE1		Tutorials for Experimental Petrology	UE2
Module 15: Theoretical Petrology				
Basic knowledge of Theoretical Petrology	VO 2		Theoretical Petrology	VO 1
Geothermobarometry	VO 2		Tutorials for Theoretical Petrology	UE2
Module 16: Crystallography				
Crystallography	VO 3		From the elective course Applied Mineralogy and Material Sciences	VU 4
Crystallography	UE1			
Module 17: Systematic Mineralogy				
Silicates	VO 3		Silicates	VO 2
Non-Silicates	VO 1		Non-Silicates	VO 1
Module 10: Sedimentary Geology (2)				
Facies	VO 2		Facies	VO 2
Sequence stratigraphy	VO 1		Tutorials for Facies	UE2
Geoscientific field trip	EX1		Geological-palentological field trip	EB1
Module 11: GIS				
GIS for geologists	VU 4		From the elective course Geological Engineering and Hydrogeology	VU 4
Module 18: Applied Mineralogy				
Mineral raw materials and materials	VO 3		Inorganic Materials	VO 2
Mineral raw materials and materials	UE1		From the elective course Applied Mineralogy and Material Sciences	UE2
Module 13: Geophysics				
Geophysics	VO 3		Geophysical working methods	VO 2
Geophysics	UE1		Tutorials for Geophysics	UE2
Module 21: Analytical Techniques (2)				
Analytical Techniques (2)	VO 2		From the elective course Petrology and Crystallization (Geology)	UE4
Analytical Techniques (2)	UE2			

Annex 2: Recommended course sequence