



Guidelines for the Specialized Master of Science (MSc) in Geography

1 Why study for a Specialized Master's degree?

Are you looking for in a Master's degree programme that provides you with:

- an in-depth scientific, research-oriented education;
- a broad range of skills to carry out independent scientific work;
- close mentoring throughout your studies;
- the chance to work with a group of internationally recognized scholars;
- a group of student peers who are equally ambitious;
- the opportunity to develop your own research ideas and to implement them in a comprehensive Master's thesis,
- an internationally recognized degree?

Are you interested in specializing in one of the following subject areas:

- Geographic Information Science (GIScience)
- Geographies of Global Change: Resources, Markets and Development
- Physical Geography
 - a: Glaciology & Geomorphodynamics
 - b: Hydrology & Climate
 - c: Soil Science & Biogeochemistry
 - d: Geochronology
- Remote Sensing

Then, our Specialized Master's degree in Geography is the right choice for your studies! The degree programme is suitable for students who wish to undertake scientific research as part of a higher degree and who wish to continue for PhD or to work at a research institution after their studies (Figure 1). Furthermore, it provides an entry point for students with a non-geographical background to continue on from their Bachelor's Degree with a Master of Science in Geography. The Master's program prepares students to find exciting and challenging positions in companies, academia, government, NGOs and international organizations.

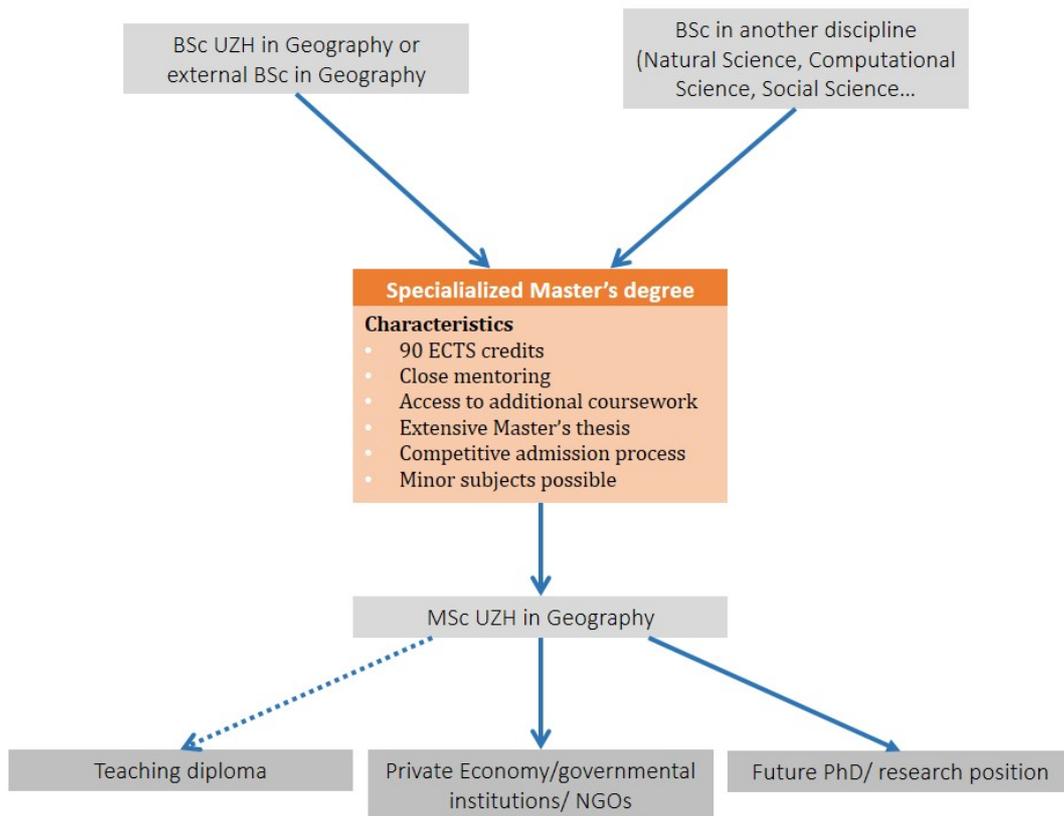


Figure 1: The entrance requirements, characteristics and career opportunities of the Specialized Master's program. The continuous lines show an optimal development while the dashed line shows a possible development.

The Department of Geography offers two Master's degrees in Geography: a *consecutive* Master's degree and the *specialized* Master's degree. If you are not sure about the right choice, please consult the student advisory services at: administration_spezmaster@geo.uzh.ch



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2 Overview

2.1 Study programmes

The Specialized Master's degree has four independent study programs. The degree awarded depends on the chosen study program:

"Master of Science UZH in Geography – Geographic Information Science (GIScience)"

"Master of Science UZH in Geography – Geographies of Global Change: Resources, Markets and Development"

"Master of Science UZH in Geography – Physical Geography (a, b, c or d)"

where: a: Glaciology & Geomorphodynamics

b: Hydrology & Climate

c: Soil Science & Biogeochemistry

d: Geochronology

"Master of Science UZH in Geography – Remote Sensing"

Each of the four study programs have individual curricula and expectations which are detailed in sections 3 to 6. Information on admissions for all four study programs is provided in section 7.

The title Master of Science UZH in Geography is awarded when all the modules of the Master's agreement are successfully completed.

The Bachelor of Science UZH in Geography followed by the Specialized Master's program qualifies a candidate for admission to the teaching diploma in Geography at the University of Zurich (other BSc's need to be approved and may be associated with further required courses).

2.2 Standard period of study

The Master's degree runs over 3 semesters, with a maximum study period of 6 semesters. If a student is not able to complete his/ her studies by the end of this period, they are excluded from graduating at the Faculty of Science UZH (= University of Zurich). A longer period of study *may* be granted in justified cases. A change from the Specialized Master's program to the Consecutive Master's program or vice versa is not generally allowed. Exceptions may be made individually, based



on a written request to the Head of Teaching, Department of Geography (head.teaching@geo.uzh.ch).

2.3 Language

The general language of the study program is English. Some courses, mainly elective modules, are held in German. In the chapters 3.2.2 (GIScience), 4.2.2 (Geographies of Global Change), 5.2.2 (Physical Geography), 6.2.2 (Remote Sensing) the course language of the core elective modules is listed.

2.4 Minor subject

A Minor subject of an additional 30 ECTS credits (ECTS = European Credit Transfer System) may be chosen during your Specialized Master's studies. In this case, students must earn a total of 120 ECTS credits in order to obtain their Master's degree. Consequently, the standard period for the Master's program is 4 semesters, with a maximum period of study of 8 semesters. Minor subjects outside the MNF and ETH are usually only possible if the corresponding minor subject has already been studied during a Bachelor's degree at the University of Zurich.



3 GIScience

3.1 Study description

Increasing urbanization and mobility, multiple social networks and health data, accelerating climate change and natural disasters; all bring with them fundamental research challenges and ever increasing volumes of spatial data.

Geographic Information Science (GIScience for short) is at the core of research on theories, methods and tools to analyse and understand events, patterns and processes occurring in space and time.

By studying GIScience you will learn the fundamental properties of (geographic) space; how to model space; how to analyse spatial and temporal processes and relationships; how to deal with spatial data; and how to measure and interpret spatial behaviour.

After finishing your degree, you will be an expert in spatial data handling and analysis, data visualization, and geocomputation. You will be able to find exciting, challenging positions in academia, industry, and government.

3.2 Study structure

3.2.1 Overview

The Specialized Master's program with focus on GIScience comprises 90 ECTS credits and is structured into compulsory, core elective and elective modules. The detailed subdivision of the 90 ECTS credits is shown in Table 1.

Table 1: Study structure for the Specialized Master in Geography with focus on GIScience.

	ECTS credits
Compulsory modules	57
Core elective modules	18
Elective Modules	15
Total	90



3.2.2 Compulsory Modules

Compulsory modules are mandatory for all students. Students of the Specialized Master’s program with focus on GIScience must complete a Master’s thesis which accounts for 45 ECTS credits (Table 2). Additionally, students with the focus on GIScience must complete modules GEO 661 and GEO 662 which are exclusive to student of the specialised Masters in GIScience and give opportunities for detailed discussions on research with your peers and teaching staff, as well as applied project work (Table 2).

Table 2: Compulsory modules for the Specialized Master in Geography with focus on GIScience.

Compulsory module	The module consists of:	ECTS credits
GEO 661 Fundamental Challenges in GIScience		6
GEO 662 Project Planning, Execution and Management		6
GEO 620 Master’s thesis	<ul style="list-style-type: none"> • Master’s thesis • Master’s exam 	45

Master’s thesis

The Master’s thesis contains all the main features of a scientific work and is conducted independently by a student under the supervision of an experienced scientist. The amount of time spent on a Master’s thesis corresponds to 45 ECTS credits (9 months full time work). At the beginning of the Master’s thesis, the title and the draft concept must be added to the Specialized Master’s program agreement form and accepted by the mentor. The submission deadline is, at the latest, 12 months after the starting date. Late submission means automatic failure. The Master’s thesis is graded and passed if a minimum grade of 4.0 is achieved.

Master’s exam

The Master’s exam takes place shortly after submission of the Master’s thesis. It consists of a colloquium presentation and question and answer round of a maximum duration of one hour. The student is tested not only on his/her knowledge of the subject matter of the Master’s thesis, but also as to whether they can position the thesis in the context of research in GIScience more generally.

The Master’s exam is passed when a grade of at least a 4.0 is given for the Master’s presentation and disputation. A failed Master’s exam can be repeated once. If the repetition is also insufficient, a Master's degree at the Faculty of Science UZH will be



not granted. The Master's exam counts as 10% of the final grade for the Master's thesis (Geo 620).

3.2.3 Core Elective Modules

Students of the Specialized Master's program in GIScience have to complete core elective modules of 18 ECTS credits. A core elective module is a module which must be chosen from the "Major list" of the Consecutive Master's (Table 3). However, the choice of the modules depends on the planned individual research project and should be agreed between the student and mentor.

Table 3: List of the core elective modules for the Specialized Master in Geography with focus on GIScience. The table shows the name, the subdivisions of the module, the course language, the amount of ECTS credits and the term when the module is offered.

Term	Core elective module	The module consists of:	Course language	ECTS credits
Fall	GEO 871 Retrieving Geographic Information	GEO 871.1 Retrieving Geographic Information	English	3
Fall	GEO 872 Advanced Spatial Analysis I	GEO 872.1 Advanced Spatial Analysis I	English	3
Fall	GEO 873 Cognitive Issues in GIScience	GEO 873.1 Cognitive Issues in GIScience	English	3
Fall	GEO 874 Introduction to Databases	GEO 874.1 Introduction to Databases GEO 874.2 Introduction to Databases, Exercises	English	3
Fall	GEO 875 Spatial Databases	GEO 875.1 Spatial Databases GEO 875.2 Spatial Databases, Exercises	English	3
Spring	GEO 876 Introduction to Programming for Spatial Problems	GEO 876.1 Introduction to Programming for Spatial Problems	English	3
Spring	GEO 877 Spatial Algorithms	GEO 877.1 Spatial Algorithms	English	3
Spring	GEO 878 Geovisualization	GEO 878.1 Geovisualization	English	3
Fall	GEO 879 3D Geovisualization	GEO 879.1 3D Geovisualization	English	3



Spring	GEO 880 Computational Movement Analysis	GEO 880.1 Computational Movement Analysis	English	3
Spring	GEO 881 Advanced Spatial Analysis II	GEO 881.1 Advanced Spatial Analysis II	English	3
Fall	GEO 883 Interactive Information Visualization	GEO 883.1 Interactive Information Visualization	English	3
Spring	GEO 878 Location-based Services	GEO 884.1 Location-based Services	English	3

3.2.4 Elective Modules

In total, elective modules of 15 ECTS credits must be completed. The elective modules can be chosen from courses offered by the University of Zurich, ETH and even of other Swiss universities. As for core elective modules, the choice of the elective modules depends on the planned individual research project and should be agreed between the student and mentor.

3.3 Mentoring

A core element of the degree is mentoring. Students of the Specialized Master's degree are assigned a mentor, who in some cases will also be the supervisor of the Master's thesis. The mentor will advise the mentee on all aspects of study, including choosing appropriate courses from the offerings of the programme as well as additional courses from the Master's offerings at the University of Zurich, ETH Zurich, or other Swiss universities.



4 Geographies of Global Change

4.1 Study description

In the wake of current global challenges, north-south relations are being fundamentally reconfigured and the question of what exactly “development” means is subject to intense public debate. This new Master’s program in Human Geography offers students the chance to engage with the complexities and entanglements of our globalized world, and to explore alternative future possibilities for international development in theory and practice. Combining cutting-edge thinking from development studies, political economy, cultural studies and postcolonial studies, we will help you to come to terms with the multiple connections (and disconnections) between countries of the Global North and Global South. A key aim of the Master’s program is to encourage students to go beyond familiar “Northern” concepts and categories when thinking about the Global South. In line with our departmental guiding theme, “one earth, many worlds” we encourage you to approach our mobile world from a perspective that acknowledges that seemingly global processes assume manifold forms, giving rise to diverse economies, variegated governance and livelihood practices. “Geographies of Global Change: Markets, Resources and Development” is delivered through small group teaching and leading scholars from the human geography groups in the Department. Each Student will choose a senior member of staff as mentor who will advise and guide her/him throughout the course.

Join this Master’s program to:

- acquire in-depth knowledge of development practices and experiences in key locations of the Global North and South
- critically assess the strengths and weaknesses of different theoretical perspectives in studying the social, political and economic realities in the Global South
- develop your own independent research project, thereby acquiring crucial academic and practical skills.

4.2 Study structure

4.2.1 Overview

The Specialized Master’s program with focus on Geographies of Global Change comprises 90 ECTS credits and is structured into compulsory, core elective and elective modules. The detailed subdivision of the 90 ECTS credits is shown in Table 4.



Table 4: Study structure for the Specialized Master in Geography with focus on Geographies of Global Change.

	ECTS credits
Compulsory modules	57
Core elective modules	18
Elective Modules	15
Total	90

4.2.2 Compulsory Modules

Compulsory modules are mandatory for all students. Students of the Specialized Master’s program with focus on Geographies of Global Change must complete a Master’s thesis which accounts for 45 ECTS credits (Table 5). Additionally, students with focus on Geographies of Global Change must complete the modules GEO 681 and GEO 682 which are exclusive to student of the specialised Masters in Geographies of Global Change (Table 5).

Table 5: Compulsory modules for the Specialized Master in Geography with focus on Geographies of Global Change.

Compulsory module	The module consists of:	ECTS credits
GEO 681 Designing and Communicating Research		6
GEO 682 Geographies of Global Change: Resources, Markets and Development		6
GEO 620 Master’s thesis	<ul style="list-style-type: none"> • Master’s thesis • Master’s exam • Research seminar 	30

Master’s thesis

The Master’s thesis contains all the main features of a scientific work and is conducted independently by a student under the supervision of an experienced scientist. The amount of time spent on a Master’s thesis corresponds to 30 ECTS credits (6 months full time work). At the beginning of the Master’s thesis, the title and the draft concept must be added to the Specialized Master’s program agreement form and accepted by the mentor. The submission deadline is, at the latest, 12 months after the starting date. Late submission means automatic failure. The Master’s thesis is graded and passed if a minimum grade of 4.0 is achieved.



Master's exam

The Master's exam takes place shortly after submission of the Master's thesis. It consists of a colloquium presentation and question and answer round of a maximum duration of one hour. The student is tested not only on his/her knowledge of the subject matter of the Master's thesis, but also as to whether they can position the thesis in the context of research in Human Geography more generally.

The Master's exam is passed when a grade of at least a 4.0 is given for the Master's presentation and disputation. A failed Master's exam can be repeated once. If the repetition is also insufficient, a Master's degree at the Faculty of Science UZH will be not granted. The Master's exam counts as 10% of the final grade for the Master's thesis (Geo 620).

Research seminar

Research seminars mainly take place during lecture periods. The participation in the research seminar of the respective group(s) is compulsory, in accordance with the individual study plan and the mentor. It is expected that the participation includes regular attendance as well as an individual presentation.

4.2.3 Core Elective Modules

Students of the Specialized Master's program in Geographies of Global Change have to complete core elective modules of 33 ECTS credits. A core elective module is a module which must be chosen from the "Major list" of the Consecutive Master's (Table 6). However, the choice of the modules depends on the planned individual research project and should be agreed between the student and mentor.

Table 6: List of the core elective modules for the Specialized Master in Geography with focus on Geographies of Global Change. The table shows the name, the subdivisions of the module, the course language, the amount of ECTS credits and the term when the module is offered.

Term	Core elective module	The module consists of:	Course language	ECTS credits
Fall	GEO 421 Development Geography	GEO 421.1 Development Geography	English	6
Spring	GEO 422 Qualitative Methodologies and Methods in Human Geography	GEO 422.1 Qualitative Methodologies and Methods in Human Geography GEO422.2 Conducting research in human geography	English	6



Spring	GEO 423 Political Geography	GEO 423.1 Political Geography	English	6
Fall	GEO 425 Political Ecology	GEO 425.1 Political Ecology	English	6
Fall	GEO 431 Regional and urban development	GEO431.1 Kunst, Kultur und Kreativität in der Stadt des 21. Jahrhunderts GEO431.2 Regional Environmental Governance	English / German	6
Fall	GEO 432 Work, Gender and Space	GEO 432.1 Work, Gender and Space: Inequality in a neoliberal city GEO 432.2 Work, Gender and Space: Application to Zurich	English	6
Spring	GEO 433 Global Economic Geographies of Agriculture and Food Systems	GEO 433.1 Global Economic Geographies of Agriculture and Food Systems	English	6

4.2.4 Elective Modules

In total, elective modules of 15 ECTS credits must be completed. The elective modules can be chosen from courses offered by the University of Zurich, ETH and even of other Swiss universities. As for core elective modules, the choice of the elective modules depends on the planned individual research project and should be agreed between the student and mentor.

4.3 Mentoring

A core element of the degree is mentoring. Students of the Specialized Master's degree are assigned a mentor, who in some cases will also be the supervisor of the Master's thesis. The mentor will advise the mentee on all aspects of study, including choosing appropriate courses from the offerings of the programme as well as additional courses from the Master's offerings at the University of Zurich, ETH Zurich, or other Swiss universities.



5 Physical Geography

5.1 Study description

Global changes currently modify many aspects of terrestrial physical systems. From the carbon cycle to the water cycle, from glaciers to archives of the past, these changes are studied from different research perspectives in the Department of Geography. In addition to our internationally recognized scientific expertise, the Department offers the opportunity to specialize in one subject area of Physical Geography by following an individually tailored study program including a Master’s thesis of 60 ECTS credits. Currently this possibility is offered for:

- Glaciology & Geomorphodynamics
- Hydrology & Climate
- Soil Science & Biogeochemistry
- Geochronology

These Specialized Master's programs have a clear research focus and prepare students for a PhD at a university or for scientific work in research institutions or governmental agencies.

5.2 Study structure

5.2.1 Overview

The Specialized Master’s program with focus on Physical Geography comprises 90 ECTS credits and is structured into compulsory, core elective and elective modules. The detailed subdivision of the 90 ECTS credits is shown in Table 7.

Table 7: Study structure for the Specialized Master in Geography with focus on Physical Geography.

	ECTS credits
Compulsory modules	60
Core elective modules	12
Elective Modules	18
Total	90

5.2.2 Compulsory Modules

Compulsory modules are mandatory for all students. Students of the Specialized Master’s program with focus on Physical Geography must complete a Master’s thesis



(including a Master’s exam and the research seminar) which accounts for 60 ECTS credits (Table 8).

Table 8: Compulsory modules for the Specialized Master in Geography with focus on Physical Geography.

Compulsory module	The module consists of:	ECTS credits
GEO 610 Master’s thesis	<ul style="list-style-type: none"> • Master’s thesis • Master’s exam • Research seminar 	60

Master’s thesis

The Master’s thesis contains all the main features of a scientific work and is conducted independently by a student under the supervision of an experienced scientist. The amount of time spent on a Master’s thesis corresponds to 60 ECTS credits (12 months full time work). At the beginning of the Master’s thesis, the title and the draft concept must be added to the Specialized Master’s program agreement form and accepted by the mentor. The submission deadline is, at the latest, 18 months after the starting date. The prerequisite for an elongation of the submission deadline of the Master’s thesis from 12 to 18 months, is the visit of university courses. Late submission means automatic failure. The Master’s thesis is graded and passed if a minimum grade of 4.0 is achieved.

Master’s exam

The Master’s exam takes place shortly after submission of the Master’s thesis. It consists of a colloquium presentation and question and answer round of a maximum duration of one hour. The student is tested not only on his/her knowledge of the subject matter of the Master’s thesis, but also as to whether they can position the thesis in the context of research in Physical Geography more generally.

The Master’s exam is passed when a grade of at least a 4.0 is given for the Master’s presentation and disputation. A failed Master’s exam can be repeated once. If the repetition is also insufficient, a Master's degree at the Faculty of Science UZH will be not granted. The Master’s exam counts as 10% of the final grade for the Master’s thesis (Geo 610).

Research seminar

Research seminars mainly take place during lecture periods. The participation in the research seminar of the respective group(s) is compulsory, in accordance with the individual study plan and the mentor. It is expected that the participation includes regular attendance as well as an individual presentation.

5.2.3 Core Elective Modules

Students of the Specialized Master’s program in Physical Geography have to complete core elective modules of 12 ECTS credits. A core elective module is a module which must be chosen from the “Major list” of the Consecutive Master’s (Table 9). However, the choice of the modules depends on planned individual research project (i.e. the topic of the Master’s thesis) and has to be agreed between the student and mentor.

Table 9: List of the core elective modules for the Specialized Master in Geography with focus on Physical Geography. The table shows the name, the subdivisions of the module, the course language, the amount of ECTS credits and the term when the module is offered.

Term	Core elective module	The module consists of:	Course language	ECTS credits
Spring	GEO 411 Field studies on high mountain processes	GEO 411.1 Field studies on high mountain processes: Preparatory seminar GEO 411.2 Field studies on high mountain processes: Field course	English	6
Spring	GEO 412 Soil Science III: Practical Project	GEO 412.1 Introduction to the field and laboratory practical project GEO 412.2 Field and laboratory practical project (block course)	English	6
Fall / Spring	GEO 413 Quantification and modelling of the Cryosphere	GEO 413.1 Quantification and modelling of the Cryosphere: dynamic processes GEO 413.2 Quantification and modelling of the Cryosphere: spatial and thermal processes	English	6
Spring	GEO 415 Cryosphere	GEO 415.1 The high-mountain cryosphere: processes and risks GEO 415.2 Snow and Avalanches: Processes and Risk Management	English	6



Fall / Spring	GEO 417 Environmental archives and age determination	<p>GEO 417.1 Laboratory course in geochronology</p> <p>GEO 417.2 Tree rings - a high-resolution environmental archive: applications</p> <p>GEO 417.3 Field course geochronology: practical applications of dendrochronology and relative and numerical dating (block course)</p>	English	6
Fall / Spring	GEO 418 Atmosphere und Climate	<p>Two of four ETH courses must be chosen:</p> <p>GEO 418.2 Land-Climate Interactions</p> <p>GEO 418.3 Radiation and climate change</p> <p>GEO 418.4 Climate change uncertainty and Risk</p> <p>GEO 418.5 Cloud Dynamics</p>	English	6
Spring	GEO 419 Soil Science II: Seminar plant-soil systems in a changing world	<p>GEO 419.1 The biogeochemistry of plant- soil systems in a changing world</p> <p>GEO 820.1 Isotope application in geographical research</p>	English	6
Fall	GEO 463 Soil Science I: Current challenges in soil science	<p>GEO 463.1 Soil Science I: Current challenges in soil science</p>	English	6
Spring	GEO 471 Hydrological field measurements and calculations	<p>GEO 471.1 Hydrological field measurements and calculations</p>	English	6
Fall	GEO 475 Hydrological Modelling and Programming	<p>GEO 475.1 Hydrological Modelling</p> <p>GEO 475.2 Exercises Hydrological Modelling</p>	English	6

5.2.4 Elective Modules

In total, elective modules of 18 ECTS credits must be completed. The elective modules can be chosen from courses offered by University of Zurich, ETH and even of other Swiss universities. As for core elective modules, which modules are included in the individual study program depends on the planned individual research project and should be agreed between the student and mentor.

Table 10: List of the elective modules offered by the department of Physical Geography. The table shows the name, the subdivisions of the module, the course language, the amount of ECTS credits and the term when the module is offered.

Term	Elective module	The module consists of:	Course language	ECTS credits
Fall	GEO 805 Natural hazards and mountain risk assessment	GEO 805.1 Natural hazards and mountain risk assessment (block course)	English	3
Fall	GEO 815 Quantification and modelling of the Cryosphere: dynamic processes	GEO 413.1 Quantification and modelling of the Cryosphere: dynamic processes	English	3
Fall / Spring	GEO 818 Dendro-Ecology	GEO 818.1 Dendro-Ecology GEO 818.2 Praktikum Tree-Ring Ecophysiological Research	English / German	6
Spring	GEO 819 The biogeochemistry of plant- soil systems in a changing world	GEO 819.1 The biogeochemistry of plant-soil systems in a changing world	English	4
Spring	GEO 820 Stable isotopes in ecology and soil science	GEO 820.1 Isotope application in geographical research	English	2
Fall	GEO 851 Glacier Mass Balance Measurements and Analysis – from local observations to global assessments	GEO 851.1 Glacier Mass Balance Measurements and Analysis – from local observations to global assessments GEO 851.2 Fieldtrip	English	3
Spring	GEO 862 Cold region hydrology	GEO 862.1 Cold region hydrology GEO 862.2 Feedback	English	4



5.3 Mentoring and individual study plan

A core element of the degree is the close mentoring. Students of the Specialized Master's degree are assigned a mentor, who in most cases will also be the supervisor of the Master's thesis. The mentor discusses with the student about their individual study plan, including the chosen core elective and elective modules. The individual study plan is part of the Specialized Master's program agreement form and must be accepted by the mentor. It is mandatory to do so before beginning the Master's study. Changes of the individual study plan are only possible with a written approval by the mentor.



6 Remote Sensing

6.1 Study description

Remote sensing is the science of deriving information about the Earth's spheres through the capture, processing and analysis of electromagnetic radiation of different wavelengths. Remote sensing is integral to a wide range of applications including: global climate change, ecology and conservation, deforestation, fire mapping, earthquakes, volcanology, pollution, oceanography, resource management, food security and humanitarian applications.

The remote sensing activities at the Department of Geography of the University of Zurich combine Europe's leading groups by advancing our understanding of the Earth functioning using remote sensing methods. The Specialized Master's program in Remote Sensing is integrated into the Department's modular MSc structure, such that students benefit from interaction with students in Geographic Information Science, Earth System Science, Glaciology, Hydrology and Soil Science, among other disciplines, as well as a wide choice of modules. The course draws on highly committed research staff who are world-class experts in spectroscopy, laser- and radar remote sensing, as well as multimodal remote sensing.

The Specialized Master in Remote Sensing attracts students from a wide range of disciplines helping to understand the role remote sensing plays in understanding the environment. It attracts not only those with a background in environmental sciences but also those with a background in the fundamental natural sciences (e.g., physics, mathematics, biology, computing) who wish to exploit their skills in an Earth system context. The Specialized Master will support individuals interested in developing key scientific skills as well as vocational competences allowing them to work in remote sensing related positions in research institutions, as well as public and private sectors. This highly interdisciplinary Master's program develops methodological, analytical and computational competencies needed to analyse Earth observation data. The program has a clear research focus, which is particular suitable for those planning a scientific career (e.g., continue with a PhD).

6.2 Study structure

6.2.1 Overview

The Specialized Master's program with focus on Remote Sensing comprises 90 ECTS credits and is structured into compulsory, core elective and elective modules. The detailed subdivision of the 90 ECTS credits is shown in Table 11.

Table 11: Study structure for the Specialized Master in Geography with focus on Remote Sensing.

	ECTS credits
Compulsory modules	60
Core elective modules	12
Elective Modules	18
Total	90

6.2.2 Compulsory Modules

Compulsory modules are mandatory for all students. For the Specialized Master's degree in Geography with focus on Remote Sensing only the Master's thesis (including a Master's exam and the research seminar) are compulsory (Table 12). Students of the Specialized Master's program with this focus have to complete a Master's thesis which accounts for 60 ECTS credits.

Table 12: Compulsory modules for the Specialized Master in Geography with focus on Remote Sensing.

Compulsory module	The module consists of:	ECTS credits
GEO 610 Master's thesis	<ul style="list-style-type: none"> • Master's thesis • Master's exam • Research seminar 	60

Master's thesis

The Master's thesis contains all the main features of a scientific work and is conducted independently by a student under the supervision of an experienced scientist. The amount of time spent on a Master's thesis corresponds to 60 ECTS credits (12 months full time work). At the beginning of the Master's thesis, the title and the draft concept must be added to the Specialized Master's program agreement form and accepted by the mentor. The submission deadline is, at the latest, 18 months after the starting date. The prerequisite for an elongation of the submission deadline of the Master's thesis from 12 to 18 months, is the visit of university courses. Late submission means automatic failure. The Master's thesis is graded and passed if a minimum grade of 4.0 is achieved.



Master's exam

The Master's exam takes place shortly after submission of the Master's thesis. It consists of a colloquium presentation and question and answer round of a maximum duration of one hour. The student is tested not only on his/her knowledge of the subject matter of the Master's thesis, but also as to whether they can position the thesis in the context of research in Remote Sensing more generally.

The Master's exam is passed when a grade of at least a 4.0 is given for the Master's presentation and disputation. A failed Master's exam can be repeated once. If the repetition is also insufficient, a Master's degree at the Faculty of Science UZH will be not granted. The Master's exam counts as 10% of the final grade for the Master's thesis (Geo 610).

Research seminar

Research seminars mainly take place during lecture periods. The participation in the research seminar of the respective group(s) is compulsory, in accordance with the individual study plan and the mentor. It is expected that the participation includes regular attendance as well as an individual presentation.

6.2.3 Core Elective Modules

Students of the Specialized Master's program in Remote Sensing have to complete core elective modules of 12 ECTS credits. A core elective module is a module which must be chosen from the "Major list" of the Consecutive Master's (Table 13). However, the choice of the modules depends on planned individual research project (i.e. the topic of the Master's thesis) and has to be agreed between the student and mentor.

Table 13: List of the core elective modules for the Specialized Master in Geography with focus on Remote Sensing. The table shows the name, the subdivisions of the module, the course language, the amount of ECTS credits and the term when the module is offered.

Term	Core elective module	The module consists of:	Course language	ECTS credits
Spring	GEO 441 Remote Sensing A: Seminar & Colloquium	GEO 441.1 Colloquium in Remote Sensing GEO 441.2 Remote Sensing Seminar	English	6
Fall	GEO 442 Remote Sensing B: Spectroscopy of the Earth System	GEO 442.1 Spectroscopy of the Earth System GEO 442.2 Spectroscopy of the Earth System, Exercises	English	6



Fall	GEO 443 Remote Sensing C: SAR und LIDAR	GEO 443.1 SAR and LIDAR GEO 443.2 SAR and LIDAR Exercises	English	6
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6.2.4 Elective Modules

In total, elective modules of 18 ECTS credits must be completed. The elective modules can be chosen from courses offered by the University of Zurich, ETH and even of other Swiss universities. As for core elective modules, which modules are included in the individual study program depends on the planned individual research project and should be agreed between the student and mentor.

6.3 Mentoring and individual study plan

A core element of the degree is the close mentoring. Students of the Specialized Master's degree are assigned a mentor, who in most cases will also be the supervisor of the Master's thesis. The mentor discusses with the student about their individual study plan, including the chosen core elective and elective modules. The individual study plan is part of the Specialized Master's program agreement form and must be accepted by the mentor. It is mandatory to do so before beginning the Master's study. Changes of the individual study plan are only possible with a written approval by the mentor.



7 Admission

7.1 Admission criteria

The following criteria will be applied in the selection process:

- formal eligibility to study a Master's degree at the Faculty of Science,
- above average marks in a relevant Bachelor degree in Geography or equivalent, depending on the chosen study program.

For applicants who are in their Bachelor studies in the year of application a 'conditional acceptance' is possible. This means that the applicant is accepted on the condition that he/she completes successfully his/her Bachelor's studies until the begin of the Master's studies.

Some study programs have also specified details about required course work necessary to be admitted to the study program. These detailed admission criteria are listed in an Appendix to this document. Any required coursework should be completed during the BSc degree or as part of additional education. Missing competencies (before the beginning of the MSc) may be obtained during the study program as additional required coursework. However, this coursework should be limited to 30 ECTS credits (and must not exceed 60 ECTS credits). If required coursework exceeds this limit, admission to the Specialized Master's program will not be granted.

7.2 Procedure

Prospective students should submit an application package containing the following items: CV, study transcripts, a motivation letter, a recommendation letter and contact information for two further referees.

Applications are possible once a year. The first stage of an application is the electronic submission of application documents to admissions@geo.uzh.ch. The complete procedure and deadlines are detailed in Table 14.

An admission committee from each individual study program reviews all application packages. Applicants who seems to be potential candidates for the program are invited for an interview with the admissions committee, either face-to-face or through a video conference. After the interviews, the admission committee informs candidates of their



provisional recommendation, subject to approval by the Admissions Office. The documents of these students are forwarded to the Admissions Office and the Faculty of Science UZH. In addition, the candidate must follow the regular admission procedure of the University of Zurich (Table 14). The final decision about the admission is taken by the Faculty of Science UZH.

Table 14: Timelines for the Specialized Master's program.

Tasks	Responsible Person	Timelines
Application at the Geographical Institute: Electronic submission to admissions@geo.uzh.ch	Candidate	Deadline: 31.01.
Check of the application documents	Geographical Institute	First half of February
Interviews	Candidate / Admission Committee	Second half of February
Notification of acceptance	Geographical Institute	Begin of March
Nomination of selected candidates to the Admissions Office and Faculty of Science UZH	Geographical Institute	Begin of March
Regular application at the University of Zurich (for applicants who need a visa)	Candidate	28.2.
Regular application at the University of Zurich (for applicants who do not need a visa)	Candidate	Deadline: 30.4.
Notification of the Admissions Office with login information	Admissions Office	July/ August
Start of Studies and Signing of the Specialized Master's Agreement Form, Part A1	Candidate	Mid of September



8 Contact

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Function	Name	e-mail
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Program responsible of Geographies of Global Change	Dr. Timothy Raeymaekers	timothy.raeymaekers@geo.uzh.ch
Program responsible of Physical Geography	Dr. Samuel Abiven	samuel.abiven@geo.uzh.ch
Program responsible of Remote Sensing	Dr. Hendrik Wulf	hendrik.wulf@geo.uzh.ch
Student Advising for the Specialized Master		administration_spezmaster@geo.uzh.ch
Application Process		admissions@geo.uzh.ch



Appendix

The Specialized Master's programs in Physical Geography and Remote Sensing require previous coursework for admission:

Physical Geography

“Glaciology & Geomorphodynamics”:

- Physical geography and/or other introductory natural sciences: at least 45 ECTS credits, including basic knowledge in cryosphere and geomorphodynamics: at least 10 ECTS credits
- GIS/Remote Sensing: at least 10 ECTS credits
- Mathematics/Statistics: at least 10 ECTS credits

“Hydrology & Climate”:

- Physical geography and/or other introductory natural sciences (physics, chemistry, biology...): at least 45 ECTS credits, including basic knowledge in hydrology: at least 7 ECTS credits
- GIS/Remote Sensing: at least 10 ECTS credits
- Programming: at least 5 ECTS credits
- Mathematics/Statistics: at least 10 ECTS credits

“Soil Science & Biogeochemistry”:

- Physical geography and/or other introductory natural sciences (physics, chemistry, biology...): at least 45 ECTS credits, including basic knowledge in
 - soil-plant-environment: at least 7 ECTS credits
 - Mathematics/Statistics: at least 5 ECTS credits

“Geochronology”:

- Physical geography and/or other introductory natural sciences (geology, chemistry, biology...): at least 45 ECTS credits
- Mathematics/Statistics: at least 10 ECTS credits

Remote Sensing

- Specialization in Remote Sensing/GIS and/or other relevant natural science subjects (physics, biology, computer science, life sciences...): at least 45 ECTS credits, including basic knowledge in computer science (at least 7 ECTS credits)
- Mathematics/Statistics: at least 5 ECTS credits