

Humboldt-Universität zu Berlin
Faculty of Mathematics and Natural Sciences

Study and examination regulations of the Master of Science (MSc):

Global Change Geography

**Including interdisciplinary elective modules for other
Master programs (“Überfachlicher
Wahlpflichtbereich”)**

English translation of the legally binding German version
“Fachspezifische Studien- und Prüfungsordnung für den
Masterstudiengang Global Change Geography”
(as published on 2 August 2021 in “Amtliches Mitteilungs-
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Study regulations

of the Master of Science in Global Change Geography

According to § 17 section 1 number 3 of the constitution of the Humboldt-Universität zu Berlin in the version from 24th October 2013 (Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin Nr. 47/2013), the faculty council of the faculty of Mathematics and Natural Sciences issued* the following study regulations on 9th June 2021:

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§ 1 Field of application

These study regulations contain the subject-specific regulations of the Master of Science program *Global Change Geography*. It is valid in connection with the subject-specific examination regulations of the Master of Science program *Global Change Geography* and the "Fächerübergreifende Satzung zur Regelung von Zulassung, Studium und Prüfung" (ZSP-HU) in the valid version.

These study and examination regulations present an English translation of the legally binding German original published on 2nd August 2021 in "Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin 37/2021".

§ 2 Start of the program

The program can be commenced in the winter semester.

§ 3 Objectives of the program

(1) The program is targeted at interdisciplinary, research-orientated contents. It aspires to the following specialist competencies:

- Profound knowledge of current research approaches and findings of the interactions between society and environment in the context of Global Change

- Understanding of geographic questions in the context of sustainability goals, e.g., the sustainable development goals of the United Nations
- In-depth knowledge and application of scientific methods and findings to core topics in global change, particularly climate change, land-use change, food security, water security, land degradation, loss of biodiversity, sustainable development, and ecosystem services
- In-depth knowledge of advanced spatial, statistical, and mathematical modeling approaches for the analysis of geodata and human-environment systems
- Development of in-depth understanding of cross-scale relationships, from local to global, as well as methodological approaches for observing, describing, and interpreting these relationships
- Ability to integrate scientific theories, findings and procedures to analyze and understand human-environment systems
- Develop skills in exploring the state of science in the context of global change and in developing research questions
- Ability to assess alternative courses of action and to reflect on overarching science policy and social issues in the context of global change
- Advance scientific skills such as scientific writing and presentation, the analysis of primary literature, as well as knowledge of technical terminology in English

The knowledge and skills acquired are taught in classroom teaching, virtual teaching, and self-study as well as in intensive research seminars and research-related project work.

(2) The Master of Science *Global Change Geography* offers the opportunity to participate in research projects.

(3) The Master of Science *Global Change Geography* promotes internationality, as modules can be completed abroad and are taught in English in an international student cohort. A period of study abroad is recommended for the 3rd semester.

(4) Successful completion of the degree qualifies students for a wide range of possible professions, especially for a career in science, but also in political consulting, nature conservation or international organizations.

* The university presidential board has confirmed this study regulation on 9th June 2021.

§ 4 Course work

(1) In addition to the types of courses listed in the ZSP-HU, there is also a "field practice" course (German: Geländepraktikum).

(2) Field practice (GP): During the field practice course, which can be completed in a block or during the semester, students gain insights into various fields of activity, such as the installation of measuring equipment, mapping and mobile measurements in the field, and try out the application of the course content they have learned.

(3) All modules of the degree program are offered in English. Tasks and exams within the modules must be completed in English.

§ 5 Modules of the program

The Master of Science program in *Global Change Geography* includes the following modules with a total of 120 ECTS credit points (German: LP for Leistungspunkte):

(a) Compulsory part (70 ECTS)

Modul MSc1: Quantitative Methods for Geographers (10 ECTS)

Modul MSc2: Climate and Earth System Dynamics (10 ECTS)

Modul MSc3: Global Land Use Dynamics (10 ECTS)

Modul MSc4: Ecosystem Dynamics and Global Change (10 ECTS)

Modul MSc9: Scientific Writing (5 ECTS)

Master Thesis (25 ECTS)

(b) Subject-specific elective part (40 ECTS)

One module (10 ECTS) must be selected from each module area: MSc5, MSc6, MSc7, and MSc8:

Acquisition and Analysis of Environmental Data

Modul MSc5.1: Field Observation in Climatology and Hydrology (10 ECTS)

Modul MSc5.2: Earth Observation (10 ECTS)

Global Change Geography - Specialization

Modul MSc6: Specialization 1 (10 ECTS)

Modul MSc7: Specialization 2 (10 ECTS)

Modul MSc8: Specialization 3 (10 ECTS)

As alternative to modules MSc6, MSc7, and MSc8, students can select extra modules in the fields MSc5.1/5.2 or modules 8.0a-c of the Master of Arts program "Geographie der Großstadt - Humangeographie" (Urban Geography).

(c) Interdisciplinary elective part (10 ECTS)

In the interdisciplinary elective part (German: "überfachlicher Wahlpflichtbereich", short: üWP), a free choice of üWP modules from the module catalogues of other subjects/departments or central facilities must be completed, with a total of 10 ECTS (LP).

§ 6 Modules for the interdisciplinary elective part (üWP) of other Master programs

The following modules are offered for the interdisciplinary elective part (üWP) of other Master programs:

Modul MSc2: Climate and Earth System Dynamics (10 ECTS)

Modul MSc3: Global Land Use Dynamics (10 ECTS)

Modul MSc4: Ecosystem Dynamics and Global Change (10 ECTS)

ÜWP Modul MSc5.2: Earth Observation (10 ECTS)

Modul MSc6: Specialization 1 (10 ECTS)

Modul MSc7: Specialization 2 (10 ECTS)

Modul MSc8: Specialization 3 (10 ECTS)

§ 7 Entry into force

(1) These study regulations come into force on the day after their publication in the "Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin" (official information bulletin).

(2) These study regulations are valid for all students who start their study after these study regulations have entered into force or who continue their study after a change of university, subject or program.

(3) For students who have started their study before these study regulations have entered into force or who have continued their study after a change in university, subject or program, the study regulations from 18. March 2016 (Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin Nr. 19/2016) remain valid on a transitional basis. Alternatively, they can choose these study regulations including the corresponding examination regulations. The choice must be explained to the "Prüfungsbüro" (examination office) in written form and is irrevocable. With the expiry of 30. September 2024 the study regulations of 18. March 2016 becomes invalid. Thereafter the study program is continued according to these study regulations also by the students designated in sentence 1. Previous achievements are considered according to § 110 ZSP-HU.

Appendix 1: Module descriptions

Module MSc1		ECTS credits: 10	
Quantitative Methods for Geographers (Compulsory)			
<u>Educational and qualification objectives:</u> The students can describe, explain, and systematize different advanced spatial, statistical, and mathematical approaches to the quantitative analysis of geo- and environmental data and the modelling of human-environment systems, e.g., methods of applied and multivariate (geo-)statistics, mathematical modelling, and time series analysis. Based on the acquired theoretical and exemplified knowledge, the students can apply existing approaches independently and adapt them to specific problems where necessary. They can develop scientific research questions in the fields of data analysis and modelling and, using the acquired applied programming skills, plan and implement their own analyses.			
Prerequisites for participation in the module or specific courses within the module: None			
Type of course	Time of attendance, Work-load in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS¹</u> <u>90 hours</u> 25 hours attendance, 65 hours preparation and follow-up for the course	3 LP, participation	Advanced selection from the quantitative methods of Geography and human-environment systems analysis, e.g.: Models in Geography (typology), mathematical preliminaries, spatial autocorrelation, spatial interpolation, variogram, kriging, spatial cluster analysis, the linear model (multiple linear regression, ANOVA), Generalized Linear Models (logistic & log-linear), model validation, statistical tests, autocorrelation, Principal Component Analysis, MANOVA, Discriminant Function Analysis, cluster analysis, time series analysis
SE (computer seminar with application of special software)	<u>3 SWS</u> <u>150 hours</u> 35 hours attendance, 115 hours preparation and follow-up for the course and special tasks	5 LP, participation, exercises of about 4 hours per week	The participants deepen the methods acquired in the SE through practical application to case studies and learning of a programming language (e.g. R) or specialist software.
Module exam	<u>60 hours</u> Term paper (10 pages (ca. 15.000 to 20.000 ZoL oM ²)), or portfolio (ca. 15-25 pages or digital equivalent), or written (45 min.) exam and preparations	2 LP, pass	Project work with programming elements connected to current research at the institute.
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input type="checkbox"/> Summer semester		

¹ SWS = Semesterwochenstunden (hours/week of attendance)² „ZoL oM“ = Zeichen ohne Leerzeichen und ohne Materialanhang (character without space and without appendix)

Module MSc2		ECTS credits: 10	
Climate and Earth System Dynamics (Compulsory)			
<u>Educational and qualification objectives:</u> Students have gained both an overview as well as in-depth insights into the dynamics of regional and global climate, and earth as a complex system. They have acquired extensive competence for understanding and discussing dynamic systems and their underlying principles. They understand the empirical foundations as well as current scientific and political discourses and are able to evaluate these critically. They have the ability to educate themselves about complex phenomena of the geosystem from primary scientific literature, to lecture on these phenomena and to develop personal research perspectives in the field. The module consists of a lecture and two alternatively selectable seminars with either an atmospheric (climatic) or a terrestrial (hydrological) focus.			
Prerequisites for participation in the module or specific courses within the module: None			
Type of course	Time of attendance, Work-load in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
Lecture	<u>2 SWS</u> <u>90 hours</u> 25 hours attendance, 65 hours preparation and follow-up for the course	3 LP, participation	The lecture "Earth as a Complex System" includes among others the following topics: - Complexity and nonlinearity in the earth system related to global change - Selected principles from earth history, i.e. geo-cybernetic feedbacks, destabilisation, system transitions, tipping points, path dependency - Dynamic of the anthropocene: noetic dynamics, co-evolution, earth system analysis, socio-ecological metabolism, sustainability science, control theory
SE (main seminar)	<u>2 SWS</u> <u>150 hours</u> 25 hours attendance, 125 hours preparation and follow-up for the course and special tasks	5 LP, participation, preparation and presentation (ca. 30 min.) of a selected topic	Seminar with selected foci on atmosphere, climate, cryosphere, hydrosphere, and terrestrial biosphere. Topics may be: - Variability of sea level and glacier change - Teleconnections and variability within the climate system - Extreme weather, urban climate effects and climate impacts of land system change - Global water cycle and human impacts on it, water scarcity and droughts - Interactions of vegetation and water - Teleconnections in the water system - Water management, water culture and water ethics
Module exam	<u>60 hours</u> Written (90 min.), or oral (30 min.) exam and preparations, or term paper (10 pages (ca. 15.000 to 20.000 ZoL oM))	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input type="checkbox"/> Summer semester		

Module MSc3 Global Land Use Dynamics (Compulsory)		ECTS credits: 10	
<p><u>Educational and qualification objectives:</u> Students have acquired a sound understanding of the role of land use in the earth system and in the context of current global sustainability challenges, such as food security, land degradation, sustainable supply chains or climate change. Students are familiar with the theoretical foundation and methodological tools to analyze land systems and their dynamics across scales and in an integrated fashion. Students have deepened their skills to understand and assess the primary literature, and to summarize and critically discuss research results. They are able to analyze case studies and put them into the broader context of processes of global change. The course participants are able to develop their own research questions and to develop and presents concepts to assess and answer these questions.</p>			
Prerequisites for participation in the module or specific courses within the module: None			
Type of course	Time of attendance, Work-load in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, presentation (ca. 20 min.)	Course participants will attain a knowledge base on: <ul style="list-style-type: none"> - The history of land-use change and possible future land-use trajectories, with focus on agriculture - Underlying drivers and processes of land-use change - The importance of land use for human societies, especially in the context of food security - Land use conflicts and the increasing competition for land - Impacts of global land-use change, including on climate, biodiversity, and land degradation - Globalization and land use, e.g., decoupling of production and consumption, land grabbing, sustainable supply chains and rising urbanization - Theoretical foundation of and knowledge generation in Land System Science as a scientific discipline
SE (main seminar, in parts computer seminar with application of special software)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercise (ca. 4 hours per week), 2-3 presentations (a total of 20 min.)	Course participants delve deeper into the topics discussed in the SE, using case studies on aspects of global to local land-use change that students will work on independently and reflect on critically. A focus will be on assessing alternative methodological approaches to analyze land systems across scales and in different regional contexts.
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZoL oM))	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input type="checkbox"/> Summer semester		

Module MSc4		ECTS credits:	
Ecosystem Dynamics and Global Change (Compulsory)		10	
<u>Educational and qualification objectives:</u> Students attained profound knowledge of key theories and concepts related to ecosystem ecology, learned basic principles of system theory, and acquired a deep understanding of complex human-environment systems. Students know, and have practiced, methods to analyze, model, and understand human-environment systems, particularly with respect to the feedbacks between the different components within such systems and the spatiotemporal dynamics, stability, and resilience of human-environment systems. Students have learned how key processes of global change impact ecosystem functioning and understand the role of biodiversity in ecosystems. Moreover, students attained a methodological basis to assess ecosystem services, to analyze trade-offs and synergies between in human-environment systems across scales. Course participants have deepened their skills in critically evaluating, summarizing, and discussing primary research literature.			
Prerequisites for participation in the module or specific courses within the module: None			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Topics include: - Foundations of ecosystem ecology: abiotic and biotic components of ecosystems, ecosystem functioning, energy, water, and nutrient cycling, trophic dynamics - Spatial and temporal dynamics in ecosystems across scales - Non-linearity, critical thresholds, and resilience in human-environment systems - Impacts of global change on ecosystems and their functioning - The role of biodiversity in ecosystems - Ecosystem services (concepts, quantification, evaluation, trade-offs and synergies) - Ecosystem management (landscape design, restoration ecology, optimization)
SE (computer seminar with application of special software)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Training in and application of analytical, computer-based tools to, e.g.: visualization and analysis of systems (e.g., causal-loop diagrams, system diagrams), analyze and model spatiotemporal dynamics in coupled human-natural systems (e.g., habitat models, population models, nutrient cycling, vegetation modelling), assess and map ecosystem services, analyze synergies and trade-offs between multiple goals, scenarios and model uncertainty. Teaching will be carried out primarily via project- and problem-oriented learning in groups.
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZöL oM)) or portfolio (ca. 15-25 pages or digital equivalent)	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Module MSc5.1		ECTS credits:	
Field Observation in Climatology and Hydrology (Elective)		10	
<u>Educational and qualification objectives:</u> Students acquired both an overview on theories and concepts as well as in-depth competences of experimental methods of landscape climatology and eco-hydrology related to local impacts of global change. They have gained the capability to carrying out experiments in the field and to operating measurement systems within landscape climatology and eco-hydrology. Students are able to develop own research questions within landscape climatology and drainage basin hydrology in the context of global change. They can carry out, analyze, and present associated measurement procedures.			
Prerequisites for participation in the module or specific courses within the module: Successful participation in MSc1 and MSc2			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
Lecture	<u>1 SWS</u> <u>60 hours</u> 15 hours attendance, 45 hours preparation and follow-up for the course and special tasks	2 LP, participation, 5 exercises (ca. 2 pages)	The lecture „The climate near the ground“ communicates in-depth insights regarding the concepts and approaches of landscape climatology to students. This includes spatial and temporal typification, compilation and investigation of the boundary layer, basic micro-meteorological principles and experimental methods and approaches. The impact of urban systems on the atmosphere near the ground related to urban climate and air quality is discussed.
Lecture	<u>1 SWS</u> <u>60 hours</u> 15 hours attendance, 45 hours preparation and follow-up for the course and special tasks	2 LP, participation, 5 exercises (ca. 2 pages)	In the lecture „Experimental Ecohydrology“, students receive in-depth insights into concepts, measurement techniques and approaches in applied eco-hydrology, especially related to the topics: hydrological processes, generation of runoff in landscapes, tracer hydrology, storage/transport/exchange of water, impact of land use on hydrological processes. In focus are hydrological processes in “natural” and urban landscapes.
Field practice (Geländepraktikum)	<u>150 hours</u> 50 hours attendance as single days resp. block course in the field (ca. 7 days), 100 hours preparation and follow-up for the course and special tasks	5 LP, participation (ca. 7 days), report about a selected research question of the field practice (max. 25 pages including figures)	Students learn climatological and hydrological measurement techniques, e.g., mapping of climate relevant landscape features and vegetation dynamics, measuring components of the water balance (precipitation, evapotranspiration, runoff, soil water, ground water), atmospheric fluxes (Eddy-Covariance), tracer experiments, energy and radiation balance, balancing of hyporheic rivers, topo-climatic profile measurements, field mapping and water body mapping. Students autonomously carry out and analyze their own experiment, discuss theories and experiments, and present the results in the form of scientific publications.
Module exam	<u>30 hours</u> oral (20 min.) or written (90 min.) exam and preparation	1 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Module MSc5.2		ECTS credits:	
Earth Observation (Elective)		10	
<u>Educational and qualification objectives:</u> Building on prior knowledge, students have acquired advanced skills and knowledge in remote sensing methods. They are familiar with theory, concepts and methods from environmental monitoring and the analysis of land cover and land use systems. They can independently perform computer-based analyses targeting advanced research questions. Students have been involved in ongoing research and are capable of embedding remote sensing approaches in both applied and problem-oriented work as well as scientific analyses.			
Prerequisites for participation in the module or specific courses within the module: Successful participation in MSc1 and MSc3			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Participants acquire in-depth knowledge on mapping and monitoring terrestrial ecosystems and land use systems. Students will conceptualize methodological frameworks that match the investigated process regimes (and that will be implemented in the computer seminar of the module).
SE (computer seminar with application of special software)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercises and project work (ca. 4 hours per week)	Participants deepen their knowledge on remote sensing theory, concepts, and methods through the PC-based analysis of case studies. These case studies focus on three core research areas in geography: - urban and peri-urban areas - agricultural landscapes - forests.
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZoL oM)), or portfolio (ca. 15-25 pages or digital equivalent)	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Module MSc6 Specialization 1 (Elective)		ECTS credits: 10	
<u>Educational and qualification objectives:</u> Students receive in-depth theoretical and methodological knowledge in scientifically and societally relevant geography topics (such as sustainable development, climate change, natural resource management, land use change) and/or theoretical and practical knowledge in the principles and applications of different modelling concepts using spatial-temporal data (such as statistical and geostatistical methods, machine learning, agent-based modelling, system dynamics, programming, and satellite data analysis).			
Prerequisites for participation in the module or specific courses within the module: none			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Contents correspond to the courses designated for module MSc6 ³
Seminar and/or computer seminar	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercises and/or project work (ca. 4 hours per week)	Contents correspond to the courses designated for module MSc6 ³
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZöL oM)) or portfolio (ca. 15-25 pages or digital equivalent) or multimedial exam (e.g., development of a model, data analysis workflow, database, or computer code to analyze human-environment systems) including a two-page written description.	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

³ The current course offers for MSc6, MSc7 and MSc8 will be decided each semester and announced timely at the platform AGNES.

Module MSc7		ECTS credits: 10	
Specialization 2 (Elective)			
<u>Educational and qualification objectives:</u> Students receive in-depth theoretical and methodological knowledge in scientifically and societally relevant geography topics (such as sustainable development, climate change, natural resource management, land use change) and/or theoretical and practical knowledge in the principles and applications of different modelling concepts using spatial-temporal data (such as statistical and geostatistical methods, machine learning, agent-based modelling, system dynamics, programming, and satellite data analysis).			
Prerequisites for participation in the module or specific courses within the module: none			
Type of course	Time of attendance, Work-load in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Contents correspond to the courses designated for module MSc7 ³
Seminar and/or computer seminar	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercises and/or project work (ca. 4 hours per week)	Contents correspond to the courses designated for module MSc7 ³
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZoL oM)) or portfolio (ca. 15-25 pages or digital equivalent) or multimedial exam (e.g., development of a model, data analysis workflow, database, or computer code to analyze human-environment systems) including a two-page written description.	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Module MSc8		ECTS credits: 10	
Specialization 3 (Elective)			
<u>Educational and qualification objectives:</u> Students receive in-depth theoretical and methodological knowledge in scientifically and societally relevant geography topics (such as sustainable development, climate change, natural resource management, land use change) and/or theoretical and practical knowledge in the principles and applications of different modelling concepts using spatial-temporal data (such as statistical and geostatistical methods, machine learning, agent-based modelling, system dynamics, programming, and satellite data analysis).			
Prerequisites for participation in the module or specific courses within the module: none			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Contents correspond to the courses designated for module MSc8 ³
Seminar and/or computer seminar	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercises and/or project work (ca. 4 hours per week)	Contents correspond to the courses designated for module MSc8 ³
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZoL oM)) or portfolio (ca. 15-25 pages or digital equivalent) or multimedial exam (e.g., development of a model, data analysis workflow, database, or computer code to analyze human-environment systems) including a two-page written description.	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Module MSc9		ECTS credits: 5	
Scientific Writing (Compulsory)			
<u>Educational and qualification objectives:</u> The students are deepening their knowledge on writing scientific texts. Furthermore, by visiting colloquiums, they get insights into the approach of handling and writing final theses and their presentation and discussion.			
Prerequisites for participation in the module or specific courses within the module: None			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>90 hours</u> 25 hours attendance, 65 hours preparation and follow-up for the course and special tasks	3 LP, participation, in-class exercises, assignments (ca. 4 hours per assignment) and final text (ca. 2500 words excl. references)	The writing of scientific texts is deepened using practical examples.
CO (Colloquium)	<u>2 SWS</u> <u>60 hours</u> 25 hours attendance, 35 hours preparation and follow-up for the course and special tasks	2 LP, participation, presentation and discussion of a master thesis topic in a talk (ca. 15 min.)	Within the colloquium skills are gained to conceptualise master theses. Within the presentation problems, concepts, methods of data acquisition and collection of materials, and its processing resp. analysis are presented and reflected critically. Depending on the colloquium, different topics of Geography are discussed.
Module exam	none		
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input checked="" type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

ÜWP Module MSc5.2		ECTS credits:	
Earth Observation (Elective)		10	
<u>Educational and qualification objectives:</u> Building on prior knowledge, students have acquired advanced skills and knowledge in remote sensing methods. They are familiar with theory, concepts and methods from environmental monitoring and the analysis of land cover and land use systems. They can independently perform computer-based analyses targeting advanced research questions. Students have been involved in ongoing research and are capable of embedding remote sensing approaches in both applied and problem-oriented work as well as scientific analyses.			
Prerequisites for participation in the module or specific courses within the module: none			
Type of course	Time of attendance, Workload in hours	ECTS credits (LP) and requirements for their issuance	Topics, Content
SE (seminar)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course	4 LP, participation	Participants acquire in-depth knowledge on mapping and monitoring terrestrial ecosystems and land use systems. Students will conceptualize methodological frameworks that match the investigated process regimes (and that will be implemented in the computer seminar of the module).
SE (computer seminar with application of special software)	<u>2 SWS</u> <u>120 hours</u> 25 hours attendance, 95 hours preparation and follow-up for the course and special tasks	4 LP, participation, exercises and project work (ca. 4 hours per week)	Participants deepen their knowledge on remote sensing theory, concepts, and methods through the PC-based analysis of case studies. These case studies focus on three core research areas in geography: - urban and peri-urban areas - agricultural landscapes - forests.
Module exam	<u>60 hours</u> Written (90 min.) or oral (30 min.) exam and preparations or term paper (10 pages (ca. 15.000 to 20.000 ZöL oM)), or portfolio (ca. 15-25 pages or digital equivalent)	2 LP, pass	
Duration of module	<input checked="" type="checkbox"/> 1 Semester <input type="checkbox"/> 2 Semester		
Begin of module	<input type="checkbox"/> Winter semester <input checked="" type="checkbox"/> Summer semester		

Appendix 2: Recommended course schedule⁴

To enable a smooth and successful study program, planning ahead of compulsory and elective course work is essential. Below is a recommended (not compulsory) course schedule for the regular study period of 4 semesters.

No. of module	Name of the modules	1st semester	2nd semester	3rd semester	4th semester
MSc1	Quantitative Methods for Geographers	5 SWS, 10 ECTS			
MSc2	Climate and Earth System Dynamics	4 SWS, 10 ECTS			
MSc3	Global Land Use Dynamics	4 SWS, 10 ECTS			
MSc4	Ecosystem Dynamics and Global Change		4 SWS, 10 ECTS		
MSc5	Acquisition and Analysis of Environmental Data		2/4 SWS, 10 ECTS		
MSc6	Specialization 1		4 SWS, 10 ECTS		
MSc7	Specialization 2			4 SWS, 10 ECTS	
MSc8	Specialization 3			4 SWS, 10 ECTS	
MSc9	Scientific Writing			4 SWS, 5 ECTS	
	Interdisciplinary elective (üWP)			5 ECTS	5 ECTS
	Master Thesis				25 ECTS
SWS and ECTS per Semester		13 SWS 30 ECTS	10/12 SWS 30 ECTS	14-15 SWS 30 ECTS	2-3 SWS 30 ECTS

⁴ The 3rd semester is especially suitable for a study at a university abroad. To simplify the crediting of study achievements and examinations at the foreign university it is recommended that a Learning Agreement is completed previously.

Examination regulations of the Master program „Global Change Geography“

According to § 17 section 1 number 3 of the constitution of the Humboldt-Universität zu Berlin in the version from 24th October 2013 (Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin Nr. 47/2013), the faculty council of the faculty of Mathematics and Natural Sciences issued* these examination regulations on 9th June 2021:

- § 1 Field of application
- § 2 Standard period of study
- § 3 Examination board
- § 4 Module exam
- § 5 Master thesis
- § 6 Final grade
- § 7 Academic degree
- § 8 Entry into force

Appendix: Overview of exams

§ 1 Field of application

These examination regulations contain the subject-specific regulations of the Master program *Global Change Geography*. It is valid in connection with the subject-specific study regulations of the Master program *Global Change Geography* and the "Fächerübergreifende Satzung zur Regelung von Zulassung, Studium und Prüfung" (ZSP-HU) in the valid version.

These examination regulations are an English translation of the [legally binding German original](#) as published on 2nd August 2021 in "Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin 37/2021".

§ 2 Standard period of study

The Master program *Global Change Geography* has a standard study period of 4 semesters.

§ 3 Examination board

The examination board of the Geographical Institute is responsible for examination matters of the Master program *Global Change Geography*.

§ 4 Module exams

(1) Oral exams are conducted in the presence of a competent assessor if, according to ZSP-HU, two examiners are not appointed. The assessor watches and minutes the exam. She or he is not involved in the oral examination and the grading.

(2) Written exams and term papers must be composed in English. Oral exams are taken in English.

§ 5 Master thesis

(1) Passed master theses must be defended.

(2) For the calculation of the grade of the master thesis, the grade of the written part and the grade of the defense are weighted 9:1.

(3) The Master thesis must be written in English.

§ 6 Final grade

(1) The final grade of the Master program *Global Change Geography* is calculated from the grades of the module exams and the grade of the master thesis, weighted according to the ECTS credits which are shown in the appendix for the modules and the master thesis.

(2) In the subject-specific elective part, only the two modules (20 ECTS) with the highest grades count towards the final grade. The remaining 20 ECTS are not considered in the calculation of the final grade.

(3) Module exams, that are not graded or that are marked as "passed", due to an incomparable grading system, and the ECTS credits of these modules are not considered in the calculation according to section/paragraph 1.

§ 7 Academic degree

The students who successfully completed the Master program *Global Change Geography*, acquire the academic degree "Master of Science" ("M.Sc.").

§ 8 Entry into force

(1) These examination regulations come into force on the day after their publication in the "Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin."

(2) These examination regulations are valid for all students who start their study after these examination regulations have entered into force or who continue their study after a change of university, subject or program.

(3) For students who have started their study before these examination regulations have entered into force or who have continued their study after a change in university, subject or program, the examination regulations from 18th March 2016 (Amtliches Mitteilungsblatt der Humboldt-Universität zu Berlin Nr. 19/2016) stay valid on a transitional basis. Alternatively, they can choose these examination regulations including the corresponding study regulations. The choice must be explained to the "Prüfungsbüro" (examination office) in written form and is irrevocable. With the expiry of 30th September 2024, the examination regulations of 18th March 2016 become invalid. Thereafter the study program is continued according to these examination regulations also by the students designated in sentence 1. Previous achievements are considered according to § 110 ZSP-HU.

* The university presidential board has confirmed this examination regulation on 22. July 2021.

Appendix: Overview of exams

No. of module	Name of module	Credits of module	Subject-specific admission requirements for the exam	Type, duration/processing time/extent, possibly language of exam according to § 108 section 2 ZSP-HU	Grading
Compulsory part ⁵ (70 ECTS)					
MSc1	Quantitative Methods for Geographers	10	none	Term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or written exam (45 minutes).	yes
MSc2	Climate and Earth System Dynamics	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix).	yes
MSc3	Global Land Use Dynamics	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix).	yes
MSc4	Ecosystem Dynamics and Global Change	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent).	yes
MSc9	Scientific Writing	5	The module is completed without exam.		
	Master Thesis	25	Completion of modules MSc1-6 und MSc9	Writing of a scientific thesis with an extent of 90.000 to 110.000 characters (without space and without appendix), defense of thesis (presentation of ca. 30 minutes) with subsequent discussion (ca. 15 minutes).	yes
Subject-specific elective part ⁶ (40 ECTS) – The two modules with the two highest grades are considered in the calculation of the final grade.					
MSc5.1	Field Observation in Climatology and Hydrology	10	none	Oral exam, 20 minutes or written exam, 90 minutes	yes

⁵ All compulsory modules must be completed.

⁶ In the subject-specific elective part modules with altogether 40 ECTS credits must be completed.

No. of module	Name of module	Credits of module	Subject-specific admission requirements for the exam	Type, duration/processing time/extent, possibly language of exam according to § 108 section 2 ZSP-HU	Grading
MSc5.2	Earth Observation	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent).	yes
MSc6	Specialization 1	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix).	yes
MSc7	Specialization 2	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix).	yes
MSc8	Specialization 3	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix).	yes
Interdisciplinary elective part (üWP) (10 ECTS)					
	In the interdisciplinary elective part, a free choice of modules from the module catalogues of other subjects or central facilities must be completed.	Altogether 10	The modules are completed according to the regulations of the other subjects resp. central facilities. The examination board of the Geographical Institute decides whether the achievements are considered.		The modules are considered without grade.

Interdisciplinary elective part for other Master programs (üWP)

No. of module	Name of module	Credits of module	Subject-specific admission requirements for the exam	Type, duration/processing time/extent, possibly language of exam according to § 108 section 2 ZSP-HU	Grading
MSc2	Climate and Earth System Dynamics	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix).	yes
MSc3	Global Land Use Dynamics	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix).	yes
MSc4	Ecosystem Dynamics and Global Change	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent).	yes
ÜWP MSc5.2	Earth Observation	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent).	yes
MSc6	Specialization 1	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix)	yes
MSc7	Specialization 2	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix)	yes
MSc8	Specialization 3	10	none	Written exam (90 minutes), or oral exam (30 minutes), or term paper (ca. 10 pages, ca. 15.000 to 20.000 characters without space and without appendix), or portfolio exam (ca. 15-25 pages, ca 30.000 – 50.000 characters without space and without appendix, or digital equivalent), or multimedia exam (e.g., development of a model, a data analysis workflow, a database or computer program for the analysis of human-environment systems) including a two-page report (ca. 4.000 characters without space and without appendix)	yes