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**Mitteilungen**  
**Amtsblatt (Official Register) of Freie Universität Berlin 38/2012, 24 May 2012**

**Study regulations for the double degree master's program in Environmental Earth Sciences at the Department of Earth Sciences of Freie Universität Berlin in cooperation with Nanjing University, China**

**Preamble**

On the basis of § 14 subsection 1 no. 2 of the *Teilgrundordnung* (Partial Basic Regulations) (trial model) of Freie Universität Berlin dated 27 October 1998 (FU Mitteilungen 24/1998) the governing board of the Department of Earth Sciences of Freie Universität Berlin enacted the following study regulations for the double degree master's program in Environmental Earth Sciences on 18 April 2012\*:

**Contents**

- § 1 Applicability
- § 2 Qualification objectives
- § 3 Program contents
- § 4 Program structure
- § 5 Types of teaching and learning
- § 6 Studying abroad
- § 7 Academic advising
- § 8 Entry into force

**Appendices:**

Appendix 1: Module descriptions

Appendix 2: Sample degree program tables

**§ 1**  
**Applicability**

(1) These regulations govern the aims, contents, and structure of the double degree master's program in Environmental Earth Sciences at the Department of Earth Sciences of Freie Universität Berlin in cooperation with Nanjing University, China (master's program) on the basis of the examination regulations for the master's program dated 18 April 2012.

(2) This is a consecutive master's program in accordance with § 23 subsection 3 no. 1 (a) of the Berlin Higher Education Act (Berliner Hochschulgesetz – BerlHG) of 26 July 2011 (GVBl. p. 378); it is interdisciplinary and research-oriented.

**§ 2**  
**Qualification objectives**

(1) The graduates of the master's program will be able to familiarize themselves rapidly and independently with subject matter in the Earth and Environmental Sciences and to plan, implement and finalize process- and system-oriented projects using a goal-oriented approach. They are able to select the appropriate working methods, instruments, and techniques for the topic in question. They are familiar with the interrelations between the solid Earth, the atmosphere, the hydrosphere, and the biosphere in terms of environmental science; they have a comprehensive understanding of the processes within and between the various geospheres and are able to analyze and interpret them.

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\* The Senate administration responsible for universities took note of these regulations on 15 May 2012. These regulations are valid until 30 September 2013.

They have gained knowledge of fundamental and advanced geoscientific methods, including field methods, and are able to apply them. As a result of their study stay in China, graduates possess knowledge of regional environmental systems and geoscientific processes.

(2) They possess inter- and transdisciplinary abilities and skills to meet the challenges posed by complex environmental issues and problems. Graduates are able to document and present their results clearly and to consider and evaluate their results critically. They are able to apply their acquired competences to issues in the field of Environmental Earth Sciences. They possess communication and teamwork skills and are capable of responsible action and independent scientific work. During the course of study, topics and issues related to gender aspects are taken into appropriate account in connection with geoscientific contents.

(3) Graduates of the master's program are qualified for professional employment or for doctoral studies. Possible fields of employment and activity include public authorities, associations, organizations, industry, NGOs, development agencies, engineering and geo consulting, insurance companies, consultancy, administration and politics. Graduates can work within the public sector, mainly in higher education, research establishments as well as subject-related federal and regional authorities. International research establishments and organizations also provide various employment opportunities. The study period at the University of Nanjing and the regional competences they have acquired open up fields of employment in China as well.

### **§ 3 Program contents**

(1) The master's program enables students to deepen and extend their knowledge, abilities, and skills by the study of a broad range of subjects in the core curriculum and elective modules. Students learn to analyze and evaluate process and system interrelations in the Earth and Environmental Sciences. They will acquire geoscientific regional competence and cultural knowledge during their study stay in China.

(2) The degree program teaches interdisciplinary theoretical and methodological competence and trains general scientific and subject-specific judgement in theoretical and practical terms. Students learn to familiarize themselves with topics of the Earth and Environmental Sciences rapidly and independently and to plan, implement and finalize work projects using a goal-oriented approach. The objective is to select the appropriate methods, instruments, and techniques for the respective topic. Results must be clearly documented, presented, and considered critically.

### **§ 4 Program Structure**

(1) The master's program consists of modules totaling 90 credit points (CP) and the master's thesis – including defense and accompanying colloquium – comprising 30 CP.

(2) Of the required courses, modules totaling 44 CP are taken at Freie Universität Berlin:

- Module: Geographical Information Processing for Advanced Students (10 CP)
- Module: Ecosystem Dynamics (20 CP)
- Module: Environmental Hydrogeology (6 CP)
- Module: Weather and Climate Diagnosis (8 CP).

(3) Of the elective courses, modules totaling 16 CP are taken at Freie Universität Berlin as follows:

1. Of the following two modules, one module totaling 6 CP must be chosen and completed:
  - Module: Landscape-Forming Processes and Material Flows (6 CP)
  - Module: Morphodynamics (6 CP)
2. Of the following modules, a student must choose and complete one module totaling 10 CP or two modules each totaling 5 CP:
  - Module: Modelling in Environmental Hydrology (10 CP)
  - Module: Landscape Archaeology (10 CP)
  - Module: Climate Models (5 CP)

–Module: Environmental Hydrology in Practice (5 CP).

(4) In the mandatory study period abroad in accordance with § 7 subsection 1, course units (CU) totaling 900 hours (30 CP) are completed at Nanjing University, China, as follows:

1. The CU Chinese language course totaling 300 hours (10 CP) must be completed.
2. A total of 5 CU from at least three different subject areas must be chosen and completed. Each CU totals 120 hours.
  - a) Subject area "Ocean Dynamics":
    - CU 1: Ocean Dynamics
    - CU 2: Advanced marine geology
    - CU 3: Introduction in coastal sciences
  - b) Subject area "Terrestrial Environmental Systems"
    - CU 1: Progress in Physical Geography
    - CU 2: Interlinked environmental processes
    - CU 3: Watersheds and environmental change
  - c) Subject area "Global Change and geochemical processes":
    - CU 1: Recent advance in mineral deposit research
    - CU 2: Global changes
  - d) Subject area "Atmospheric processes":
    - CU 1: Hydrometeorology
    - CU 2: Atmospheric chemistry
  - e) Subject area: "Laboratory and computer analysis"
    - CU 1: Laboratory and computer analysis.

(5) Modules already completed during previous university studies cannot be transferred to the master's program.

(6) Information about the contents, aims, types of teaching and learning, workload hours, forms of active participation, standard duration, and frequency of the modules is given in the module descriptions in Appendix 1.

(7) Information about the recommended study plan is given in the sample degree program table in Appendix 2.

## § 5

### Types of teaching and learning

1. A lecture (L) conveys an overview of Environmental Earth Sciences subdisciplines, of working methods, problems, and results. The link between the respective subdiscipline and other research fields is clarified, and an orientation is given for subsequent special topics. Lecturers convey course material with reference to specialist literature and provide incentives for students' own work and critical thinking.
2. A seminar (S) familiarizes students with examples of contents, theories, and methods of geography using topics of manageable scope. Guided by a member of the teaching staff, students explore, present, and discuss topics using subject-related literature and empirical findings.
3. A reading course (R) involves the intensive exploration of a specific subject area and allows students to practise independent scientific work. Guided by a member of the teaching staff, students design, present, and discuss course material using subject-related literature and empirical knowledge. A greater share of independent study is required than in a seminar.
4. An exercise course (*Übung*) (E) conveys working techniques or deals with the course material in greater depth, generally by means of experiments, mathematical work or analytic assignments.

5. A practical course (P) focuses on the practical application of newly acquired knowledge and methodological skills in the lab and/or in the field.
6. A colloquium (C) offers specialist presentations by staff and students on topical aspects of research, with subsequent discussion.

## **§ 6 Academic advising**

(1) Throughout the degree program, students will be advised by both a German supervisor (Department of Earth Sciences of Freie Universität Berlin) and a Chinese supervisor (School of Geographic and Oceanographic Sciences, School of Earth Sciences and Engineering, and School of Atmospheric Sciences of Nanjing University, China).

(2) The Center for Academic Advising and Psychological Counseling of Freie Universität Berlin will provide general student advisory services.

## **§ 7 Studying abroad**

(1) Studying at Nanjing University (China) for one semester is an integral part of the master's curriculum and is scheduled for the second semester of the master's program. The coursework and exams during this study period abroad in accordance with § 4 subsection 4 are part of the master's program.

(2) The supervisors responsible for the master's program support students in their plans and preparations for studying abroad. They provide information about possible funding of travel and subsistence costs.

(3) The Chinese Nanjing University will issue a separate certificate confirming the coursework performed in the course units studied at the Chinese Nanjing University.

## **§ 8 Entry into force**

(1) These study regulations enter into force on the day after their publication in the FU Mitteilungen (Official Register) of Freie Universität Berlin.

## Appendix 1: Module descriptions

### Explanations:

For each module of the master's program, the following module descriptions specify:

- the title of the module
- prerequisites
- the qualification objectives and contents of the module
- the types of teaching and learning in the module
- the workload required for a student to successfully complete a module, subdivided into attendance time and independent study time
- forms of active participation
- the language used in class
- standard duration and frequency of the module.

Information about student workloads especially takes into account:

- active participation during attendance time
- the workload involved in minor tasks during attendance time
- time required for self-directed preparation and follow-up work
- direct preparation time for examination work
- actual examination time.

The workload details correspond to the number of credit points assigned to the respective module as a measure of the approximate student workload required to complete the module successfully. Derived from this are the times quoted for self-directed study, comprising preparation and follow-up work of attendance time, exam preparation, etc.

As well as regular attendance at classes and successful completion of the examination requirements of a module, active participation is a precondition for obtaining the credit points assigned to the respective module.

The number of credit points and additional exam-related information about each module are given in Appendix 1 of the examination regulations for the master's program.

<b>Module:</b> Geographical Information Processing for Advanced Students			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> None			
<b>Qualification objectives:</b> Students will gain well-founded, advanced knowledge of space- and time-related raster and vector data processing in theory and practice. They are able to combine the different processes of Geographical Information Processing in order to obtain individual and appropriate solutions.			
<b>Contents:</b>			
<ul style="list-style-type: none"> <li>• Dualism of attributes in space and attribute spaces</li> <li>• Spatial reference as object location and object attribute</li> <li>• Aspects of temporal and spatial variance</li> <li>• Stationary and non-stationary transitions</li> <li>• Threshold values and boundary spaces</li> <li>• Temporal and spatial autocorrelation</li> <li>• Variogram analysis: from the discretum to the continuum, spatial interdependence</li> <li>• Dispersion and concentration in space, spatial distribution patterns</li> <li>• Non-linear and logistic models</li> </ul> <p>Important image data formats are presented, as well as essential concepts, methods and algorithms necessary for the thematic processing of digital image data. Particular attention will be paid to transforming these algorithms into training- and practice-oriented image processing systems. The theoretical contents of the lecture are intensified and put into practice using common software packages.</p>			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	2	-	Attendance (L) 30 Preparation and follow-up (L) 30
Seminar	4	Working on assignments, seminar paper, etc	Attendance (S) 60 Preparation and follow-up (S) 60 Exam preparation and exam 120
<b>Language:</b>		English; German is optional	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended; seminar: yes	
<b>Total workload:</b>		300 hours	10 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Geographical Sciences (all specializations); Master's program in Environmental Earth Sciences	

<b>Module:</b> Ecosystem Dynamics			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institutes of Geological Sciences, Geographical Sciences, and Meteorology			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> None			
<b>Qualification objectives:</b> Students possess a comprehensive understanding of dynamic processes, climate and the interactions between palaeontologically relevant taxa in marine and continental ecosystems of the Phanerozoic; in both theory and practice, they are able to analyse these factors in the field, interpret them and present the results in an expert and professional manner.			
<b>Contents:</b> Detailed analysis and interpretation of marine and continental Phanerozoic ecosystems, focusing on the Quaternary, with regard to temporal/spatial changes in the interactions between communities, their habitats and the climate with reference to case studies from current research, primarily in China, and students' own project work, primarily in China.			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	3	Discussion	Attendance time (L) 45 Preparation and follow-up (L) 60
Exercise course (Übung)	1	Completion of assignments	Attendance time (E) 15 Preparation and follow-up (E) 30
Seminar	2	Presentation, term paper	Attendance time (S) 30 Preparation and follow-up (S) 60
Practical course	6	Report	Attendance time (P) 90 Preparation and follow-up (P) 90
Colloquium	2	Lecture	Attendance time (C) 30 Preparation and follow-up (C) 60 Exam preparation and exam 90
<b>Language:</b>		English	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended; exercise course, seminar, practical course and colloquium: yes	
<b>Total workload:</b>		600 hours	20 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b> Master's program in Environmental Earth Sciences			

<b>Module:</b> Environmental Hydrogeology			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geological Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students are familiar with the natural elements and processes of the landscape water balance and the geogenic and anthropogenic factors controlling it. They know the fundamental procedures for investigating, evaluating, and remediating soil and groundwater contamination.			
<b>Contents:</b> Lecture I: <ul style="list-style-type: none"> <li>• Elements of the water balance</li> <li>• Landscape water balance in glacial landscapes</li> <li>• Groundwater dynamics</li> </ul> Lecture II: <ul style="list-style-type: none"> <li>• Soil and groundwater protection</li> <li>• Fundamentals of environmental legislation</li> <li>• Risk assessment of environmental damage</li> <li>• Remediation strategies</li> </ul>			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture I	2	–	Attendance time (L I) 30 Preparation and follow-up (L I) 45
Lecture II	2	–	Attendance time (L II) 30 Preparation and follow-up (L II) 45 Exam preparation and exam 30
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance is recommended.	
<b>Total workload:</b>		180 hours	6 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Environmental Earth Sciences; Master's program in Geological Sciences (specializing in Hydrogeology)	

<b>Module:</b> Weather and Climate Diagnosis			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Meteorology			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students are able to describe and assess selected weather and climate phenomena using diagnostic approaches, including calculation of spatio-temporal variability and knowledge of the underlying physical processes. They learn methods for the temporal and spatial analysis of observational data and numerical simulation results (including forecast models) and how to implement them in practice using a programming language. Students are familiar with the basic outcomes of these methods.			
<b>Contents:</b> Procedures for identifying meteorological phenomena at various spatial and temporal scales and assessing their spatio-temporal variability, underlying factors and mechanisms, connections between such phenomena: large-scale variability patterns (e.g. NAO, PNA, QBO, polar vortices, weather conditions) including interaction with the ocean; synoptic scale variability of the extratropics (waves, cyclones and emergence mechanisms, identification, measures of intensity, effects); weather parameters at stations. Exercise course: Computations related to lecture topics, using datasets and mathematical-statistical procedures (including multivariate statistics, cluster analysis).			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	2	–	Attendance time (L) 30 Preparation and follow-up (L) 40
Exercise course	2	Completing assignments	Attendance time (E) 30 Preparation and follow-up (E) 40 Attendance time (S) 30 Preparation and follow-up (S) 40 Exam preparation and exam 30
Seminar	2	Presentation, paper	
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended. Exercise course: yes; seminar: yes.	
<b>Total workload:</b>		240 hours	8 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Environmental Earth Sciences	

<b>Module:</b> Landscape-forming Processes and Material Flows			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students possess an overview over the history of research on landscape-forming processes and material flows. They are able to access and evaluate relevant academic sources and to arrive at a critical assessment of the contents.			
<b>Contents:</b> Through reading subject-related literature, students will train their ability to conduct scientific discourse, the focus being on historic–genetic aspects of geomorphology. The seminar will clarify the development and interconnection of geomorphological and hydrological research.  The following topics will be explored with reference to different regions: <ul style="list-style-type: none"> <li>• Multiscale reliefs and relief generations</li> <li>• Mass balance processes</li> <li>• Mass balance in different climate zones</li> <li>• Human impact on mass budget/mass balance</li> </ul>			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Reading course	2	Discussing specified literature, chairing discussions	Attendance time 30 Preparation and follow-up 90 Exam preparation and follow-up 60
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Yes	
<b>Total workload:</b>		180 hours	6 CP
<b>Duration of module</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Environmental Earth Sciences	

<b>Module:</b> Morphodynamics									
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences									
<b>Module coordinator:</b> Module lecturer									
<b>Prerequisites:</b> none									
<b>Qualification objectives:</b> Students possess an overview over the history of research on morphodynamics. They are able to access and evaluate relevant academic sources and to arrive at a critical assessment of the contents.									
<b>Contents:</b> Through reading subject-related literature, students will train their ability to conduct scientific discourse, the focus being on functional geomorphology with current morphodynamic aspects. The seminar will clarify the development and interconnection of geomorphological and hydrological research.  The following topics will be explored with reference to different regions: <ul style="list-style-type: none"> <li>• Morphodynamics in different climate zones</li> <li>• Measuring morphodynamics</li> <li>• Dimensions and frequencies of morphodynamic processes</li> <li>• Risks of morphodynamic processes and their assessment</li> </ul>									
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)						
Reading course	2	Discussing specified literature, chairing discussions	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Attendance time</td> <td style="text-align: right;">30</td> </tr> <tr> <td>Preparation and follow-up</td> <td style="text-align: right;">90</td> </tr> <tr> <td>Exam preparation and follow-up</td> <td style="text-align: right;">60</td> </tr> </table>	Attendance time	30	Preparation and follow-up	90	Exam preparation and follow-up	60
Attendance time	30								
Preparation and follow-up	90								
Exam preparation and follow-up	60								
<b>Language:</b>		English (German is optional)							
<b>Mandatory regular attendance:</b>		Yes							
<b>Total workload:</b>		180 hours	6 CP						
<b>Duration of module</b>		One semester							
<b>Frequency offered:</b>		Every winter semester							
<b>Applicability:</b>		Master's program in Environmental Earth Sciences							

<b>Module:</b> Modeling in Environmental Hydrology			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students are familiar with the theory, the fundamental mathematical process descriptions, and the application of hydrological models. They are able to understand and assess hydrologically relevant parameters and incorporate them into existing databases. They can model system components (rainfall, runoff, groundwater, evaporation, soil erosion) and integrate the factors influencing them. In addition, they are able to assess the uncertainties and limits of mathematical models.			
<b>Contents:</b> Model theory and model types. Data bases. Developing models. Mathematical implementation of hydrological processes in models. Model uncertainties, model applications. How to incorporate hydrologically relevant measurement data into simulation programs. Model quality and how to assess it.			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	2	-	Attendance time (L) 30 Preparation and follow-up (L) 40
Seminar	4	Presentation, exercises with simulation programs	Attendance time (S) 60 Preparation and follow-up (S) 80 Exam preparation and exam 90
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended. Seminar: yes	
<b>Total workload:</b>		300 hours	10 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Geographical Sciences (specializing in Environmental Hydrology); master's program in Environmental Earth Sciences	

<b>Module:</b> Landscape Archaeology			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students will have knowledge of modern interdisciplinary issues and research approaches in landscape archaeology. They will be familiar with the interactions between human settlement behavior, forms of land use and economic activity, and the surrounding natural space in synchronistic and diachronic perspectives, and with the fundamentals of prehistoric cultural landscape origins.			
<b>Contents:</b> The lectures give an overview of the following topics: <ul style="list-style-type: none"> <li>• Introduction to landscape archaeology: outline of its research history, concepts and objectives, scale levels and spatially effective factors</li> <li>• Overview of prehistoric settlement structures and forms of land use</li> <li>• Cultural-space location factors and human-induced landscape changes with reference to selected examples, modeling and archaeological prediction.</li> </ul> In the exercise course, selected topics of landscape archaeology are explored with reference to well-documented interdisciplinary projects, focusing on the problems involved in evaluating bio- and geoscientific data in comparison with archaeological evidence, on source evaluation in settlement archaeology, and on problems of synchronization and interpretation.			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	2	-	Attendance time (L) 30 Preparation and follow-up (L) 60
Seminar	2	Group work, assignments	Attendance time (S) 30 Preparation and follow-up (S) 60 Exam preparation and exam 120
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended. Seminar: yes	
<b>Total workload:</b>		300 hours	10 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Geographical Sciences (specializing in Terrestrial Systems), master's program in Environmental Earth Sciences	

<b>Module:</b> Climate models			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Meteorology			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students are familiar with the structure and application of various climate models; they can analyse and evaluate the results of climate model calculations as well as understand and assess the relevant literature.			
<b>Contents:</b> Construction of climate models, basic equations, physical parametrizations, coordinate systems, time step procedures, types of model, applying and assessing climate models.			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	1	–	Attendance time (L) 15 Preparation and follow-up (L) 30
Exercise course	2	Completing assignments	Attendance time (E) 30 Preparation and follow-up (E) 30 Exam preparation and exam 45
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended. Exercise course: yes	
<b>Total workload:</b>		150 hours	5 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Environmental Earth Sciences	

<b>Module:</b> Environmental hydrology in practice			
<b>University/Department/Institute:</b> Freie Universität Berlin/Dept of Earth Sciences/Institute of Geographical Sciences			
<b>Module coordinator:</b> Module lecturer			
<b>Prerequisites:</b> none			
<b>Qualification objectives:</b> Students will be familiar with application-related questions and work methods in Integrated Watershed Management. They are able to apply theoretical knowledge in the context of typical water management problem areas and can assess the societal relevance of sustainable water resource management.			
<b>Contents:</b> Practical examples illustrate topical problems of Integrated Watershed Management in Europe and in non-European megaregions, including risk assessment e.g. of extreme discharges, soil erosion or droughts, developing the foundations for planning projects (e.g. assessment of natural landscape potential), evaluating general measures after their implementation in terms of their effects on the water budget, and assessing the environmental impact of hydrological measures.			
<b>Types of teaching and learning</b>	<b>Attendance time</b> (hours per week per semester)	<b>Forms of active participation</b>	<b>Workload</b> (hours)
Lecture	2	-	Attendance time (L) 30 Preparation and follow-up (L) 20
Seminar	2	Paper, chairing discussions	Attendance time (S) 30 Preparation and follow-up (S) 25 Exam preparation and exam 45
<b>Language:</b>		English (German is optional)	
<b>Mandatory regular attendance:</b>		Attendance at lecture is recommended. Seminar: yes	
<b>Total workload:</b>		150 hours	5 CP
<b>Duration of module:</b>		One semester	
<b>Frequency offered:</b>		Every winter semester	
<b>Applicability:</b>		Master's program in Geographical Sciences (specializing in Environmental Hydrology), master's program in Environmental Earth Sciences	

Appendix 2: Sample degree program table

1st semester	2nd semester	3rd semester	4th semester	
<b>Geographical Information Processing for Advanced Students (required)</b> L (2 hpw.) S (4 hpw) <p style="text-align: right;"><b>10 CP</b></p>	<p style="text-align: center;"><b>Mandatory semester abroad at Nanjing University</b></p> <p style="text-align: center;">Five course units (120 hours each) from at least three of the five subject areas in § 4 subsection 4 (required) <b>20 CP</b></p> <p style="text-align: center;"><b>Chinese language course (required)</b> <b>10 CP</b></p>	<b>Ecosystem Dynamics (required)</b> L (3 hpw) E (1 hpw) S (2 hpw) P (6 hpw) C (2 hpw) <p style="text-align: right;"><b>20 CP</b></p>	<b>Interdisciplinary master's thesis with accompanying colloquium and defense</b> C (2 hpw) <p style="text-align: right;"><b>30 CP</b></p>	
<b>Elective modules totaling 6 CP acc. to § 4 subsection 3 no. 1 (elective):</b> <b>(1) Landscape-Forming Processes and Material Flows (6 CP)</b> R (2 hpw) or <b>(2) Morphodynamics (6 CP)</b> R (2 hpw) <p style="text-align: right;"><b>6 CP</b></p>		<b>Elective modules totaling 10 CP acc. to § 4 subsection 3 no. 2 (electives):</b> <b>(1) Modeling in Environmental Hydrology (10 CP)</b> L (2 hpw) S (4 hpw) or <b>(2) Landscape archaeology (10 CP)</b> L (2 hpw) S (2 hpw) or <b>(3a) Climate models (5 CP)</b> L (1 hpw) E (2 hpw) and <b>(3b) Environmental hydrology in practice (5 CP)</b> L (2 hpw) S (2 hpw) <p style="text-align: right;"><b>10 CP</b></p>		
<b>Environmental hydrology (required)</b> L I (2 hpw) L II (2 hpw) <p style="text-align: right;"><b>6 CP</b></p>				
<b>Weather and Climate diagnosis (required)</b> L (2 hpw) E (2 hpw) S (2 hpw) <p style="text-align: right;"><b>8 CP</b></p>				
<b>CP/semester: 30 CP</b>	<b>30 CP</b>	<b>30 CP</b>	<b>30 CP</b>	
<b>Total:</b>			<b>120 CP</b>	

**Abbreviations:**

- C: Colloquium
- R: Reading course
- P: Practical course
- S: Seminar
- E: Exercise course (*Übung*)
- L: Lecture
- CP: Credit points
- hpw: Hours per week (*Semesterwochenstunden*)

**Please note:**

**This English translation is for information purposes only. The original German *Prüfungsordnung* published in the *Mitteilungen der Freien Universität Berlin 38/2012* is legally binding.**

**Mitteilungen  
Amtsblatt (Official Register) of Freie Universität Berlin  
38/2012, 24 May 2012**

**Examination regulations for the double degree master's program in Environmental Earth Sciences at the Department of Earth Sciences of Freie Universität Berlin in cooperation with Nanjing University, China**

**Preamble**

On the basis of § 14 subsection 1 no. 2 of the *Teilgrundordnung* (Partial Basic Regulations) (trial model) of Freie Universität Berlin dated 27 October 1998 (FU Mitteilungen 24/1998) the governing board of the Department of Earth Sciences of Freie Universität Berlin enacted the following examination regulations for the double degree master's program in Environmental Earth Sciences on 18 April 2012:\*

**Contents**

§ 1 Applicability

§ 2 Examining board

§ 3 Standard study period

§ 4 Scope of academic performance

§ 4 Master's thesis and defense

§ 6 Completing the master's degree

§ 7 Entry into force

Appendix 1: Academic performance, prerequisites, attendance requirements and credit points

Appendix 2: Sample certificate of academic record (*Zeugnis*)

Appendix 3: Sample degree certificate (*Urkunde*)

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\* The Senate Department responsible for higher education confirmed these regulations on 15 May 2012. These regulations are valid until 30 September 2013 .

## **§ 1 Applicability**

Supplementary to the currently valid version of the *Satzung für Allgemeine Prüfungsangelegenheiten (SfAP)* (bylaws for general examination matters) of Freie Universität Berlin, these regulations govern the requirements and procedure for achieving the necessary academic performance in the double degree master's program in Environmental Earth Sciences at the Department of Earth Sciences of Freie Universität Berlin in cooperation with Nanjing University, China (master's degree program).

## **§ 2 Examining board**

The examining board appointed for the master's program by the governing board of the Department of Earth Sciences of Freie Universität Berlin is responsible for organizing the examination performance and the other duties named in the SfAP.

## **§ 3 Standard study period**

The standard study period is four semesters.

## **§ 4 Scope of academic performance**

(1) In the master's program, evidence of a study and examination performance totaling 120 credit points (CP) has to be provided, comprising

- 60 CP in modules and 30 CP in course units of the study period abroad
- 30 CP for the master's thesis with defense and accompanying colloquium.

(2) Appendix 1 contains information about exams accompanying coursework, prerequisites for admission to the individual modules, details about mandatory regular attendance at types of teaching and learning, and the credit points assigned to each of the modules.

## **§ 5 Master's thesis and defense**

(1) The master's thesis should show that the student is able, within a specified period, to work independently on a chosen topic from the earth sciences using scientific methods, and to present, document, and assess the results independently. In addition, the student is able to give an oral presentation of his/her master's thesis and to defend it during a discussion.

(2) On application, students will be accepted for a master's thesis provided that they have last been enrolled in the master's program at Freie Universität Berlin.

(3) The application for admission to the master's thesis must be accompanied by proof that the requirements stated in subsection 2 have been met, and also by written confirmation by an authorized examiner that he/she is prepared to supervise the master's thesis. The examining board concerned decides on the application; if written confirmation of agreement to supervise the master's thesis in accordance with sentence 1 has not been submitted, the examining board will appoint a supervisor. Students may propose their own topics, but they do not have the right to insist that their proposal be accepted.

(4) In agreement with the thesis supervisor, the examining board assigns the topic of the master's thesis. The topic and the tasks set should be such that the student can complete the thesis within the set period. A written record must be kept that the topic was assigned and that the thesis was submitted on time.

(5) The time allotted for completing the thesis (750 hours) begins when the topic is assigned by the examining board. The submission period for the master's thesis is 19 weeks. The topic can be refused once within the first three weeks after it was assigned and then counts as not assigned.

(6) Parallel to the time allowed for completing the thesis, students are required to regularly attend the colloquium accompanying the master's thesis and to give a presentation reporting on their own work progress. This presentation does not count towards the final grade of the master's thesis according to subsection 11.

(7) The master's thesis is about 18,000 words long. The master's thesis must be written in English.

(8) Three bound copies and an electronic version of the master's thesis must be submitted within the time allowed for completion. On handing in the thesis, the student must attest in writing that she/he has written the thesis autonomously, using no sources or aids other than those specified.

(9) The master's thesis will be graded by two examiners appointed by the examining board; one of the examiners should be the thesis supervisor. The examining board should have received the assessments of the written work four weeks after submission of the thesis. The defense takes place as soon as possible after the master's thesis. The student is given due notice of the date set for the defense.

(10) The defense lasts about 40 minutes and comprises a presentation of the master's thesis (about 20 minutes) and a subsequent discussion (about 20 minutes). Two examiners conduct the defense. They should be identical with the examiners of the master's thesis.

(11) The grade for the master's thesis counts for four-fifths, the grade for the defense for one-fifth of the overall grade for the master's thesis and defense.

(16) The master's thesis, including its defense, counts as passed if the overall grade according to subsection 11 is at least "sufficient" (4.0); otherwise, the master's thesis may be repeated once.

## § 6

### Completing the master's degree

(1) In order to obtain her/his degree, a student must have fulfilled the requirements in § 4 subsection 1 of these examination regulations in conjunction with § 4 of the study regulations. The degree may not be conferred if – at another university in the same degree program or in a module that is identical or comparable with one of the modules that have to be completed in the master's degree program and that count towards the final grade – the student has definitively not achieved the required academic performance, or has definitively failed examinations, or if his/her examination process is still pending,

(2) The application for confirmation of the degree must be accompanied by proof of the prerequisites in accordance with subsection 1 sentence 1 as well as an affirmation that none of the cases listed in subsection 1 sentence 2 applies to the applicant. The program's examining board decides on the application.

(3) Having passed their examination, students receive

1. a certificate of academic record (*Zeugnis*) and a degree certificate (*Urkunde*) of Freie Universität Berlin (appendices 2 and 3)

2. a certificate of academic record (*Zeugnis*) and a degree certificate (*Urkunde*) of Nanjing University, China, and

3. a joint certificate confirming that the master's degree program has been completed, and

4. a diploma supplement (English and German versions).

In addition, a transcript is issued with details of the individual modules and their components. On application, English versions of the certificates will be issued.

**§ 7**  
**Entry into Force**

These regulations enter into force on the day after their publication in the FU-Mitteilungen (Official Register of Freie Universität Berlin).

## **Appendix 1: Academic performance, prerequisites, attendance requirements and credit points**

### Explanation:

The following information about the modules of the master's program concerns

- the prerequisites for admission to the respective module,
- the types of examination,
- mandatory regular attendance,
- the credit points assigned to each module.

If mandatory regular attendance is required for the respective types of teaching and learning, it is a prerequisite – along with active participation in the types of teaching and learning and passing a module's required examinations – for obtaining the credit points assigned to the respective module. Regular attendance means that a student was present during at least 85 % of the attendance time stipulated for the module's types of teaching and learning. Even if regular attendance at the module's type of teaching and learning is not mandatory, it is nevertheless strongly recommended. If the respective course description merely recommends attendance, the course instructor is not permitted to insist on mandatory attendance .

The number of credit points allotted to a module depends on the student workload necessary to complete the module successfully. This workload includes attendance time as well as self-directed study time (preparation and follow-up, examination preparation etc.). One credit point corresponds to 30 hours.

The respective module examination has to be taken for each module. Only one examination (module examination) is necessary to complete a module. The module examination must relate to the qualification objectives of the module; on the basis of some examples, the exam monitors whether the aims of the module have been attained. The scope of the examination is no broader than necessary. In the case of modules where provision is made for alternative types of examination, the module instructor must announce the type of examination for the respective semester no later than in the first session of the semester. Students are awarded credit points only after they have successfully completed the entire module – i.e. if they have regularly attended and actively participated in the types of teaching and learning and have passed the module exam.

Appendix 1 of the study regulations for the master's program describes the contents and aims, types of teaching and learning of the module, the estimated student workload for successful completion of the module, forms of active participation, standard duration of the module and the frequency with which it is offered.

<b>Module:</b> Geographical Information Processing for Advanced Students		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (90 minutes)	Attendance is recommended.
Seminar		Yes
<b>Credit points:</b> 10		

<b>Module:</b> Ecosystem Dynamics		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (90 minutes)	Attendance is recommended.
Exercise course		Yes
Seminar		Yes
Practical course		Yes
Colloquium		Yes
<b>Credit points:</b> 20		

<b>Module:</b> Environmental Hydrology		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture I	Written exam (90 minutes)	Attendance is recommended.
Lecture II		Attendance is recommended.
<b>Credit points:</b> 6		

<b>Module:</b> Weather and Climate Diagnosis		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (60 minutes) or oral exam (about 20 minutes)	Attendance is recommended.
Exercise course		Yes
Seminar		Yes
<b>Credit points:</b> 8		

<b>Module:</b> Landscape-Forming Processes and Material Flows		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Reading course	Term paper or essay (about 1200 words)	Yes
<b>Credit points:</b> 6		

<b>Module:</b> Morphodynamics		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Reading course	Term paper or essay (about 1200 words)	Yes
<b>Credit points:</b> 6		

<b>Module:</b> Modeling in Environmental Hydrology		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (90 minutes) or term paper (about 3000 words)	Attendance is recommended.
Seminar		Yes
<b>Credit points:</b> 10		

<b>Module:</b> Landscape Archaeology		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (90 minutes)	Attendance is recommended.
Seminar		Yes
<b>Credit points:</b> 10		

<b>Module:</b> Climate models		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Written exam (90 minutes)	Attendance is recommended.
Exercise course		Yes
<b>Credit points:</b> 5		

<b>Module:</b> Environmental hydrology in practice		
<b>Prerequisites:</b> none		
<b>Types of teaching and learning</b>	<b>Module examination</b>	<b>Mandatory regular attendance</b>
Lecture	Term paper (about 3000 words)	Attendance is recommended.
Seminar		Yes
<b>Credit points:</b> 5		

The course units and language studies during the semester abroad in accordance with §§ 4 subsection 4; 7 subsection 1 of the study regulations total 30 CP; there is no differentiated grading of examination performances.

**Appendix 2: Sample certificate of academic record (translation of the original German Zeugnis)**

Freie Universität Berlin  
Department of Earth Sciences

**Certificate of Academic Record**

Ms/Mr [First name, name]

born in [Place of Birth] on [Day/Month/Year]

has successfully completed the International Master's Degree Programme, offered together with Nanjing University, China, in

Environmental Earth Sciences

in accordance with the examination regulations of 18 April 2012 (FU-Mitteilungen 38/2012) with the final grade

[Grade as Number and Text]

and has earned the required 120 credit points.

The individual components of the programme were graded as follows:

Area(s) of Study	Credit points	Grade
Modules	90 (60)	[XX]
Master's thesis with defence	30 (30)	[XX]

The topic of the master's thesis was: [XX]

Berlin, [Day/Month/Year]

(Seal)

The Dean

The Chair of the Examining Board

Grading scale: 1.0 – 1.5 very good; 1.6 – 2.5 good; 2.6 – 3.5 satisfactory; 3.6 – 4.0 sufficient; 4.1 – 5.0 fail  
The credit points comply with the European Credit Transfer and Accumulation System (ECTS).  
Part of the academic performance is ungraded; the number in parentheses indicates the number of credit points affecting the final grade.

**Appendix 3: Sample degree certificate (translation of the original German *Urkunde*)**

Freie Universität Berlin  
Department of Earth Sciences

**Degree Certificate**

**Ms/Mr [First name/surname]**

born in [Place of Birth] on [Day/Month/Year]

has successfully completed the International Master's Degree Programme,  
offered together with Nanjing University, China,

in

Environmental Earth Sciences

In accordance with the university examination regulations of 18 April 2012  
(FU-Mitteilungen 38/2012)

the Degree of

Master of Science (M.Sc.)

is hereby awarded.

Berlin, [Day/Month/Year]

(Seal)

The Dean

The Chair of the Examining Board