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Study regulations for the master's programme in Geography with specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology

Preamble

On the basis of § 14 par. 1 (2) of the *Teilgrundordnung (Erprobungsmodell)* of Freie Universität Berlin dated 27 October 1998 (FU Official Journal 24/1998) the Departmental Council of the Department of Earth Sciences of Freie Universität Berlin enacted the following Study Regulations on 11 July 2007:

Contents

§ 1
Applicability

These regulations regulate the aims, contents and structure of the master's programme in Geography with specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology on the basis of the Examination Regulations of 11 July 2007.

§ 2
Description of the programme

(1) The consecutive, more research-oriented master's programme in Geography with specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology enables graduates with a bachelor's degree in Geography or equivalent to enhance their knowledge, skills and competences by specialising and deepening their academic studies in three specialist areas of geography: "Geographical Development Studies," "Terrestrial Systems" and "Environmental Hydrology".

(2) The programme trains subject-specific and interdisciplinary theoretical and methodological competencies and schools generic scientific and subject-related critical thinking in theoretical and practical terms. On successful completion of the master's programme, students are able to familiarise themselves rapidly and independently with geographical subject matter, especially in their chosen area of specialisation, and to purposefully plan, execute and complete geographical projects. This also includes being able to select the appropriate working methods, instruments and techniques for the respective topic. Graduates are able to document and present their results clearly and with a critical eye. They possess communication and teamwork skills and are capable of responsible action and independent scientific work. They are equipped with subject-specific knowledge and skills qualifying them for employment or for doctoral studies.

§ 3
Structure and content of the programme

(1) The master's programme in Geography with specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology consists of thematic units (modules) that generally comprise several thematically related methods of teaching and learning. Students must complete the modules of the core area (§ 4) and one of the specialisations:

- Geographical Development Studies (§ 5),
- Terrestrial Systems (§ 6),
- Environmental Hydrology (§ 7).

(2) Information about the contents, aims, teaching and learning methods, work load hours, forms of active participation, duration and frequency of the modules in the master's programme in Geography is given in the module descriptions (Appendix 1) unless otherwise regulated in the following.

(3) Information about the recommended study timeframe is given in the example course schedule (Appendix 2).

§ 4
Core Area

The following modules must be completed for the core area:

- Geographical skills and techniques for advanced-level students,
- Remote sensing and geographical information systems for advanced-level students
- Human-environment relations.

§ 5
Specialisation in Geographical Development Studies

(1) In the master's programme in Geography, the specialisation in "Geographical Development Studies" addresses spatial structures and processes in developing and transformation countries, using theories, models and methods of the social sciences. Students explore theories of development studies, human-environment relations, regional geography, decentralisation, municipal management, regional planning, as well as development practice, policy and cooperation.

(2) In the "Geographical Development Studies" specialisation, students are taught specialist knowledge and skills that qualify them for employment in development organisations and in the media multiplier field, or to study for a doctorate. The master's programme aims to equip students to meet professional requirements in academic and practical work.

(3) In the "Geographical Development Studies" specialisation, students take the following modules:

1. Fundamentals of Geographical Development Studies
2. Regional Studies – Regional Geography of South and Central Asia
3. Project I – Empirical Development Studies
4. Work Placement
5. Decentralisation and Municipal Development
6. Development Practice and Methods of Regional Planning
7. Project II: Development Cooperation.

(4) To deepen and specialise students' knowledge and skills, additional modules from cognate disciplines are taken, totalling 20 credits; modules may be selected from Islamic Studies, Turkic Studies, Social Anthropology, Central Asian Studies or Agricultural Sciences. The list of selectable modules will be made known to the students of the master's programme in Geography specialising in Geographical Development Studies with reference to the respective study and examination regulations for the module descriptions in due time before the start of the application period. On written application by the student, the examination board can agree to allow modules from other subjects to be chosen. Modules already completed during previous university studies cannot be repeated or recognised for the cognate disciplines.

§ 6
Specialisation in Terrestrial Systems

(1) In the master's programme in Geography, the specialisation in Terrestrial Systems addresses spatial structures and processes related to changing natural and man-made landscapes theories against the background of palaeo and present climates, using models and methods of the natural sciences. Students also learn methods of collecting and evaluating proxy data and supplementary methods of palaeo-environmental research. Processes with and without human impact are temporalised and regionalised, rendering the data potentially useful for planning and predictive purposes. Archaeology course contents are included to strengthen insights into human impact on recent Earth history. The climatic aspect is underpinned by subject matter from Meteorology, and topics from the Geological Sciences supplement palaeobiological and ecological knowledge.

(2) In the "Terrestrial Systems" specialisation, students are taught expert knowledge and skills that qualify them for employment in resource management of rocks, soil and water, landscape protection and nature conservation, consultancy work for local, regional or federal authorities, or to study for a doctorate. The master's programme specialising in Terrestrial Systems aims to enable students to use modern methods to meet professional requirements in both academic and practical work.

(3) In the "Terrestrial Systems" specialisation, students must complete the following modules:

1. Research topics Terrestrial Systems and Environmental Hydrology
2. Regional Studies – Relief and soils of selected major regions
3. Project I – Palaeoenvironmental research
4. Work placement
5. Archaeology
6. Project II – Terrestrial Systems

(4) To deepen and specialise students' knowledge and skills, additional modules totalling 20 credits are completed in cognate disciplines; modules may be selected from

1. 10 credits in Earth Science Modules, of which the modules

- Modern Ecosystems (10 credits)
- Palaeobotany (10 credits)
- The Earth I (10 credits)
- The Earth II
- Sedimentology and Stratigraphy (6 credits)
- Geology of Europe (for Geography)
- Fundamentals of Meteorology
- Physical Climatology
- Synoptic Meteorology

may be chosen, and

2. 10 credits in modules from Biology, Computer Science, Meteorology, Physics and Prehistoric Archaeology.

The list of selectable modules will be made known to the students of the master's programme in Geography specialising in Terrestrial Systems with reference to the respective study and examination regulations for the module descriptions in due time before the start of the application period. On written application by the student, the examination board can agree to allow modules from other subjects to be chosen. Modules already completed during previous university studies cannot be repeated or recognised for the cognate disciplines.

§ 7
Specialisation in Environmental Hydrology

(1) In the master's programme in Geography, the specialisation in "Environmental Hydrology" addresses the principles and rules of the water cycle in natural and human-influenced structures and processes using methods of the natural sciences. In addition, water systems with interdependencies

between natural conditions and human impacts are analysed, regionalised and described, in order to control and regulate them. Using theories, models and methods of the natural sciences, spatial structures and processes of water resources and their cycles are studied, so these outcomes can be used for planning and predictive purposes. Selected aspects of the water cycle are explored. The theory-guided use of appropriate methods of empirical analysis should produce results that can be used for forecasting and spatial planning. Natural and human-influenced factors that vary over space and time are taken into account, as well as their interactions.

(2) In the "Environmental Hydrology" specialisation, students learn expert knowledge and skills that qualify them for employment in resource management of surface- and groundwater (including extreme hydrological situations), in landscape protection and nature conservation, consultancy work for local, regional or federal authorities, or to study for a doctorate. The master's programme specialising in Environmental Hydrology aims to enable students to use modern methods to meet professional requirements in academic and practical work.

(3) In the "Environmental Hydrology" specialisation, students complete the following modules:

1. Research topics Terrestrial Systems and Environmental Hydrology
2. Regional Studies in Environmental Hydrology
3. Project I – Environmental Hydrology
4. Work placement
5. Environmental Hydrology in Practice
6. Modelling in Environmental Hydrology
7. Project II – Applied Environmental Hydrology

(4) To deepen and specialise students' knowledge and skills, additional modules from cognate disciplines are taken, totalling 15 credits; modules may be selected from Biology, Hydrogeology, Computer Science, Meteorology, Physics and Prehistoric Archaeology. To build a stronger profile, the choice of hydrogeological modules, especially "Applied Hydrogeology", "Modelling", "Instructions for Working Independently in Hydrogeology" are recommended. The list of selectable modules will be made known to the students of the master's programme in Geography specialising in Environmental Hydrology with reference to the respective study and examination regulations for the module descriptions in due time before the start of the application period. On written application by the student, the examination board can agree to allow modules from other subjects to be chosen. Modules already completed during previous university studies cannot be repeated or recognised for the cognate disciplines.

§ 8
Teaching and learning methods

(1) Lectures serve to convey an overview of subdisciplines of geography, working methods, problems and results. The links between one subdiscipline and other research fields are clarified, and an orientation is given for subsequent special topics. Lecturers convey teaching contents with reference to specialist literature and provide incentives for students' own work and critical thinking.

(2) Seminars and advanced-level seminars familiarise students with examples of contents, theories and methods of geography using topics of manageable scope. Under the supervision of a faculty member, students explore, present and discuss topics using specialised literature and empirical findings. Advanced-level seminars are held in small, intensively supervised groups.

(3) Field seminars help students to implement methods of working on specific questions, both under guidance and independently.

(4) Colloquia are specialist presentations by teachers and students on new aspects of research, with subsequent discussion.

(5) Laboratory practicals focus on the practical application of newly acquired knowledge and methodological skills. These types of courses are conducted in small, intensively supervised groups.

(6) During the subject-related practical training (work placement) each student learns individually how to put geographical methods, theories or models into practice. The work placement is carried out at a research facility not belonging to the Department of Earth Sciences of Freie Universität Berlin, at a company or an organisation, e.g. in development cooperation.

§ 9
Study abroad

(1) Study at a university abroad is recommended. While studying abroad, students should perform study and examination work for which credits can be transferred. Credits cannot be transferred to an MSc thesis.

(2) Prior to the period of study abroad, a learning agreement should be signed between the student, the chair of the appropriate examining board, and the competent person at the host university. Credits will be transferred for study and examination work performed in accordance with the agreement.

§ 10
Entry into force

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

Appendix 1: Module descriptions

Explanations:

The following module descriptions specify:

- the title of the module
- contents and aims of the module
- the workload required for a student to successfully complete a module
- forms of active participation
- duration of the module.

Information about student workload hours refers especially to

- active participation during contact hours
- the workload involved in minor tasks during contact hours
- time required for self-directed preparation and follow-up work
- work on study units in phases of online study
- direct preparation hours for examination work
- actual examination time.

The times quoted for self-directed study (including preparation and follow-up time, exam preparation) are guidelines to help students to organise the scheduling of their module-related workload.

The workload details correspond to the number of credits assigned to the respective module as a measure of the approximate student workload required to complete the module successfully.

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

The number of credits and additional examination-related information about each module are given in Appendix 1 of the Examination Regulations.

1. Core area

Module: Geographical skills and techniques for advanced students

Aims:

Students are able to independently design and structure a project and submit a proposal; they can plan a work programme and give a presentation of their results in appropriate oral and written form. In addition, they have mastered the specific survey and evaluation techniques of interdisciplinary research.

Contents:

Seminar I: Project management

- Formulating a problem, finding ideas, structuring
- Developing work programmes to handle and analyse problems
- Designing and writing applications and reports
- Designing a project structure (breakdown structure)
- Building and using networks (networking)
- Giving a presentation

Seminar II: Participatory methods

- Participation in the development context
- Necessity and limits of participation
- Participatory Rural Appraisal (PRA)
- Rapid Rural Appraisal (RRA)
- Gender analysis
- Organisation analysis

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)
Seminar I	1	Giving presentation, chairing discussions, group work	Seminar I contact hours 15 Seminar I preparation and follow-up 15 Seminar II contact hours 30 Seminar II preparation and follow-up 30 Exam preparation and exam 60
Seminar II	2		

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology)

Module: Remote sensing and geographical information processing for advanced-level students

Aims:

Students are able to apply advanced methods of space- and time-related raster and vector data processing.

Contents:

The lecture offers an overview of important fundamentals of digital image processing in the context of geoscientific remote sensing. Important image data formats are presented, as well as essential concepts and algorithms necessary for the thematic processing of digital image data (contrast optimisation, digital filters, geometric corrections, radiometric pre-processing and modelling, linear transformations, classification algorithms, etc.). Particular attention will be paid to transforming these algorithms into training- and practice-oriented image processing systems.

The seminar will explore the lecture material in greater depth, giving illustrative examples. In addition, it provides substantive knowledge of geographical information processing in scientific practice:

- dualism of attributes in space and attribute spaces
- spatial reference as object location and object attribute
- aspects of temporal and spatial variance
- stationary and non-stationary transitions
- threshold values and boundary spaces
- temporal and spatial autocorrelation
- variogram analysis: from the discretum to the continuum, spatial interdependence
- dispersion and concentration in space, spatial distribution patterns
- non-linear and logistic models

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Lecture preparation and follow-up	30
			Seminar contact hours	60
Seminar	4	Working on assignments	Seminar preparation and follow-up	60
			Exam preparation and exam	120

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology)

Module: Human-environment relations

Aims:

Students are able to recognise and interpret interactions between natural conditions and forms of cultural-technological use and shaping of spaces. They possess basic knowledge about the complex interactions between humans and the environment (e.g., description of natural spaces and landscape spaces, environmental change and resource availability, use of natural resources).

Contents:

The module focuses on human activity, both as formative action and reaction to climatic and ecological changes of natural and human origin. In addition, it deals with the human dimensions of global change, theoretical concepts of human ecology, political ecology, approaches to risk research, perception and handling of natural events. The advanced-level seminar deals in greater depth with theoretical concepts of human-environment issues and with forms and consequences of anthropogenic use of natural resources with reference to concrete examples.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Lecture preparation and follow-up	15
Advanced seminar	2	Chairing discussions, taking part in discussions	Advanced-seminar contact hours	30
			Advanced-seminar preparation and follow-up	15
			Exam preparation and exam	60

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisations in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology)

2. Specialisations

2.1. Specialisation in Geographical Development Studies

Module: Basics of Geographical Development Studies

Aims:

Students are familiar with the specialist terminology and concepts, theory and practice of Geographical Development Studies and know the basics, which are the starting point for a more intensive exploration of theoretical, empirical and application-oriented questions. They are qualified to independently handle common development-relevant concepts.

Contents:

- Concerns and concepts of development research
- Indicators of development and underdevelopment
- Underdevelopment - development: explanatory approaches, theories and models
- Global economy and spatial structures
- Bi- and multilateral strategies to overcome underdevelopment
- Perspectives of Geographical Development Studies

The lecture creates the basis for concentrating on fundamental questions of development studies.

In the seminar students analyse and discuss the acquired general skills with reference to concrete and topical examples. They acquire a deeper understanding of the nexus of theory and practice.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours Lecture preparation and follow-up Seminar contact hours	30 15 30
Seminar	2	Studying source material, chairing discussions, taking part in discussions, group work	Seminar preparation and follow-up Exam preparation and exam	15 60

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Regional studies – Regional geography of South and Central Asia

Aims:

Students are familiar with fundamental interconnections of the regions in question in South and Central Asia and are able to conduct independent research on the basis of concepts and knowledge of regional studies. They have mastered subject-specific work methods and are familiar with explanatory approaches to geographical regional analyses.

Contents:

- Concerns and concepts of regional geography
- Spatial analysis in the development of geography
- Regional disparities
- Development region: South and Central Asia.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Lecture preparation and follow-up	15
			Seminar contact hours	30
Seminar	2	Studying source material, chairing discussions, taking part in discussions, group work	Seminar preparation and follow-up	15
			Exam preparation and exam	60

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: Every summer semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Project I – Empirical development studies

Aims:

Building on their acquired competences in scientific theories and methods, students are able to independently work on topical issues relating to regions in South or Central Asia. Students have gained regional competence through guided and independent scientific work.

Contents:

The advanced-level seminar provides preparation for the field seminar in South or Central Asia and consists in work on a complex subject area with regional reference on the basis of literature studies. The field seminar focuses on transferring theoretical knowledge to the region by studying development-relevant questions related to the selected region. This includes performing empirical geographical field research, if possible in cooperation with non-governmental organisations (NGOs) and development cooperation institutions.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Advanced-level seminar	2	Taking part in discussions, formulating concepts of problem analysis	Advanced-level seminar contact hours	30
			Advanced-level seminar preparation and follow-up	30
Field seminar	4	Conducting and evaluating empirical surveys	Field seminar contact hours	60
			Field seminar preparation and follow-up	60
			Exam preparation and exam	120

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester; advanced-level seminar during the lecture period, 14-day compact field seminar in the semester break

Frequency offered: every summer semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Work placement

Aims:

Students are familiar with working methods in non-university research facilities and companies and/or have gained insight into the professional environment of development agencies. Students experience the types of jobs in which geographers are employed and involved in independent problem-solving.

Contents:

Insight into the structure and work methods of development agencies, companies and non-university facilities. In the colloquium students describe their respective work experiences and introduce their fellow students to the various working environments. Students thus become acquainted with potential fields of employment for geographers.

Teaching and learning methods	**Forms of active participation**	**Workload** (hours)	
Work placement	Report	Placement contact hours	240
		Placement follow-up	30
Colloquium	Presentation	Colloquium contact hours	15
		Colloquium preparation and follow-up	15

Language: German; English or the language of the country in the case of placements abroad

Workload/total hours: 300

Duration of module: Two semesters; work placement in the break before the summer semester, colloquium during the summer semester

Frequency offered: colloquium every summer semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Decentralisation and municipal development

Aims:

Students are able to analyse decentralisation processes, are aware of aid instruments and can assess their possibilities and limitations realistically. Students are familiar with municipal areas of responsibility and the role of local institutions in the development process.

Contents:

Seminar I – Decentralisation in developing countries:

- Dimensions, forms, aims and risks of decentralisation
- Conditions and principles for distributing tasks among levels of government

Seminar II – Municipal development and local civil society:

- Municipal areas of responsibility and the role of civil society organisations in the local/regional development process
- The role of development cooperation in building up functioning communities and decentralised institutions

<table>
<tr><th>Teaching and learning methods</th><th>Contact hours
(hours per week per semester)</th><th>Forms of active participation</th><th>Workload
(hours)</th></tr>
<tr><td>Seminar I</td><td>2</td><td rowspan="2">Studying source material, participating in discussions, presentation, group work</td><td rowspan="2">Seminar I contact hours 30
Seminar I preparation and follow-up 15
Seminar II contact hours 30
Seminar II preparation and follow-up 15
Exam preparation and exam 60</td></tr>
<tr><td>Seminar II</td><td>2</td></tr>
</table>

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Development practice and methods of regional planning

Aims:

Students are able to identify location- and target-group-compatible strategies for regional development, while taking account of the interacting dimensions of sustainable development. They are aware of the major methods of planning, monitoring and evaluating measures of regional development and are able to assess their possibilities and limits.

Contents:

Seminar I - Strategies

- Multi-level approach to development cooperation
- Linking of sectoral and regional approaches
- Regional economic development
- Decentralised management of natural resources
- Target groups and gender approach
- Role of technical and financial cooperation

Seminar II - Methodology

- Regional analysis
- Land use planning
- Target groups and problem analysis
- Organisation analysis
- Project and programme planning
- Impact analysis
- Evaluation methods

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)
Seminar I	2	Studying source material, taking part in discussions, presentation, group work	Seminar I contact hours 30 Preparation and follow-up Seminar I 15 Seminar II contact hours 30 Preparation and follow-up Seminar II 15 Exam preparation and exam 60
Seminar II	2		

Language: German or English

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies)

Module: Project II – Development Cooperation

Aims:
Students know the organisation, structure and functioning of various multinational, governmental, non-governmental, church-run and private agencies of development cooperation in Europe. Building on their acquired competences in scientific theories and methods, they are able to independently design, implement, evaluate and present thematically circumscribed projects. They are able to hold subject-related talks with representatives of research institutions and development cooperation organisations and to subject their positions to critical analysis.

Contents:
Advanced-level seminar:

- Tasks of governmental, semi-governmental and private-sector agencies and non-governmental organisations (NGOs) working in development cooperation
- History, sectoral orientation and current programmes of governmental and non-governmental development cooperation
- International agreements
- Scope for action in the work programmes of various organisations
- Role of the European Union in European development policies

Field seminar: Students visit development cooperation agencies and conduct specialised talks on a given topic with representatives of these institutions about sectoral plans, programmes of national, international and non-governmental development cooperation and questions of quality management.

In the colloquium, research results from the field seminar are presented, and related studies are introduced by external speakers. The colloquium thus contributes to linking the results of modules Project I and Project II with current research topics.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)
Advanced-level seminar	2	Chairing discussions, conducting and evaluating empirical surveys	Advanced-level seminar contact hours 30 Advanced-level seminar preparation and follow-up 30 Field seminar contact hours 30 Field seminar preparation and follow-up 30 Colloquium contact hours 30 Colloquium preparation and follow-up 30 Exam and exam preparation 120
Field seminar	2	Chairing discussions, conducting and evaluating empirical surveys	
Colloquium	2	Taking part in discussions, report	

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Geographical Development Studies, Terrestrial Systems and Environmental Hydrology)

2.2 Specialisation in Terrestrial Systems

Module: Research topics Terrestrial Systems and Environmental Hydrology

Aims:

Students have gained an overview over the development of research in the field of morphodynamics and of landscape-shaping processes and material flows.

Contents:

Reading specialist literature aims to train the capacity for scientific discourse. Seminar I focuses on the historic-genetic aspects of geomorphology, seminar II on functional geomorphology with current morphodynamic aspects. The aim of both seminars is to make clear the development and linking of geomorphological and hydrological research.

The following topics will be explored for different example regions:

Seminar I – Reading course: Landscape-shaping processes and material flows:

- Multi-scale reliefs and relief generations
- Material budget processes
- Material budgets in different climate zones
- Human influence on the material budget

Seminar II – Reading course: Morphodynamics:

- Morphodynamics in different climate zones
- Measuring morphodynamics
- Dimensions and frequencies of morphodynamic processes
- Risks of morphodynamic processes and their assessment

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Seminar I	2	Reading the given literature, taking part in discussions, chairing discussions	Seminar I contact hours	30
			Seminar I preparation and follow-up	30
Seminar II	2		Seminar II contact hours	30
			Seminar II preparation and follow-up	30
			Exam preparation and exam	30

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems, Environmental Hydrology)

Module: Regional Studies - Relief and soils of selected major regions

Aims:

Students are able to analyse and interpret complex connections in relief evolution and soil development as well as the factors governing them in selected major regions.

Contents:

The lecture presents conceptual models of relief evolution and soil development in selected major regions. Morphogenetic aspects are explained in the context of process-response systems in geomorphology. Building on this basis, the advanced-level seminar explores specific regional examples in depth.

- Comparing models of relief evolution
- Relief development in various climates
- Use and risk potentials of different relief units
- Soil development in different climates
- Toposequences, catenas
- Use and risk potentials of soils

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours Preparing and following up lecture	30 15
Advanced-level seminar	2	Taking part in discussions, chairing discussions	Advanced-level seminar contact hours Preparing and following up advanced-level seminar Exam preparation and exam	30 15 60

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every summer semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Project I – Palaeo-environmental research

Aims:

Students are competent in the scientific methods required to take samples, analyse soils and sediments, and collect proxy data. They are able to evaluate and present results against the background of specific topics in the field of terrestrial systems.

Contents:

Starting from a specific scientific issue, the advanced-level seminar focuses on palaeoclimate reconstruction techniques such as physical and chemical dating or proxy data analysis.

In the field seminar, students select sampling sites using various methods of sampling, mapping outcrops or drilling. The focus is on sampling in order to solve the issue addressed in the advanced-level seminar.

In the laboratory practical, students analyse samples and learn techniques of obtaining proxy data for reconstructing the palaeo-environment. Analysis of the primary data collected in the field seminar produces results that contribute to solving the initial issue. The results are interpreted and discussed in the research context during the Project II module.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Advanced-level seminar	2	Taking part in discussions, chairing dscussions	Advanced-level seminar contact hours	30
			Preparing and following up advanced-level seminar	15
Field seminar	2	Sampling and collecting primary data	Field seminar contact hours	30
			Preparing and following up field seminar	15
Laboratory practical	2	Analysing samples	Lab practical contact hours	30
			Preparing and following up laboratory practical	15
			Exam preparation and exam	165

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester. Advanced-level seminar during the lecture period, field seminar as a 7-day and laboratory practical as a 5-day compact course during the semester break.

Frequency offered: every summer semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Archaeology

Aims:

Students have knowledge of modern interdisciplinary issues and research approaches in settlement and landscape archaeology. They are familiar with the interactions between human settlement behaviour, forms of land use and economic activity, and the surrounding natural space in a synchronistic and diachronic perspectives, and with the fundamentals of prehistoric cultural landscape genesis.

Contents:

The lectures give an overview of the following topics:

- Introduction to settlement and landscape archaeology: outline of its research history, concepts and objectives, scale levels and spatially effective factors
- Overview of prehistoric house and settlement types, settlement structures and forms of land use
- Cultural-space location factors and human-induced landscape changes with reference to selected examples, modelling and archaeological prediction

The exercises address selected topics of settlement and landscape archaeology 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 synchronisation and interpretation.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Preparing and following up lecture	30
			Exercises contact hours	30
Exercises	2	Group work, exercise assignments	Preparing and following up exercises	90
			Exam preparation and exam	120

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Project II – Terrestrial systems

Aims:

Building on the competence in scientific methodology acquired in the module "Project I – Palaeo-environmental research", students are able to work on, evaluate and present scientific issues independently. They have acquired methodological competences in project management.

Contents:

In the advanced-level seminar, students, under guidance, evaluate and interpret the data they collected in field and laboratory work, thus concluding the issue explored in Project I.

In the colloquium, students communicate their research results from the advanced-level seminar, and external speakers present relevant topics. The colloquium thus contributes to linking the results of the modules Project I and Project II with topical research issues.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Advanced-level seminar	4	Processing and evaluating data	Advanced-level seminar contact hours	60
			Preparing and following up advanced-level seminar	60
Colloquium	2	Taking part in discussions, chairing discussions	Colloquium contact hours	30
			Preparing and following up colloquium	15
			Exam preparation and exam	135

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Modern Ecosystems (10 credits)

Aims:

Understanding current processes in ecosystems as a prerequisite for palaeo-ecological studies

Contents:

In two consecutive practicals, marine and continental systems are analysed in terms of ecology and facies, focusing on the interactions of taxa that are relevant for palaeontology. The seminar addresses fundamental palaeontological processes in ecosystems.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Practical A	4	Completing exercise assignments, taking part in discussions	Contact hours Preparation and follow-up Exam preparation and exam	60 15 45
Practical B	4		Contact hours Preparation and follow-up Exam preparation and exam	60 15 45
Seminar	2	Chairing discussions, taking part in discussions	Contact hours Preparation and follow-up, Exam preparation and exam	30 30

Language: English

Workload/total hours: 300

Duration of module: one semester; compact 20-day course during the semester break

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Palaeobotany (10 credits)

Aims:

Knowledge of the palaeobotanically relevant groups of organisms and their use in solving stratigraphic problems in science and economics.

Contents:

Lecture I: Theoretical basics of palaeobotany (evolution and palaeobiogeography, vegetation types)

Exercises I: Plant identification exercises comparing fossil and recent material.

Lecture II: Introduction to pollen and spores, laboratory work, microscopic analysis and documentation, principles and interpretation of diagrams, application in stratigraphy and ecology.

Exercises II: Plant identification exercises comparing fossil and recent material.

Exercises III: Collecting material in the field, micropalaeontological preparation methods (chemical and physical), raster electron microscopy, digital photography through the microscope, making thin sections.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture I	3	-	Contact hours Preparation and follow-up and exam preparation	45 45
Exercises I	1	Completing exercise assignments, taking part in discussions	Contact hours Preparation and follow-up and exam preparation	15 15
Lecture II	2	-	Contact hours Preparation and follow-up and exam preparation	30 30
Exercises II	2	Completing exercise assignments, taking part in discussions	Contact hours Preparation and follow-up and exam preparation	30 30
Exercises III	2		Contact hours Preparation and follow-up and exam preparation	30 30

Language: German; English is optional

Workload/total hours: 300

Duration of module: two semesters (Lecture I and Exercises I in the winter semester; Lecture II, Exercises II and III in the next summer semester)

Frequency offered: Once a year, starting each winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: The Earth I (10 credits)

Aims:

Thorough understanding of the structure, composition and processes of our planet. Understanding of the Earth's uniqueness compared with other planets. Insight into the physical and chemical processes shaping the Earth's surface, and their driving forces in its interior. Knowledge of the Earth's structure and its significance. Knowledge of the methods earth scientists use to explore the Earth's interior. Insight into geological cycles and their time frames. Knowledge of and ability to identify the major rock-building minerals and rocks and how they were formed.

Contents:

Lecture: Fundamental systems and processes of Planet Earth. Space and time, composition, geoscientific cycles, interaction between hydrosphere, atmosphere, geosphere; relative and absolute age, sedimentary cycles (weathering, erosion, sedimentation), phenomenological geophysics (seismology, magnetics, geoelectrics, geothermal energy), magmatism, metamorphism, structure, plate tectonics.

Exercise: Experimental and theoretical exercises to consolidate lecture information

Practical: Macroscopic identification of minerals and rocks

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	3	-	Contact hours Preparation and follow-up Exam preparation and exam	45 90 45
Exercise	2	Completing exercise assignments	Contact hours Preparation and follow-up, exam preparation and exam	30 30
Practical	2	Identification exercises	Contact hours Preparation and follow-up, exam preparation and exam	30 30

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester.

Frequency offered: every winter semester.

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Sedimentology and stratigraphy (6 credits)

Aims:

Knowledge of the origin and internal architecture of different types of sedimentary basin, methods of stratigraphy, and transport and depositional processes of rocks. Ability to use knowledge of lithologies, sedimentary structures and geometries of a sediment body at different scales to identify its formation conditions and driving factors (climate, tectonics).

Contents:

Lecture I: Process-oriented fundamentals of sedimentary geology, especially transport processes and their driving factors; climatic and tectonic factors governing basin formation. Summary of depositional environments.

Exercises: Experiment-focused consolidation of lecture contents.

Lecture II: Basic principles and applications of stratigraphy. Description of different methods of correlation and dating, each with practical examples.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture I	1	-	Contact hours Preparation and follow-up Exam preparation and exam	15 30 15
Exercise	2	Performing and evaluating experiments; completing exercise assignments	Contact hours Preparation and follow-up Exam preparation and exam	30 20 10
Lecture II	2	-	Contact hours Preparation and follow-up Exam preparation and exam	30 15 15

Language: German; English is optional

Workload/total hours: 180

Duration of module: one semester.

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module: Geology of Europe (for geographers)

Aims:

Knowledge of the regional geology of Europe, with emphasis on central Europe, and understanding of its complex geology. Understanding of the processes of continent formation. Ability to identfy the major rock units and knowledge of their geological history. Ability to classify and interpret geological maps of central Europe in terms of time and space.

Contents:

Lecture: Processes of continental growth and the interaction between tectonics, basin formation and climate exemplified by (central) Europe. Process-focused geological evolution of Europe: Pre-Cambrian, Caledonides, Variscides, Tertiary mountain ranges (Pyrenees, Alps, Carpathians, Hellenides, Taurides) and fault systems, Rhine graben, ice ages.

Seminar: On the basis of the lecture contents, students write short papers and summaries and discuss oral and written contributions to contemporary topics in the geosciences. They search for and work with scientific literature.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)
Lecture	2	-	Contact hours 30 Preparation and follow-up 50 Exam preparation and exam 10
Seminar	2	Oral presentations, writing abstracts, taking part in discussions, locating and evaluating literature	Contact hours 30 Preparation and follow-up 30 Exam preparation and exam 30

Language: German; English is optional

Workload/total hours: 180

Duration of module: one semester.

Frequency offered: every winter semester.

Applicability: Master's programme in Geography (specialisation in Terrestrial Systems)

Module "Work Placement": see 2.1.

Module "The Earth II": see *Studienordnung für den Bachelorstudiengang „Geologische Wissenschaften“*.

Modules "Fundamentals of Meteorology“, "Physical Climatology" and "Synoptic Meteorology": see *Studienordnung für den Bachelorstudiengang Meteorologie*.

2.3 Specialisation in Environmental Hydrology

Module: Regional studies in Environmental Hydrology

Aims:

Students have an expanded basic knowledge about the hydrology of rural and urban spaces and can independently handle the specialist terminology. They are familiar with hydrogeological fundamentals and hydrological phenomena of flowing and standing waters and have knowledge of hydrology in practice.

Contents:

The lecture gives an overview of the regional hydrology of urban and rural spaces. In the advanced-level seminar, the topics are explored in greater detail with reference to specific examples.

- Fundamental processes of hydrology in different landscape spaces
- Groundwater recharge, water requirements and consumption
- Irrigation and drainage, salinisation, desertification
- Links between climate changes and water budget parameters
- Present and future water supply and disposal
- Quantity and quality of groundwater and surface water
- Wastewater purification and treatment
- Supplying water to metropolitan areas

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Lecture follow-up	15
			Advanced-level seminar contact hours	30
Advanced-level seminar	2	Study of source material, taking part in discussions, chairing discussions	Preparation and follow-up advanced-level seminar	15
			Exam preparation and exam	60

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every summer semester

Applicability: Master's programme in Geography (specialisation in Environmental Hydrology)

Module: Project I – Environmental Hydrology

Aims:

Students have competence in the scientific methods of sampling and analysing water and solid matter and of evaluating and presenting findings against the background of specific issues of environmental hydrology.

Contents:

The project begins with an advanced-level seminar to amplify knowledge as regards content and regional aspects. A problem is identified, and a study design is developed. The main focus is on familiarising students with methods such as physical and chemical analysis methods.

In the field seminar, appropriate sampling sites are selected using different sampling methods. The seminar focuses on taking samples to solve the problem identified in the advanced-level seminar.

In the laboratory practical, students learn analytical techniques, including both the actual laboratory work and the evaluation of analysis results. The analysis of primary data collected during the field seminar produces results that contribute to solving the initially identified problem. Interpretation of the results and discussion in the research context are the subject of module Project II.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Advanced-level seminar	2	Taking part in discussions, chairing discussions	Advanced-level seminar contact hours	30
			Preparation and follow-up advanced-level seminar	15
Field seminar	2	Sampling and collecting primary data	Field seminar contact hours	30
			Field seminar preparation and follow-up	15
Laboratory practical	2	Analysing samples	Laboratory practical	30
			Laboratory practical preparation and follow-up	15
			Exam preparation and exam	165

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester, advanced-level seminar during the lecture period, field seminar as a 7-day and laboratory practical as a 5-day compact course in the semester break

Frequency offered: every summer semester

Applicability: Master's programme in Geography (specialisation in Environmental Hydrology)

Module: Environmental Hydrology in practice

Aims:

Students are familiar with application-oriented questions and work methods in integrated watershed management.

Contents:

Watershed Management: Practical examples are used to illustrate topical problems of Integrated Watershed Management in Europe and in large non-European regions, including risk assessment (e.g., 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.

<table>
<tr><th>Teaching and learning methods</th><th>Contact hours
(hours per week per semester)</th><th>Forms of active participation</th><th colspan="2">Workload
(hours)</th></tr>
<tr><td>Lecture</td><td>2</td><td>-</td><td>Lecture contact hours
Lecture preparation and follow-up</td><td>30
15</td></tr>
<tr><td>Advanced-level seminar</td><td>2</td><td>Taking part in discussions, chairing discussions</td><td>Advanced-level seminar contact hours
Advanced-level seminar preparation and follow-up
Exam preparation and exam</td><td>30
15
60</td></tr>
</table>

Language: German; English is optional

Workload/total hours: 150

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Environmental Hydrology)

Module: Modelling in Environmental Hydrology

Aims:

Students are able to understand and assess hydrologically relevant parameters and incorporate them into existing databases. They have acquired the ability to model system components (rainfall, runoff, groundwater, evaporation, soil erosion) and to integrate the factors influencing them.

Contents:

Hydrologically relevant measurement data are incorporated into simulation programs using complex databases. A distinction is made between black box models, conceptual models and physically based models.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)	
Lecture	2	-	Lecture contact hours	30
			Lecture preparation and follow-up	15
			Seminar contact hours	60
Seminar	4	Exercises with simulation programs	Seminar preparation and follow-up	75
			Exam preparation and exam	120

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Environmental Hydrology)

Module: Project II **–** Environmental Hydrology

Aims:

Building on their competences in scientific methods acquired in Module Project I - Environmental Hydrology, students are able to independently handle, evaluate and present scientific issues. They have acquired methodological competences in project management.

Contents:
In the advanced-level seminar, students, under guidance, evaluate and interpret the data they collected during field and laboratory work, thus concluding treatment of the issue identified in Project I.

In the colloquium, students describe research results from the advanced-level seminar, and external speakers present relevant studies. The colloquium thus contributes to linking the outcomes of the Project I and Project II modules with topical research issues.

Teaching and learning methods	**Contact hours** (hours per week per semester)	**Forms of active participation**	**Workload** (hours)
Advanced-level seminar	4	Processing and evaluating data	Advanced-level seminar contact hours 60 Advanced-level seminar preparation and follow-up 60
Colloquium	2	Taking part in discussions, chairing discussions	Colloquium contact hours 30 Colloquium preparation and follow-up 15 Exam preparation and exam 135

Language: German; English is optional

Workload/total hours: 300

Duration of module: one semester

Frequency offered: every winter semester

Applicability: Master's programme in Geography (specialisation in Environmental Hydrology)

Modules Research topics "Terrestrial Systems and Environmental Hydrology": see 2.2.

Modules "Work Placement": see 2.1.

Appendix 2: Example course schedule

1st semester

Specialisation in Geographical Development Studies	***Specialisation in Terrestrial Systems***	***Specialisation in Environmental Hydrology***
M1: Geographical skills and techniques for advanced students S – Project management S – Participatory methods	**M1: Geographical skills and techniques for advanced students** S – Project management S – Participatory methods	**M1: Geographical skills and techniques for advanced students** S – Project management S – Participatory methods
M2: Remote sensing and Geographical Information Systems for advanced students L - Digital image processing S – GIS and geostatistics in scientific practice	**M2: Remote sensing and Geographical Information Systems for advanced students** L - Digital image processing S – GIS and geostatistics in scientific practice	**M2: Remote sensing and Geographical Information Systems for advanced students** L - Digital image processing S – GIS and geostatistics in scientific practice
M3: Human-environment relations L – Human-environment relations AS - Natural resources and their management	**M3: Human-environment relations** L – Human-environment relations AS - Natural resources and their management	**M3: Human-environment relations** L – Human-environment relations AS - Natural resources and their management
M4: Basics of Geographical Development Studies L – Geographical development studies S – Topical issues in geographical development studies	**M4: Research topics Terrestrial Systems and Environmental Hydrology** S – Reading course Landscape-shaping processes and material flows S – Reading course Morphodynamics	**M4: Research topics Terrestrial Systems and Environmental Hydrology** S – Reading course Landscape-shaping processes and material flows S – Reading course Morphodynamics
Cognate disciplines	**Cognate disciplines**	**Cognate disciplines**

2nd semester

Specialisation in Geographical Development Studies	***Specialisation in Terrestrial Systems***	***Specialisation in Environmental Hydrology***
M5: Regional Studies – Regional geography of South and Central Asia L – Regional geography of South and Central Asia S –Regional analysis in a developing region of South and Central Asia	**M5: Regional Studies** – Relief and soils of selected major regions L – Relief and soils of selected major regions AS – Relief and soils of selected major regions	**M5: Regional Studies –** Environmental Hydrology L – Regional hydrology of urban and rural space AS – Regional hydrology of urban and rural space
M6: Project I - Empirical development studies AS – Project preparation FW – Fieldwork	**M6: Project I** – **Palaeo-environmental research** AS – Project preparation FW – Fieldwork LPr – Laboratory practical	**M6: Project I – Environmental Hydrology** AS – Project preparation FW – Fieldwork LPr – Laboratory practical
M7: Work placement Work placement Colloquium	**M7: Work placement** Work placement Colloquium	**M7: Work placement** Work placement Colloquium
Cognate disciplines	**Cognate disciplines**	**Cognate disciplines**

3rd semester

Specialisation in Geographical Development Studies	***Specialisation in Terrestrial Systems***	***Specialisation in Environmental Hydrology***
M8: Decentralisation and municipal development S - Decentralisation in developing countries S – Municipal development and local civil society	**M8: Archaeology** L – Introduction to settlement and landscape archaeology Ex – Selected topics of settlement and landscape archaeology	**M8: Environmental Hydrology in practice** L – Watershed management AS – Watershed management
M9: Development practice and methods of regional planning S - Strategies of regional development S – Methods of planning regional development	**M9: Elective modules** Palaeontology or Geology or Meteorology	**M9: Modelling in Environmental Hydrology** L – Hydrological modelling S – Hydrological modelling
M10: Project II – Development Cooperation AS – Project evaluation FS – Institutions of development cooperation within Europe C - Colloquium	**M10: Project II Terrestrial Systems** AS – Project evaluation C - Colloquium	**M10: Project II Environmental Hydrology** AS – Project evaluation C - Colloquium
Cognate disciplines		**Cognate disciplines**

4th semester

Specialisation in Geographical Development Studies	***Specialisation in Terrestrial Systems***	***Specialisation in Environmental Hydrology***
Master's thesis • Master's thesis • Oral defence	**Master's thesis**: • Master's thesis • Oral defence	**Master's thesis**: • Master's thesis • Oral defence

L Lecture
S Seminar
AS Advanced-level seminar
FW Fieldwork
FS Field seminar
Ex Exercises
LPr Laboratory practical