International Master of Environmental Sciences

Module Handbook

IMES Examination Committee

2025-04-05

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Preface

This module handbook describes the International Master of Environmental Sciences (IMES) program at the University of Cologne. It reflects the updated structure and module descriptions valid from the winter semester 2025/2026 onward.

The module handbook serves as a key reference for students throughout their studies. It provides detailed information about the structure of the program, the types of modules offered, and the intended learning outcomes for each module. It also outlines how modules are grouped thematically and how they contribute to the overall academic and professional goals of the IMES program.

Students are encouraged to use this handbook to:

- Plan their individual study paths,
- Understand the expectations and assessment formats of each module,
- Explore elective options and specialisation areas,
- Prepare for academic advising and course registration.

Together with the examination regulations (*Prüfungsordnung*) and guidance provided by the IMES Office, this handbook is an essential tool for navigating the curriculum and making informed decisions throughout the program.

We welcome constructive feedback from students to help us further improve the module handbook. Please write to us at imes-info(at)uni-koeln.de.

Contact

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Key Academic Terms and Abbreviations

Study Structure and Curriculum

Module
A module is a self-contained unit of study that brings together related topics into a coherent teaching and learning block. It typically includes lectures, seminars, and assessments, and carries a specific number of ECTS credits.

Core Modules (CM)
Core Modules provide foundational knowledge in essential areas of environmental sciences. They are typically completed at the beginning of the program.

Advanced Modules (AM)
Advanced Modules build on Core Modules, enabling students to deepen their knowledge and apply methods more independently.

Specialisation Modules (SM)
Specialisation Modules support academic profiling and allow students to focus on specific areas of interest. They usually align with the topic of the Master's thesis.

Time and Workload

ECTS
The European Credit Transfer and Accumulation System (ECTS) is used across the European Higher Education Area (EHEA) to ensure comparability and recognition of academic qualifications. ECTS credits reflect the total workload and defined learning outcomes of a course or program. One ECTS credit at the University of Cologne corresponds to approximately 30 hours of work, including contact time, self-study, and assessment. A full academic year equals 60 ECTS credits (approximately 30 per semester).

Contact time
Contact time refers to scheduled hours during which students participate in instructor-led sessions such as lectures, seminars, or laboratory work.

Self-study time
Self-study time refers to hours dedicated to independent learning activities, including assignments, readings, and exam preparation.

CHW (Contact hours per week)
CHW refers to the number of instructor-led hours scheduled per week for a given course. This corresponds to the German abbreviation **SWS** (*Semesterwochenstunden*).

Assessment and Progress

Non-graded assessment (German: Studienleistung)
A non-graded assessment is a mandatory, formative component of coursework at the University of Cologne. It must be completed satisfactorily for academic progress but does not affect the final course grade. It may include short assignments, or practical tasks.

Semester Information

SoSe
SoSe stands for *Sommersemester* (summer semester), which runs from 1 April to 30 September.

WiSe
WiSe stands for *Wintersemester* (winter semester), which runs from 1 October to 31 March.

Acknowledgements

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ChatGPT was used to support the writing of this module handbook in the sense of computation offloading. All content originates from the program coordinator; ChatGPT was used to help formulate, structure, and refine the text.

PART I

DESCRIPTION OF THE PROGRAM

The International Master of Environmental Sciences (IMES)

Purpose

Environmental challenges today are multifaceted, systemic, and global in scope. They cannot be addressed by isolated disciplines, isolated geographies or short-term solutions. The International Master of Environmental Sciences (IMES) program responds to this complexity by fostering a learning environment rooted in interdisciplinarity, internationality, scientific inquiry, and anticipatory thinking.

Inspired by the Club of Rome's vision of No Limits to Learning, the program views education not merely as knowledge transmission, but as a transformative and continuous process. Students are encouraged to integrate perspectives from the natural sciences, social sciences, humanities, law, and economics to better understand and engage with human–environment systems. Through this process, they develop the capacity to learn across boundaries — disciplinary, cultural, and institutional — and to respond with creativity and responsibility to emerging environmental challenges.

Aligned with the values articulated in The Fifth Element, the IMES program promotes a systems-based approach to education. It seeks to cultivate not only analytical and methodological competence, but also a sense of responsibility, relational thinking, and openness to regeneration — both ecological and societal. The program cultivates environmental stewardship as a dynamic, reflective practice rooted in scientific insight, ethical awareness, and cross-cultural dialogue. In this way, IMES prepares students to co-create knowledge and solutions in a world that demands profound and continuous learning.

Quick facts

Degree	Master of Science (M.Sc.)
Duration	4 semesters / 2 years
Credits	120 ECTS
Language	English
Application Deadline	May 15 (annually)

Study Objectives

The IMES program (Master of Science) prepares students to engage in independent, research-based inquiry into environmental challenges at the interface of natural and human systems. Students learn to critically evaluate scientific findings, apply appropriate methodologies, and analyze complex environmental problems from interdisciplinary and international perspectives.

The program fosters the ability to integrate knowledge across environmental sciences, including ecological, legal, economic, and societal dimensions. Students strengthen their scientific writing, presentation, and project management skills while developing the social competencies required to work successfully in transdisciplinary contexts. Through a combination of theoretical depth and applied experience, the IMES program equips graduates for diverse career paths in environmental science and policy, and for academic advancement at the doctoral level.

Content

IMES is a four-semester, interdisciplinary degree program that combines natural and social sciences to investigate pressing environmental challenges. Core modules introduce key scientific, legal, economic, and social dimensions of human–environment interactions. A set of integrative modules connects these domains, supporting a systems-level understanding of environmental issues.

The program fosters an international learning environment through a diverse cohort of students from EU and non-EU countries, and through the participation of guest lecturers from partner institutions worldwide. Students shape their own academic profiles by selecting elective modules that match their interests and career goals, culminating in a Master's thesis within their chosen focus area.

A mandatory internship provides practical experience and insight into professional fields related to environmental sciences. Throughout the program, students develop research and methodological skills, scientific communication abilities, and the flexibility to engage with new and complex problems. The program structure allows for a study abroad semester, typically in the third semester, further enriching the international and intercultural dimension of the degree.

Admission Requirements

The admissions requirements are described on the IMES website and can be found in the Admission Regulations.

Scientific Integrity

The University of Cologne is committed to upholding the principles of good scientific practice (*gute wissenschaftliche Praxis*). These principles apply to all members of the academic community — including students — and are essential for maintaining trust, transparency, and fairness in research and learning.

As a student in the IMES program, you are expected to follow these principles in all academic work. Good scientific practice includes:

- **Respect for intellectual property**: Always acknowledge the ideas, texts, and data of others through proper citation. Plagiarism—including paraphrasing without credit or disguising sources—is strictly prohibited.
- **Originality**: All submitted work must be your own. Reusing your own previous work without disclosure (*self-plagiarism*) is not permitted.
- **Transparency**: Methods and sources must be clearly documented and traceable.
- **Accountability**: You must be able to justify your findings and decisions and maintain records of your work.

Violations of these principles are defined as **acts of deception** in §24 of the IMES examination regulations. This includes cheating, plagiarism, and the use of unauthorized aids. Sanctions may include:

- Invalidation of the affected examination,
- Temporary or permanent exclusion from further assessments,
- Use of plagiarism detection software in suspected cases,
- Revocation of the Master's degree in cases of serious misconduct discovered after graduation.

If you are uncertain about citation rules, proper collaboration, or how to work with sources, please consult your instructors or the IMES coordination team.

For further information, see:

- Guidelines for Good Scientific Practice (University of Cologne)
- Examination Regulations (§24): *Deception and Misconduct*

Qualification Profile

The German Qualifications Framework for Higher Education (HQR)

The *German Qualifications Framework for Higher Education (HQR)* describes the key competencies that students are expected to develop during their studies at German universities. It serves as a national reference for ensuring high academic standards, transparent learning outcomes, and comparability across degree programs—both nationally and internationally.

Why does the HQR matter?

The HQR plays an important role in:

- **Designing degree programs**: Universities use it to define what students should know and be able to do at different academic levels (Bachelor, Master, Doctorate).
- **Developing modules and assessments**: It helps structure learning outcomes, teaching methods, and examinations.
- **Ensuring international comparability**: The HQR aligns with the European Qualifications Framework (EQF) and the Qualifications Framework for the European Higher Education Area (QF-EHEA).
- **Supporting mobility and recognition**: It facilitates credit transfer, student exchange, and mutual recognition of degrees across countries.

What are the core competence dimensions?

The HQR defines four broad competence areas that every Master's graduate should develop:

- **Knowledge and Understanding**
  Deep and critical understanding of theories, methods, and debates in the field of study.
- **Use, Application, and Generation of Knowledge**
  Ability to apply knowledge to new problems and to independently conduct research.
- **Communication and Cooperation**
  Skills to communicate effectively, work in diverse teams, and engage in academic or professional discourse.
- **Academic Self-Understanding and Professionalism**
  Capacity for ethical reflection, independent judgement, and responsible professional behavior.

What does the HQR mean for the IMES program?

The integration of the German Qualifications Framework for Higher Education (HQR) into the IMES program contributes to the academic structure, international comparability, and competence orientation of the degree. Specifically, it ensures that:

- Program outcomes are competence-driven: Each module fosters academic and professional skills across the four HQR dimensions.
- Learning objectives are transparent and structured: Students gain clarity about what they are expected to know and be able to do at each stage of the program.
- The degree is internationally comparable: Alignment with the HQR and European frameworks supports recognition of qualifications beyond Germany.

- Graduates are well prepared: The program equips students for both research careers and applied roles in environmental science, policy, and practice.
- Quality assurance is ensured: The framework supports consistent standards in curriculum development, teaching, and assessment.

Qualification Profile of IMES

This qualification profile outlines the core competencies expected from graduates of the IMES program. It supports curriculum development, teaching strategies, assessment, and quality assurance. The profile is based on the four competence dimensions of the German Qualifications Framework for Higher Education (HQR) and adapted to the interdisciplinary and international nature of IMES.

1. Knowledge and Understanding

Graduates of the IMES program possess:

- Broad interdisciplinary knowledge of environmental systems, interactions between natural and human systems, and global environmental challenges.
- Specialized understanding of theories, methods, and key debates in at least two relevant disciplinary fields (e.g., environmental economics, environmental law, geosciences, physical or human geography, ecology, or political science).
- A critical awareness of the limits of knowledge and current research trends in environmental sciences, including their societal relevance.

2. Use, Application, and Generation of Knowledge

Graduates are able to:

- Apply advanced methods of data collection, analysis, and modeling to environmental problems.
- Integrate and synthesize scientific, legal, economic, and social perspectives in problem-solving.
- Design and conduct independent research projects, including framing of research questions, selection of appropriate methods, and interpretation of results.
- Develop innovative and context-sensitive solutions to complex, real-world environmental challenges.

3. Communication and Cooperation

Graduates are able to:

- Effectively communicate scientific and policy-relevant insights to diverse audiences, including stakeholders from science, policy, and society.
- Work in intercultural, interdisciplinary teams and contribute to collaborative decision-making processes.
- Navigate conflicts of interest and differing worldviews with empathy, professionalism, and ethical sensitivity.

4. Academic Self-Understanding and Professionalism

Graduates are able to:

- Reflect on their academic and professional roles in society and the ethical implications of their work.
- Are prepared for careers in science, policy-making, consultancy, NGOs, or further academic research (PhD).
- Show commitment to life-long learning and critical self-reflection in complex, changing environments.

Program Structure

Thematic Categories of the IMES Curriculum

The IMES program is organized into modules—self-contained units of study that integrate related topics into coherent blocks of learning. Each module carries a defined number of ECTS credits and includes clearly articulated learning outcomes and assessments. Most modules are designed to be completed within a single semester, though some may extend across two.

To ensure a broad and interdisciplinary foundation, IMES modules are grouped into five thematic categories. Students are required to complete **at least 6 ECTS credits in each category** as part of the degree requirements:

Code	Category Name	Topics include, but are not limited to
A	Earth and Environmental Systems	Physical environment, natural sciences, climate, ecosystems
B	Societies, Education, and Ethics	Human values, education for sustainability, ethics, cities, resilience
C	Governance, Law, and Institutions	Environmental law, political systems, regulation, institutions
D	Economy and Resource Management	Environmental economics, renewable energy, resource management
E	Research and Analytical Methods	GIS, statistics, modeling, interdisciplinary methods, research methods

Overview of Modules in IMES

The IMES program comprises modules that are typically worth either 6 or 12 ECTS. The Master Thesis and Colloquium form a comprehensive research module worth 30 ECTS. The curriculum includes six mandatory modules and a wide range of electives, allowing students to shape their individual academic trajectories.

Modules in IMES are classified into Core Modules, Advanced Modules and Specialisation Modules (**?@sec-concepts**). A detailed descriptions of each module are provided in the second part of this module handbook.

Table 3: List of modules in IMES. Module types are Core Modules (CM), Advanced Modules (AM) and Specialisation modules (SM)

Module	ECTS	Mandatory (M) or Elective (E)	Module Type	Semester	Category
Introduction to Natural and Social Environmental Sciences	6	M	CM	1	Research and Analytical Methods
Geosphere and Hydrosphere	6	E	AM	1	Earth and Environmental Systems

Module	ECTS	Mandatory (M) or Elective (E)	Module Type	Semester	Category
Sustainable Development	6	E	AM	1	Societies, Education, and Ethics
Environmental Law	6	M	AM	1 and 2	Governance, Law, and Institutions
Energy and Climate Change	6	E	AM	1 or 2	Economy and Resource Management
Environmental Medicine	6	E	AM	1	Societies, Education, and Ethics
Anthropology	6	E	AM	1 and 2	Societies, Education, and Ethics
Methods of Spatial and Statistical Data Analysis	6	E	AM	1 and 2	Research and Analytical Methods
Environmental Humanities and Communication	6	E	AM	1	Societies, Education, and Ethics
Advanced Environmental Sciences	6	M	AM	2	Research and Analytical Methods
Ecosystems and Landscape Dynamics	6	M	AM	2	Earth and Environmental Systems
Natural Resources, Water and Renewable Energy Management (TH Köln)	6	E	AM	2 or 3	Economy and Resource Management
Environmental Ethics and Management	6	E	AM	2	Societies, Education, and Ethics
Meteorology	6	E	AM	2	Earth and Environmental Systems
Environmental Modelling and Data Science	6	E	AM	2 or 3	Research and Analytical Methods
Environmental Pollution	6	E	AM	2	Earth and Environmental Systems
Internship	12	M	SM	3	Research and Analytical Methods
Advanced Atmospheric Processes	6	E	AM	3	Earth and Environmental Systems
Human Environment Relations	6	E	AM	3	Societies, Education, and Ethics
Advanced Environmental Geography	6	E	AM	3	Earth and Environmental Systems

Module	ECTS	Mandatory (M) or Elective (E)	Module Type	Semester	Category
Environmental Spatial Methods	6	E	AM	3	Research and Analytical Methods
Individual Specialization Module	6	E	SM	3	Research and Analytical Methods
Individual Advanced Module	6	E	AM	3	Any
Master Thesis and Colloquium	30	M		4	Any

PART II

MODULE DESCRIPTIONS

Geosphere and Hydrosphere

Type of Module	Advanced Module
Module Code	IMES-AM-GeoHyd
Workload	180 h
ECTS	6
Term	Semester 1
Offered Every	WiSe
Start	WiSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
a) Lecture: Introduction to Environmental Geophysics	2 CHW / 30 h	60 h
b) Lecture: Physical Hydrology	2 CHW / 30 h	60 h

Module Description

This module consists of two lectures: *Introduction to Environmental Geophysics* and *Physical Hydrology*. It provides a comprehensive introduction to the principles and techniques of geophysics and hydrology, equipping students with the foundational knowledge to address environmental and water resource challenges. Students will explore geophysical methods such as electromagnetic and seismic techniques, emphasizing techniques essential for investigating the subsurface in environmental science. Additionally, the module covers essential hydrological concepts, including water fluxes, storage processes, and key methods for water resource management, enabling students to evaluate sustainable water use strategies effectively. Together, these two lectures introduce students to the study of the critical zone, the thin skin of the Earth's surface.

Module Objectives and Outcomes

a) Lecture: Introduction to Environmental Geophysics

The main objective of this lecture is to introduce students to fundamental concepts, methodologies, and basic interpretative techniques of geophysical methods applied in environmental studies. Building on this foundation, students will achieve the following learning outcomes:

- Identify and describe basic geophysical methods commonly used in environmental science.
- Understand fundamental principles and physical concepts underlying geophysical exploration techniques, particularly electromagnetic and seismic methods.
- Explain how geophysical data can be used to analyze environmental conditions and assess basic environmental risks.
- Recognize the strengths and limitations of various geophysical techniques in environmental applications.

b) Lecture: Physical Hydrology

The primary objective of this lecture is to introduce students to the foundational concepts of hydrology and basic methods used in water resource management, preparing them to assess the potential and limitations of different water uses. Upon completing this module, students will be able to:

- Explain the fundamental concepts of hydrology, including water fluxes and storage processes.
- Identify key hydrological methods used in water resource management.
- Assess the potential and limitations of various water uses, considering the governing processes of water fluxes and storage.
- Discuss basic hydrological processes and their implications for water resource management.

Module Content

a) Lecture: Introduction to Environmental Geophysics

- Overview of primary geophysical exploration methods and their significance in environmental studies.
- Fundamental physical principles underlying electromagnetic and seismic techniques.
- Methodologies and interpretative procedures used in geophysical data analysis.
- Applications of geophysical methods for environmental risk assessment and subsurface investigation.

b) Lecture: Physical Hydrology

- Components and processes of the water cycle across various spatial scales.
- Water fluxes and storage terms on land surfaces and their measurement.
- Environmental factors influencing water availability and distribution.
- Fundamental methods and concepts to describe, measure and model water fluxes.
- Basic principles and challenges of water resource management in the context of environmental sustainability.

Teaching Methods

Lecture

Prerequisites

None

Type of Examination

Written examination of 90–120 minutes. The subject of examination is the content of the lectures (a and b) of this module description.

Credits Awarded

Credit points are awarded upon successful completion of the module's examination, with a minimum passing grade of 4.0 (German grading system).

Compatibility with Other Curricula

JIMES (JIMES-AM-GeoHyd)

Proportion of Final Grade

5%

Module Coordinator

Prof. Dr. Karl Schneider (Institute of Geography)

Further Information

There are no restrictions on the number of places available for IMES students.

Sustainable Development

Type of Module	Advanced Module
Module Code	IMES-AM-SD
Workload	180 h
ECTS	6
Term	Semester
Offered Every	WiSe
Start	WiSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
a) Seminar: Sustainable Development	2 CHW / 30 h	60 h
b) Practical: Fieldwork	2 CHW / 30 h	60 h

Module Description

This module consists of two courses: a literature-based seminar in Sustainable Development and Fieldwork. It provides an in-depth exploration of the principles, challenges, and frameworks of sustainability. Key topics include the Sustainable Development Goals (SDGs), climate change, planetary boundaries, loss of biodiversity and Education for Sustainable Action (ESA) as a tool for transformative action. The course addresses critical global issues such as inequality, urbanization, and environmental degradation, emphasizing their interconnections and linking them to actionable strategies for sustainable solutions.

Module Objectives

- Explore the foundational concepts of sustainable development, including its pillars, challenges, and global frameworks like Agenda 21 and the SDGs.
- Analyse further important concepts like planetary boundaries, climate change and loss of biodiversity, based on scientific literature.
- Examine the role of Education for Sustainable Action (ESA) in promoting transformative learning, systems thinking, and sustainability action.

Module Outcomes

- Understand the foundational principles of sustainable development, including its pillars, challenges, and key global frameworks such as Agenda 21 and the SDGs.
- Analyze complex concepts like planetary boundaries, climate change, and biodiversity loss by critically engaging with scientific literature.
- Evaluate the challenges and opportunities in achieving sustainable development in the context of global and local issues.
- Examine the role of Education for Sustainable Development (ESD) in fostering transformative learning, systems thinking, and actionable strategies.

- Develop practical skills in applying systems thinking to identify and address sustainability challenges during Field Work.

Module Content

a) Seminar: Sustainable Development

- Basic concepts of sustainable development:
  - Understanding ‘sustainability’ and ‘development’
  - Causes and effects of unsustainable development like consumerism, globalization, urbanization, ecosystem degradation, inequity
  - Pillars of sustainable development: economic, social, environmental, political (governance)
  - Timeline of sustainable development; Agenda 21; Millennium development goals and sustainable development goals.
  - ESD as a tool for transformative learning and systems thinking
- Key sustainability concepts and challenges:
  - Climate change: causes, impacts, and mitigation strategies
  - Planetary boundaries and their relevance to sustainability
  - Ecosystem services and their role in sustainable development
  - Rapid population growth and food security
  - Poverty, income inequality, and gender disparity
  - Urbanization and its challenges, including energy transformation
  - Environmental degradation and loss of biodiversity

b) Practical: Fieldwork

- Visit and analysis of sustainability projects.
- Developing a matrix for analysing sustainability projects along with indicators.

Teaching Methods

Literature-based seminar and practical

Prerequisites

None

Type of Examination

Portfolio based on a) and b), 5 to 10 pages.

Credits Awarded

Credit points are awarded upon regular and active participation, as well as the successful completion of the module’s examination with a minimum passing grade of 4.0. (sufficient).

Compatibility with Other Curricula

JIMES (JIMES-AM-SDUoC), M.Sc. Module part (a) in Geography (AM1 and AM2), MA Geography (AM1 and AM2) and MEd Geography (AM1)

Proportion of Final Grade

5%

Module Coordinator

Dr. Veronika Selbach and Dr. Verena Dlugoß (Institute of Geography)

Further Information

Restrictions on the number of places available for IMES students might apply.

Environmental Law

Type of Module	Advanced Module
Module Code	IMES-AM-Law
Workload	180 h
ECTS	6
Term	Semester 1 and 2
Offered Every	WiSe / SuSe
Start	WiSe
Duration	2 semesters

Course Types	Contact Time	Self-study Time
a) Lecture: Environmental Law: Comparative and Basic Studies	2 CHW / 30 h	60 h
b) Lecture: International Environmental Law	2 CHW / 30 h	60 h

Module Description

The module consists of two lectures: *Environmental Law: Comparative and Basic Studies* and *International Environmental Law*. Environmental Law introduces students to the discipline of law, with a focus on domestic legal systems and the role of environmental law within these systems. It explores how environmental problems have been addressed through legal mechanisms, both historically and in contemporary contexts, including before and after the introduction of dedicated environmental legislation.

The lecture *International Environmental Law* advances students' understanding of domestic law introduced in lecture a), focusing on international law and its application to global environmental challenges. Students will explore the unique sources, institutions, and subjects of international environmental law, and distinguish them from their domestic counterparts. The course emphasizes the role of treaties, litigation, and arbitration in shaping international environmental governance.

Module Objectives

- Introduce students to the principles, sources, institutions, and subjects of domestic and international environmental law.
- Develop an understanding of how environmental challenges are addressed through domestic and international legal mechanisms.
- Highlight the role of treaties, litigation, and arbitration in shaping international environmental governance.
- Explore the interdisciplinary nature of environmental law and its connections with social and natural sciences.

Module Outcomes

- Identify and evaluate key sources, principles, and institutions of domestic and international environmental law.
- Compare domestic and international approaches to addressing environmental problems, including their advantages and limitations.
- Analyze the role of legal mechanisms in environmental governance and their interplay with social and natural sciences.
- Apply knowledge of international environmental law to evaluate global environmental challenges and propose solutions.

Module Content

a) Lecture: Environmental Law: Comparative and Basic Studies

- The placement of environmental law within domestic legal systems.
- Domestic sources of law, key institutions, and subjects relevant to environmental governance.
- The concept of sources of law, focusing on the fundamentals of identifying and locating applicable laws to address specific environmental challenges.
- How legal principles and processes contribute to solving environmental problems at the domestic level.
- An overview of the comparative method to understand differences in how environmental law is applied across jurisdictions.
- Interdisciplinary links between environmental law and other fields, including the social and natural sciences.

b) Lecture: International Environmental Law

- The distinction between international public environmental law and political processes.
- Fundamental principles of international environmental legislation, including its interpretation and execution.
- International sources of law, key institutions, and subjects, with a focus on their unique roles and functions.
- Comparative analysis of international and domestic environmental law, highlighting their differences and intersections.
- Study of treaties categorized by natural science domains: atmosphere, hydrosphere, and geosphere.
- Examination of litigation and arbitration cases to identify international customs and principles.
- Analysis of the interdisciplinary connections between international environmental law and the social and natural sciences.

Teaching Methods

Lecture

Prerequisites

a) None

b) While there is no formal requirement, International Environmental Law will be taught assuming the student has a basic understanding of sources of law, institutions of law and subjects of law, however that understanding was achieved.

Type of Examination

Students are required to independently research and write a paper in English, comprising 20–24 pages, to be completed outside the lecture hours.

Part I of the research paper will address an environmental problem in a country of their choice, presents that country's official state policy on the problem, presents the sources and institutions of law on that problem in that country, and then assesses whether those laws and institutions solve the problem. The student will then do the same for a second country of choice. The paper will then build a matrix by which one can compare the performance of the first country's environmental solutions with the second.

Part II of the research paper will address an analysis of a case study of international environmental law.

Credits Awarded

Credit points are awarded upon successful completion of the module's examination, with a minimum passing grade of 4.0 (sufficient).

Compatibility with Other Curricula

JIMES (JIMES-AM-Law)

Proportion of Final Grade

5%

Module Coordinator

Prof. Dr. Kirk Junker (US American Law)

Further Information

There are no restrictions on the number of places available for IMES students.

Ecosystems and Landscape Dynamics

Type of Module	Advanced Module
Module Code	IMES-AM-Ecosys
Workload	180 h
ECTS	6
Term	Semester 3
Offered Every	SuSe
Start	SuSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
a) Lecture: Ecosystem Services and Functions Under Climate Change	2 CHW / 30 h	60 h
b) Lecture: Landscape Formation	2 CHW / 30 h	60 h

Module Description

This module examines the interactions between ecosystems, landscapes, and human impacts, providing a foundation for understanding environmental processes and their role in sustainable development. The lecture *Ecosystem Services and Functions Under Climate Change* introduces key concepts from soil science, soil physics, and plant nutrition, focusing on their roles within ecosystem services and functions. It expands students' understanding of the complex processes in ecosystems and the influence of land . . .

The lecture *Landscape Formation* focuses on the factors, dynamics, and outputs of landscape evolution, with special regard to the Quaternary period and the interaction between natural phenomena and human activities.

Module Objectives

a) Lecture: Ecosystem Services and Functions Under Climate Change

- Introduce the processes within ecosystems and their interactions with human land use and climate change.
- Explore the key concepts of ecosystem services and their role in sustainable development.

b) Lecture: Landscape Formation

- Examine the key factors, processes, and dynamics involved in natural landscape formation and evolution.
- Analyze the impacts of climate change and human activities on geomorphological processes and landscape changes.

Module Outcomes

a) Lecture: Ecosystem Services and Functions Under Climate Change

- Describe the processes within ecosystems and how they are affected by human land use change and climate change.
- Explain key concepts in ecosystem services, including their role in sustainable development.
- Analyze one selected topic related to ecosystem services in depth.
- Apply the SQ4R (Survey, Question, Read, Reflect, Recite and Review) method to critically engage with scientific literature on ecosystem services and processes.
- Apply AI-assisted tools for literature review and analysis.

b) Lecture: Landscape Formation

- Identify key factors and processes involved in natural landscape formation, including morphography, morphometry, morphodynamics, and morphochronology.
- Describe the dynamics of landscape evolution, particularly during the Quaternary period, and recognize the role of relief forms.
- Explain the impact of climate change on geomorphological processes, highlighting how it influences events such as floods and landslides.
- Discuss the effects of human activities on landscape formation, including the development of technical landforms.
- Analyze specific geomorphological case studies to assess the interaction between natural processes and anthropogenic influences on landscape change.

Module Content

a) Lecture: Ecosystem Services and Functions Under Climate Change

- Introduction to soil science and soil hydrology
- Ecosystem services and Sustainable Development Goals (SDGs)
- Plant-soil interactions and nutrient cycling
- Soil organic matter and carbon sequestration in soils
- Soil degradation, sustainable land management and food production

b) Lecture: Landscape Formation

- Key aspects of relief forms, focusing on morphography, morphometry, morphodynamics, and morphochronology as fundamental controls in landscape structure.
- Core dynamics and processes involved in natural landscape formation over time.
- Influence of human activities, such as the creation of technical landforms, on landscape modification.
- Examination of how climate change intensifies geomorphological events, including floods and landslides.

Teaching Methods

Lecture

Prerequisites

None

Type of Examination

Examination in form of a portfolio (5–10 pages). The subject of examination is the content of the lecture a) of this module. During the lecture b) of this module, students are required to complete mandatory ungraded

assignments (Studienleistungen).

Credits Awarded

Credit points are awarded when the portfolio has been graded with at least 4.0 (sufficient) and the mandatory assignments (Studienleistungen) have been successfully completed.

Compatibility with Other Curricula

JIMES (JIMES-AM-Ecosys)

Proportion of Final Grade

5%

Module Coordinator

Prof. Dr. Christina Bogner (Institute of Geography)

Further Information

There are no restrictions on the number of places available for IMES students and BVDU students.

Meteorology

Type of Module	Advanced Module
Module Code	IMES-AM-Meteo
Workload	180 h
ECTS	6
Term	Semester 2
Offered Every	SuSe
Start	SuSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
a) Lecture with seminar: General Aspects of Meteorology	2 CHW / 30 h	60 h
b) Lecture with seminar: Introduction to Synoptic Meteorology	2 CHW / 30 h	60 h

Module Description

This module introduces students to the fundamental physical principles underlying atmospheric sciences. It covers key topics such as atmospheric thermodynamics, dynamics, global circulation, weather prediction techniques, remote sensing, and atmospheric chemistry, including air pollution. Students will develop a foundational understanding of the processes driving Earth's atmosphere.

Module Objectives

- Introduce the fundamental physical principles of atmospheric sciences, including thermodynamics, dynamics, and global circulation.
- Provide students with a foundational understanding of atmospheric phenomena and the tools used to describe and interpret them, such as measurement devices and remote sensing techniques.
- Familiarize students with synoptic weather systems, numerical weather predictions, and the basics of atmospheric chemistry and air pollution.

Module Outcomes

Upon successful completion of this module, students will be able to:

- Describe the basic physical principles and laws governing the atmosphere, including thermodynamics and atmospheric dynamics.
- Explain the functioning of measurement devices and techniques used in atmospheric sciences, such as remote sensing.

- Analyze atmospheric phenomena, including synoptic weather systems and global circulation, and interpret their significance in the context of weather prediction.

Module Content

In the lectures, fundamental physical principles upon which atmospheric sciences are based will be introduced. The goal is to provide an elementary description and interpretation of a wide range of atmospheric phenomena. The main topics are a survey of the atmosphere including measurement devices, basic laws describing the atmosphere, a fundamental understanding of synoptic weather systems including numerical weather predictions and aspects of remote sensing.

Teaching Methods

Lecture with seminar

Prerequisites

None

Type of Examination

Written examination of 90–120 minutes. The subject of examination is the content of the lectures (a and b) of this module description.

Credits Awarded

Credit points are awarded when the written examination has been graded with at least 4.0 (sufficient).

Compatibility with Other Curricula

JIMES (JIMES-AM-Meteo)

Proportion of Final Grade

5%

Module Coordinator

Dr. Frank Steffany (Institute of Geophysics)

Further Information

There are no restrictions on the number of places available for IMES students.

Environmental Pollution

Type of Module	Advanced Module
Module Code	IMES-AM-EnvPol
Workload	180 h
ECTS	6
Term	Semester 3
Offered Every	SuSe
Start	SuSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
Seminar with practical: From Macro- to Microplastics	4 CHW / 60 h	120 h

Module Description

This module explores the environmental challenges posed by plastics, focusing on their transition from macroplastics to microplastics. Through a combination of seminar discussions and practical sessions, students will gain a foundational understanding of plastic types, degradation mechanisms, and their ecological and health impacts. They will learn and apply analytical techniques for sampling and identifying microplastics in various environments, and critically evaluate potential mitigation strategies. The module emphasizes both theoretical knowledge and hands-on experience, equipping students to address the growing issue of plastic pollution effectively.

Module Objectives

- Introduce students to the history, types, manufacturing processes, and environmental impacts of plastics, with a focus on the transition from macroplastics to microplastics.
- Provide insights into the mechanisms of plastic degradation, including physical, chemical, and biological processes, and their influencing factors.
- Familiarize students with analytical and sampling techniques for identifying and assessing microplastics in various environments.
- Familiarize students with methods to promote public awareness and drive behavior change initiatives related to plastic pollution.

Module Outcomes

- Explain the history, types, and environmental impacts of plastics, including their transition from macroplastics to microplastics.
- Analyze the mechanisms of plastic degradation and evaluate the factors influencing these processes.
- Assess the environmental and human health impacts of microplastics, including their pathways, accumulation, and long-term effects.

- Demonstrate proficiency in sampling and identifying microplastics using appropriate analytical techniques.
- Develop and propose innovative solutions and strategies to mitigate microplastic pollution and its impacts on ecosystems and society.

Module Content

- **Introduction to Plastics and Polymers**: Overview of the history, types, and applications of plastics; basic chemistry of polymers; manufacturing processes; and environmental impacts of macroplastics.
- **Degradation and Environmental Impacts**: Mechanisms of macroplastic degradation, environmental pathways, and their effects on ecosystems and human health.
- **Microplastics in Ecosystems**: Sources, pathways, and impacts of microplastics in marine, freshwater, and terrestrial environments, with strategies for monitoring and mitigation.
- **Mitigation and Management**: Policies, innovations, and initiatives to reduce plastic and microplastic pollution, including public awareness and behavior change efforts.
- **Research and Practical Applications**: Current research, future directions, and student-led projects on microplastic pollution, with a focus on collaborative solutions and stakeholder engagement.

Teaching Methods

Seminar with practical

Prerequisites

None

Type of Examination

Written project report of 10–20 pages.

Credits Awarded

Credit points are awarded upon regular and active participation, as well as the successful completion of the module's examination with a minimum passing grade of 4.0. (sufficient).

Compatibility with Other Curricula

JIMES (JIMES-AM-EnvPol)

Proportion of Final Grade

5%

Module Coordinator

Dr. Hannes Laermanns (Institute of Geography)

Further Information

Restrictions on the number of places available for IMES students might apply.

Internship

Type of Module	Specialisation Module
Module Code	IMES-SM-Int
Workload	360 h
ECTS	12
Term	Semester 3
Offered Every	SuSe
Start	SuSe
Duration	Minimum 8 weeks

Course Types	Contact Time	Self-study Time
a) Internship	320 h	7.5 h
b) Seminar	0.5 CHW	32.5 h

Module Description

The internship of two months duration is scheduled as part of the third semester. It is an opportunity for students to develop research skills and/or gain professional expertise as well as academic knowledge. Students are expected to begin planning their internship early in the semester to ensure a timely placement and registration. While the timing of the internship may vary depending on individual arrangements, it should be aligned with the study plan and registered with the IMES Office before commencement. Students are encouraged to find their own internship placements and make initial contact with prospective organizations, as this builds communication and organizational skills. The IMES Office can provide guidance in certain cases and share a database of former internship hosts but does not guarantee placement. The module includes a seminar in which students present and reflect on their internship experiences. This setting provides a structured opportunity for peer-to-peer learning, constructive feedback, and academic exchange. Students are expected not only to defend their own internship work but also to engage actively with the presentations of their peers by asking questions, giving feedback, and discussing diverse professional contexts relevant to environmental sciences.

Module Objectives

- Facilitate the application of theoretical knowledge in real-world contexts through hands-on experience in professional settings.
- Enhance problem-solving, analytical, and decision-making skills by engaging in practical projects related to the core domains of the program.
- Cultivate professional competencies, including teamwork, communication, and leadership, through structured mentorship and collaboration with industry or research organizations.

Module Outcomes

At the end of this module, students will be able to:

- Demonstrate the ability to apply theoretical knowledge to practical challenges in professional or research environments.
- Develop and execute project-based tasks with minimal supervision, showcasing initiative and problem-solving skills.
- Communicate effectively through written reports, presentations, and discussions, tailored to both academic and professional audiences.
- Demonstrate enhanced soft skills such as teamwork, adaptability, and professionalism in diverse settings.
- Critically reflect on their internship experience to identify strengths, areas for improvement, and future career directions.
- Create meaningful contributions to their host organization, supported by innovative ideas or solutions derived during the internship.

Module Content

An internship matching the thematic focus of Environmental Sciences as defined by the IMES program.

Registration and documentation requirements

Before starting the internship, students must register it with the IMES Office. Registration requires:

- A brief written outline (1 page) describing the host organization, the planned tasks and responsibilities, and how the internship aligns with the thematic focus of Environmental Sciences as defined by the IMES program.
- A confirmation from the host organization (in any reasonable format, such as an email or signed letter) indicating the planned duration and general scope of the internship. A formal contract is not mandatory, but may be required by the host organization.

After completing the internship, students must submit a certificate of completion from the host organization. This document should briefly state the internship duration and confirm that the agreed-upon tasks were carried out.

Teaching Methods

a) Internship

b) Seminar at UoC: student presentations, peer feedback, group discussion

Prerequisites

The student has acquired at least 30 ECTS from the first three semesters.

Type of Examination

The supervisor will grade the internship based on an internship report of 20 pages, written in English, which introduces institutional/NGO setup, people encountered and worked alongside, including their tasks and positions; activities undertaken, including the content, aim, and timeframe of the work; policy areas touched upon; skills acquired; insight into institutional practice obtained. The students are required to present and defend their report during the seminar.

1. Internship report (70%)

The internship report, written in English (20 pages), should contain the following:

- Introduction to the institutional/NGO setup (10%): Describing the organization, objectives, and operations comprehensively.
- Tasks and people encountered (10%): Detailed account of roles, responsibilities, and interactions with colleagues.

- Activities undertaken (10%): Explanation of content, objectives, timelines, the scope of the work and outputs.
- Policy areas and skills acquired (10%): Identification of relevant policy domains and skills developed.
- Insights into institutional practices and self-reflection (30%): In-depth analysis of institutional processes, key learnings, challenges faced, and personal growth.

2. Presentation and defence of the report (30%)

The student presents their report to a panel of IMES staff (20 minutes), assessed on:

- Clarity, organization, and coherence of the presentation (15%).
- Ability to answer questions and demonstrate understanding of the internship's context, activities, and outcomes (15%).

Credits Awarded

Credit points are awarded upon regular and active participation in the internship and the seminar, as well as successful completion of the module's examinations with a minimum passing grade of 4.0 (sufficient). A certificate of completion from the host organization is normally required, but alternative proof may be accepted in justified cases.

The internship must be registered with the IMES Office before commencement. Registration requires a written outline of the planned tasks and a confirmation from the host organization.

Compatibility with Other Curricula

None

Proportion of Final Grade

0%. The internship is graded but does not contribute to the final grade.

Module Coordinator

Dr. Hannes Laermanns (Institute of Geography) – IMES Office

Further Information

No restriction on number of places for IMES students.

Master Thesis and Colloquium

Type of Module	Master thesis
Module Code	IMES-MasterThesis
Workload	900 h
ECTS	30
Term	Semester 4
Offered Every	WiSe / SuSe
Start	WiSe / SuSe
Duration	1 semester

Course Types	Contact Time	Self-study Time
a) Master Thesis	875 h	20 h
b) Colloquium	4 h	1 h

Module Objectives and Outcomes

a) Master Thesis

The Master's thesis is an independent academic examination designed to demonstrate the candidate's ability to address a well-defined problem within the field of study using appropriate scientific methods within a specified timeframe. The thesis may be completed in any subject of the IMES program and must be written in English.

Throughout the thesis phase, students receive individual academic supervision. Supervisors provide feedback on the exposé, guidance during the research and writing process, and support for the mid-term presentation. This structure is designed to help students manage their time effectively and produce work of high academic quality.

At the beginning of the thesis process, students are required to submit an exposé (approximately 2–4 pages), outlining the research question, objectives, theoretical background, methodology, and expected structure of the thesis. The exposé must demonstrate the feasibility and academic relevance of the project and serves as the basis for discussion and feedback with the supervisor.

Approximately halfway through the working period, a mid-term presentation is mandatory. In this presentation, the student presents their progress and discusses preliminary results in a seminar with their supervisors and peers. Both the exposé and the mid-term presentation are ungraded coursework ("Studienleistungen") and must be passed.

The maximum timeframe for completing the Master's thesis is six months from the date the topic is assigned. The thesis should not exceed 100 A4 pages.

Further details on the Master's thesis are provided in the examination regulations (§21).

b) Colloquium (Oral defense of the master's thesis)

The colloquium is conducted as an interdisciplinary individual examination. The candidate presents the contents of their Master's thesis in a 10- to 15-minute presentation, followed by questions and discussion with the examiners. The colloquium lasts between 40 and 60 minutes. Students and staff of the IMES program are permitted to attend the colloquium unless the candidate objects. Participation of observers does not include the deliberation or announcement of results.

Further details on the Colloquium are given in the examination regulations (§21).

Module Content

The module consists of four parts:
(1) submission of an exposé outlining the research question, methodology, and structure;
(2) a mandatory mid-term presentation to report on progress;
(3) completion of an independent written thesis;
(4) a final oral colloquium to defend the thesis.
The thesis should not exceed 100 pages and must be completed within six months of topic assignment.

Teaching Methods

Individual supervision including support during the exposé phase, feedback after the mid-term presentation, and academic consultations throughout the research and writing process.

Prerequisites

The student has acquired at least 60 ECTS from the first three semesters and successfully completed all mandatory modules.

Type of Examination

- Written Master thesis (weight: 75%)
- Oral defense (weight: 25%)
- Exposé (ungraded course work "Studienleistung")
- Mid-term presentation (ungraded course work "Studienleistung")

Credits Awarded

Credit points are awarded when the ungraded exposé and mid-term presentation were successfully passed and the examinations of the module parts have been successfully completed with the minimum grade 4.0 (sufficient).

Compatibility with Other Curricula

None

Proportion of Final Grade

25%

Module Coordinator

Head of the IMES Examination Committee

Further Information

None

PART III

EXAMPLE SCHEDULES

Schedules