

**OFFICIAL TRANSLATION OF**

**Fachspezifische Bestimmungen für den Masterstudiengang  
Polar and Marine Sciences – POMOR (M.Sc.)  
der Fakultät für Mathematik, Informatik und  
Naturwissenschaften der Universität Hamburg (Amtliche  
Bekanntmachung Nr. 24 vom 14. Mai 2019)**

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ONLY THE GERMAN VERSION SHALL BE LEGALLY  
VALID AND ENFORCEABLE!**

**Subject-Specific Provisions for the Master of Science in Polar  
and Marine Sciences (POMOR) (MSc)  
from the Faculty of Mathematics, Informatics and Natural  
Sciences at Universität Hamburg  
dated 2 May 2018**

On 3 September 2018 in accordance with Section 108 subsection 1 of the Hamburg higher education act (Hamburgisches Hochschulgesetz, HmbHG) the Executive University Board of Universität Hamburg ratified the Subject-Specific Provisions that were adopted by the Faculty Council from the Faculty of Mathematics, Informatics and Natural Sciences higher education act (Hamburgisches Hochschulgesetz, HmbHG) dated 18 July 2001 (HmbGVBl. p. 171), last amended on 29 May 2018 (HmbGVBl. in accordance with Section 91 subsection 2 no. 1 HmbHG dated 18 July 2001 (HmbGVBl. p. 171) as amended on 2 May 2018 (HmbGVBl. p. 200) for the master's degree program in polar and marine sciences (POMOR) as a subject of a degree program with the designation Master of Science (MSc).

## **Preamble**

These Subject-Specific Provisions supplement the provisions of the Faculty of Mathematics, Informatics and Natural Sciences' Examination Regulations dated 11 April and 4 July 2012 as amended governing Master of Science degree programs and provide a description of the modules for the Master of Science in Polar and Marine Sciences (POMOR).

## **I. Supplementary provisions to POMOR MSc**

### **Section 1:**

#### **Program and examination objectives, academic degree, and implementation of the degree program**

##### **Section 1 subsection 1:**

(1) The Master of Science in Polar and Marine Sciences (POMOR) is a consecutive, interdisciplinary, research-based, and career-oriented degree program taught in English.

(2) The Master of Science in POMOR follows the general program goals set out in Section 1 subsection 1 of the Faculty of Mathematics, Informatics and Natural Sciences' Examination Regulations governing Master of Science degree programs and the master's degree program accredited by the Russian Federation's Ministry of Education and Science in 05.04.06—Ecology and Nature Management (change of reference number due to renaming by cooperation partner).

The goals of the degree program include helping students learn to think contextually and gain analytical skills with respect to extreme habitats (e.g., marine and terrestrial as well as arctic and antarctic ecosystems) especially in light of the susceptibility of polar regions to environmental and climate changes and how to use them in a sustainable manner. POMOR graduates are able to conduct and evaluate scientific studies, apply current findings, independently undertake planning, and carry out assessments of expedition and laboratory work. They work analytically, drafting academic texts, using databases and relevant computer programs, and acquiring international and intercultural skills. Graduates possess knowledge about marine and terrestrial geosciences, physical and quantifiable oceanography, marine and terrestrial ecosystems in polar regions, natural resources, glacial and periglacial systems, and coastal regions in the Arctic and Antarctica.

Moreover, the program provides students with specialist knowledge from the fields of meteorology, oceanography, marine biology, geography, soil science, and marine geosciences. Combining these natural science disciplines with engineering and business aspects, students are specifically prepared for careers in research, administration, and industry in polar-related fields—especially for the international labor market located in the polar regions. The program teaches the following skills for

evaluating components of the arctic earth system: (a) Independent application and expansion of scientific knowledge, methods, and skills in polar and marine sciences, (b) the provision of knowledge about arctic systems in training and continuing education programs, and (c) the implementation of environmental and climate-system-related knowledge for responsible actions in sensitive polar regions based on good scientific practice.

(3) In addition to professional specialization and advanced study of the natural sciences in lectures, seminars, and practical courses, in the second semester after the second subject semester, students participate in a career-related, research-focused internship as part of the core module, in which students learn specifically about work practices in current polar and marine research as part of a work or research group. The first and second subject semesters are taught at Saint Petersburg State University and the third subject semester in Germany at Universität Hamburg or at one of the participating German partner universities (University of Bremen, Kiel University, or University of Potsdam). In the fourth semester, students write their master's thesis on a polar and marine science research issue (within 22 weeks), which is supervised by a Russian and a German university teacher.

#### **Section 1 subsection 3:**

After the successful completion of studies within the context of the POMOR double degree program, students receive the following:

- in Russia: the academic degree Master of Science in Ecology and Nature Management from Saint Petersburg State University in the discipline ecology and nature management for the Master of Science in Polar and Marine Sciences (POMOR).
- in Germany: the academic degree Master of Science (MSc) from Universität Hamburg for the Master of Science in Polar and Marine Sciences (POMOR)

#### **Section 1 subsection 4:**

The Master of Science in POMOR is offered and spearheaded by Universität Hamburg and Saint Petersburg State University in cooperation with Kiel University, University of Bremen, and University of Potsdam as well as the research institutes GEOMAR Helmholtz Centre for Ocean Research in Kiel, the Alfred Wegener Institute for Polar and Marine Research, the Leibniz Institute for Baltic Sea Research in Warnemünde, the State Scientific Center of the Russian Federation Arctic and Antarctic Research Institute of the Russian Federal Service on hydrometeorology and environmental protection, and the Otto Schmidt Laboratory for Polar and Marine Research.

The Faculty of Mathematics, Informatics and Natural Sciences at Universität Hamburg and the Institute of Earth Sciences at Saint Petersburg State University in Russia are responsible for the coordination and implementation of the degree program.

Moreover the program is offered in cooperation with Kiel University, University of Bremen, University of Potsdam as well as the research institutes GEOMAR Helmholtz Centre for Ocean Research in Kiel (GEOMAR), the Alfred Wegener Institute for Polar and Marine Research (AWI), the Leibniz Institute for Baltic Sea Research in Warnemünde (IOW), the Otto Schmidt Laboratory for Polar and Marine Research (OSL), and the Arctic and Antarctic Research Institute of the Russian Federal Service for Hydrometeorology and Environmental Protection Agency (AARI), both in Saint Petersburg. The POMOR Offices in St. Petersburg and in Kiel and the Academic Office of the Department of Earth Sciences provide administrative support for the degree program.

#### **Section 4:**

##### **Program and exam organization, modules, and ECTS credits**

##### **Section 4 subsections 2 and 3:**

(1) The Master of Science in POMOR encompasses:

- a) The first and second semesters at the Saint Petersburg State University, Russia, a total of 60 ECTS credits.
  - Module 1: Ocean Basins, Sediments and Climate Change, first semester, 9 ECTS credits
  - Module 2: High Seas and Coastal Water Oceanography, first semester, 9 ECTS credits
  - Module 3: Polar and Marine Ecosystems: Polar and Marine Ecosystems: Structure, Functioning and Vulnerability, first semester, 9 ECTS credits
  - Module 4: Natural Resources, second semester, 9 ECTS credits
  - Module 5: Processes in Coastal Zones and Environmental Management, second semester, 9 ECTS credits
  - Module 6: Periglacial Environment, second semester, 9 ECTS credits
  - Core module (key skills), first and second semester 6 ECTS credits (2 ECTS credits for the first semester (lectures), and 4 ECTS credits for the second semester including field work and participation in a student conference to present the results of that field work)

All modules shall be offered as a joint teaching engagement in equal parts by Russian and German lecturers.

- b) After the second semester, students participate in practical field work as part of the core module and work on an international research project.
- c) Students attend a participating German partner university in the third semester, contingent on the specialization in either geosciences, biosciences, climate sciences, or environmental sciences (30 ECTS credits). Universität Hamburg shall assume the academic responsibility for the third

semester in Germany. Universität Hamburg recognizes student academic achievements at the participating German partner universities in Bremen, Kiel, and Potsdam and forwards this information on to Saint Petersburg University.

- d) In the fourth semester, students write their master's thesis at a Russian and/or German partner university or research institute (30 ECTS credits).

(2) Detailed descriptions of all modules can be found in part II of these Subject-Specific Provisions. The module descriptions are listed in a table containing the names of the individual modules, their classifications (e.g., required module, required elective module, etc.), the type of courses (e.g., lecture, practical course, and seminar, etc.), and workload expected for each module expressed as ECTS credits.

(3) Students may voluntarily complete modules in excess of the 120 ECTS credits. Upon submission of a request to the Examinations Board, the additional examination grades may be reflected in the examination certificate for the master's degree program. However, they will not be used to calculate the overall final grade.

#### **Section 5: Course types**

##### **Section 5 sentence 2:**

Courses may take any form pursuant to Section 5 of the Revised Examination Regulations for Master of Science Degree Programs.

##### **Section 5 sentence 3:**

Courses will be held in English.

#### **Section 6: Limiting attendance for specific courses**

The maximum number of students who may register for a module or individual courses is set at 20, based on capacities in Russia. The Examinations Board considers this limitation into consideration at the time of admission.

#### **Section 13: Completed coursework and module examinations**

##### **Section 13 subsection 5:**

Examinations shall be held in English.

**Section 14:  
Master's thesis**

**Section 14 subsection 1:**

A component part of the master's thesis is a presentation within the framework of an academic seminar. The presentation comprises one-fifth of the grade for the master's thesis. The presentation must be given no later than six weeks after submission of the thesis.

**Section 14 subsection 2:**

Students who have earned at least 60 ECTS credits in total may be allowed to commence work on the master's thesis.

**Section 14 subsection 5:**

The topic, date of topic release, names of both supervisors (one German and one Russian) shall be recorded in the student's file.

**Section 14 subsection 6:**

The master's thesis must be written in English.

**Section 14 subsection 7 sentence 1:**

The workload for the master's thesis amounts to 30 ECTS credits, which must be completed within no more than 22 weeks.

**Section 15:  
Evaluation of examinations**

**Section 15 subsection 3 sentence 5:**

If a module examination is comprised of several course examinations, then the (overall) grade is calculated by averaging the grades from each course examination weighted according to the ECTS credits assigned to each part.

**Section 15 subsection 3 sentence 9:**

The overall final grade for the master's degree program is calculated by averaging the grades from all modules weighted according to the ECTS credits assigned to each, whereby the master's thesis has twice the weight. The grade for the core module is not used to calculate the overall final grade.

**Section 15 subsection 4:**

The overall final grade "pass with distinction" is awarded if a grade of 1.0 is earned for the master's thesis, the average overall grade is less than or equal to 1.3, and none of the module examinations were passed with grades worse than 2.3.

## II. Overview of modules and recommended module plan

The following table contains an overview of modules.

The abbreviations denote: ECTS = ECTS credits, Cr. hrs. = credit hours per week, Req. = required, RE = required elective, E = elective module, L = lecture, PC = practical course, S = seminar, I = internship, FT = field trip

No.	Semester, Module Type, and Methods of Instruction	Workload	Cr. hrs.	ECTS
<b>First semester (winter semester), Saint Petersburg State University, Russia; Russian and German lecturers</b>				
1.	Ocean Basins, Sediments and Climate Change Req.: L, S, PC, FT	270	6	9
2.	High Seas and Coastal Water Oceanography Req.: L, S, PC	270	6	9
3.	Polar and Marine Ecosystems: Structure, Functioning and Vulnerability Req.: L, S, PC, FT	270	6	9
Core	Key Skills—part 1 Req.: L, S, PC	60	2	2*
<b>Total</b>		<b>870</b>	<b>20</b>	<b>29</b>
<b>Second semester (summer semester), Saint Petersburg State University, Russia; Russian and German lecturers</b>				
4.	Natural Resources Req.: L, PC, S	270	6	9
5.	Processes in Coastal Zones and Environmental Management Req.: L, PC, S, FT	270	6	9
6.	Periglacial Environment Req.: L, S	270	6	9
Core	Key Skills—part 2 Req.: L, S, PC incl. practical field work (Req.)	120	2	4*
<b>Total</b>		<b>930</b>	<b>20</b>	<b>31</b>
<b>Third semester (winter semester), Germany</b>				
	Semester abroad in Germany at one of the participating partner universities, RE, specialization, required elective and supplementary courses: <ul style="list-style-type: none"> <li>• Universität Hamburg, MSc in Integrated Climate System Sciences (ICSS)</li> <li>• University of Bremen, MSc in Marine Biology, Marine Geosciences</li> <li>• Kiel University, MSc in Marine Geosciences</li> <li>• University of Potsdam, MSc in Geosciences/Geology</li> </ul>	900	20	30

	<b>Total</b>	<b>900</b>	<b>20</b>	<b>30</b>
<b>Fourth semester (summer semester), Russia and Germany</b>				
	Thesis in Polar and Marine Sciences and Defense (req.)	900	20	30
	<b>Total</b>	<b>900</b>	<b>20</b>	<b>30</b>
	Total for the MSc in Polar and Marine Sciences	3600	80	120

\* see Section 4

### III. Brief description of modules

The module numbers correspond to the consecutive numbers down the left side of the module plan table for the MSc in Polar and Marine Sciences.

#### Semester 1

Module no.	1
<b>Module title:</b>	<b>OCEAN BASINS, SEDIMENTS AND CLIMATE CHANGE</b>
Module type:	Required
<b>Intended learning objectives</b>	Students possess knowledge about polar regions with respect to formation of ocean basins, sediment stratigraphy, and climate changes. Students know how to map ocean floors, take sediment samples, and use marine geotechnology.
<b>Contents</b>	1.1. Marine Sediments and Polar Sedimentation Processes: L, FT 1.2. Marine Geoscience Methods: L, PC, S, FT 1.3. Ocean Floor Mapping Methods: L, PC 1.4. Ocean Basins: Morphology, Tectonic Structure, and Dynamics: L 1.5. Marine Geotechnology: L, FT
<b>Methods of instruction</b>	L, S, PC, FT
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	none
<b>Applicability of the module</b>	First semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses and field trips: Examination type: written examination Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the winter semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

Module no.	2
<b>Module title:</b>	<b>High Seas and Coastal Water Oceanography</b>
Module type:	Required
<b>Intended learning objectives</b>	Students possess knowledge about methods for exploring the arctic ocean and coastal waters and about fundamental theories.
<b>Contents</b>	2.1. Oceanographic Measurement Methods and Data Analyses: L, S 2.2. Physics of the Atmosphere – Sea Ice-Ocean Interaction in Polar Regions: L, S, PC 2.3. Ocean Currents: L, PC

	2.4. Ocean Waves: L, S, PC 2.5. Fundamentals of Physical Oceanography: L, S, PC 2.6. Oceanic Tides: L, S 2.7. Coastal Water Dynamics: L, S, I
<b>Methods of instruction</b>	L, PC, S
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	First semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: written examination Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the winter semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

<b>Module no.</b>	3
<b>Module title:</b>	<b>Polar and Marine Ecosystems: Structure, Functioning and Vulnerability</b>
<b>Module type:</b>	Required
<b>Intended learning objectives</b>	Students who complete the module know about the structure, function, and susceptibility of polar and marine ecosystems and can use this knowledge to assess sensitive ecosystems.
<b>Contents</b>	3.1. Biodiversity in Marine and Polar Ecosystems: L, S 3.2. Biological Oceanography of Pelagic Ecosystems, Principles, Examples, Future Scenarios and Modeling: L, S 3.3. Biology and Ecology of the Seabed Fauna (Benthos) in Arctic Waters: L, FT 3.4. Introduction to the Polar Ecology and Sea-Ice Ecology L, S 3.5. Geoecology of Polar Regions and Impacts on Ecosystems: L, S, PC 3.6. Biology and Ecosystems Modeling: L, S 3.7. Ecological Regulation and Utilization of Marine Natural Resources in Polar Regions: L, S
<b>Methods of instruction</b>	L, S, PC, FT
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	First semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: study project Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the winter semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

<b>Module no.</b>	Core module, CM
<b>Module title:</b>	<b>Key Competencies</b>
<b>Module type:</b>	Required
<b>Intended learning objectives</b>	Students who have completed this module have knowledge and practical skills in applying appropriate methods for polar and marine research.
<b>Contents</b>	CM. 1. Soft Skills: L, PC, S CM. 2. History of Polar Research: L CM. 3. Introduction to the Use of Online Academic Databases: S, PC CM. 4. Introduction to GIS Soft Skills and Rules for Safeguarding Good Scientific Practice: S, PC CM. 5. Field Practice Implemented in a Student Project, including presentation at the POMOR student conference S, PC
<b>Methods of instruction</b>	L, S, PC
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	First and second semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: oral examination and written report Examination language: English
<b>ECTS credits</b>	6 ECTS credits
<b>Course frequency</b>	Every second year in the winter and the summer semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

**Semester 2**

<b>Module no.</b>	4
<b>Module title:</b>	<b>Natural Resources</b>
<b>Module type:</b>	Required
<b>Intended learning objectives</b>	Students have basic knowledge of nonliving resources with special consideration of soils and minerals. They are able to analyze the interactions of the actors involved (e.g., in geology, geophysics, geochemistry, petrology, and drilling engineering) and have the ability to assess the impact on living terrestrial and marine resources.
<b>Contents</b>	4.1. Economic and Social Geography of the Arctic: L, S 4.2. Living Terrestrial Resources of the Arctic and Their Use: L, S 4.3. Mineral Resources: L, S 4.4. Hydrocarbon Resources: L, PC, S, FT 4.5. Evaluation and Processing of Geophysical Data: L, PC, S
<b>Methods of instruction</b>	L, PC, S, FT
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	Second semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: written examination Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the summer semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

<b>Module no.</b>	5
<b>Module title:</b>	<b>Processes in Coastal Zones and Environmental Management</b>
<b>Module type:</b>	Required
<b>Intended learning objectives</b>	Students possess considerable knowledge about the issues, methods, and results of the processes in polar coastal zones as well as environmental management in the Arctic.
<b>Contents</b>	5.1. Statistical Analysis of Spatial Data (Geostatistics) L, PC 5.2. Eutrophication, Monitoring, Evaluation, and Management of Coastal Zones: L, S 5.3. Marine Environmental Legislation: L, S 5.4. Numerical Modeling of Coastal Processes L, S 5.5. Modern Approaches Towards Environment Management: Co-Management L, S 5.6. Indigenous Population and Industrial Development in Arctic Areas: Impact Assessment and Sustainable Development Strategies L, S 5.7. Integrated Coastal Zone Management of the Arctic and Subarctic Regions: L, S, PC 5.8. Decision Guidance and Predictions: L, PC, S
<b>Methods of instruction</b>	L, S, PC
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	Second semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: written examination Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the summer semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

<b>Module no.</b>	6
<b>Module title:</b>	<b>Periglacial Environment</b>
<b>Module type:</b>	Required
<b>Intended learning objectives</b>	Students possess in-depth knowledge about the structure of periglacial environmental systems and the effects of basic cryogenic processes.
<b>Contents</b>	6.1. Periglacial Environment Systems and Climate Change: L, S 6.2. Glaciers and Ice Caps: L, S, PC 6.3. Cryogenic Processes, Cryosols, Geochemical Cycles in Polar Regions: L, PC, S, FT 6.4. Thaw Zone and Permafrost Soils: L, PC 6.5. Microbiology, Hydrochemical and Biochemical Processes in an Arctic Environment: L, S 6.6. Periglacial Water Bodies, River Runoff and Basic Types of Anthropogenic Influence on Water Bodies of Polar Land: L, S, PC
<b>Methods of instruction</b>	L, S, PC
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	None
<b>Applicability of the module</b>	Second semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	Requirements: active participation in courses Examination type: written examination Examination language: English
<b>ECTS credits</b>	9 ECTS credits
<b>Course frequency</b>	Every second year in the summer semester
<b>Duration</b>	While lectures are held during the semester and/or as a block course

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

### Semester 3

<b>Module no.</b>	DS 3.0
<b>Module title:</b>	<b>German Semester (GS): Semester at a partner university in Germany</b>
<b>Module type:</b>	Required elective
<b>Intended learning objectives</b>	Students possess in-depth knowledge about the issues, methods, and evaluation procedures in polar and marine geosciences (meteorology, marine geochemistry, marine biology, geology, and soil science) and how to independently apply them.
<b>Contents</b>	<p>Students complete a semester abroad in Germany at one of the participating partner universities within the respective MSc degree program:</p> <ul style="list-style-type: none"> <li>• Universität Hamburg, MSc in Integrated Climate System Sciences</li> <li>• University of Bremen, MSc in Marine Biology, Marine Geosciences</li> <li>• Kiel University, MSc in Marine Geosciences</li> <li>• University of Potsdam, MSc in Geosciences and Geology</li> </ul> <p>The respective curriculum can be found in the module course catalog for the MSc POMOR.</p>
<b>Methods of instruction</b>	<p>DS 1: Seminar 3 ECTS credits            DS 2: Study project 15 ECTS credits            DS 3: Supplementary course 12 ECTS credits</p> <p>In accordance with the module descriptions of the German partner universities L, S, I, PC, FT</p> <p>* Teaching at Kiel University is conducted according to the module handbook (as amended) for the M.Sc. Marine Geosciences. The study project is only carried out in exceptional circumstances and in consultation with the relevant supervisors.</p>
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	Successful completion of 60 ECTS credits for the MSc POMOR
<b>Applicability of the module</b>	Third semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	In accordance with the module descriptions of the German partner universities
<b>ECTS credits</b>	30 ECTS credits
<b>Course frequency</b>	Every second year in the winter semester
<b>Duration</b>	1 semester

Abbreviations: Lecture L, Practical Course P, Seminar S, Field Trip FT, Practical Course PC.

POMOR students take part in selected modules of the Master of Science in Integrated Climate System Sciences (MSc ICSS) at Universität Hamburg. Equivalent modules completed at other German partner universities are recognized for this module. The courses in semester 3 usually consist of a study project, a seminar, and supplementary classes.

### **Selected modules of the Master of Science in Integrated Climate System Sciences**

#### **Semester 1:**

- Module 1.1 Basic Scientific Skills
- Module 1.2 The Climate System
- Module 1.3 Climate and Society
- Courses from the Module 1.4 Climate Science Specialization

#### **Semester 2**

Courses from the Module 2.5 Technical Skills

#### **Semester 3**

- Module 3.1 Climate System Sciences Seminar
- Module 3.2 Climate Study Project
- Courses from the Module 3.3 Climate Science Additional

<b>Module abbreviation:</b> 1.1 CLIBASICS		
Module title: Basic Scientific Skills		
<b>Intended learning objectives</b>	Graduates have an initial overview of the concept of integrated climate research and have gained the knowledge in mathematics, statistics, numerics, and physics required for climate research.	
<b>Contents</b>	Required courses: 1.1.1 Basic Research Skills (Grannis, Harms) 1.1.2 Introduction to Statistics (Franzke)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	None	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	oral or written examination; the specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	none
	Language:	English
	Duration/length:	maximum 120 minutes written exam, or 45 minutes oral examination.
<b>ECTS credits</b>	6	
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	First semester of the MSc ICSS; reference semester 1	
<b>Module frequency</b>	Once each winter semester	
<b>Duration</b>	1 semester, including a one-week block course in the first week of the lectures	
<b>Module coordinator</b>	Head of the SICSS	

<b>Module abbreviation:</b> 1.2 CLISYS		
Module title: The Climate System		
<b>Intended learning objectives</b>	Graduates have fundamental knowledge of the physical and biochemical aspects of the climate system.	
<b>Contents</b>	Required courses: 1.2.1 Physics of the Climate System (Baehr, Düsterhaus) 1.2.2 Global Biogeochemical Cycles (Hartmann, Kutzbach)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	None	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	oral or written examination; the specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	none
	Language:	English
	Duration/length:	maximum 120 minutes written exam, or 45 minutes oral examination.
<b>ECTS credits</b>	9	
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	Reference semester 1	
<b>Module frequency</b>	Once each winter semester	
<b>Duration</b>	1 semester	
<b>Module coordinator</b>	Coordinator physics, track coordinator biochemistry	

<b>Module abbreviation:</b> 1.3 CLISOC		
Module title: Climate and Society		
<b>Intended learning objectives</b>	Students are familiar with the economic and social science basics and are able to apply this knowledge to climate related problems.	
<b>Contents</b>	Required courses: 1.3.1 Climate Policy Scenarios: Economics, Integrative Assessments and Negotiations (Held, Köhl, Mues, Wolf) 1.3.2 Human-Environment Interactions and Climate Change: Security and Sustainability (Scheffran, Schneider) 1.3.3 Introduction to Social Sciences and Climate Communication (Brüggemann, Rödder)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	None	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	oral or written examination; the specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	none
	Language:	English
	Duration/length:	maximum 120 minutes written exam, or 45 minutes oral examination.
<b>ECTS credits</b>	9	
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	Reference semester 1	
<b>Module frequency</b>	Once each winter semester	
<b>Duration</b>	1 semester	
<b>Module coordinator</b>	Track coordinator for economic and social sciences	

<b>Module abbreviation:</b> 1.4 CLISPEC		
Module title: Climate Science Specialization		
<b>Intended learning objectives</b>	Students possess specialized knowledge in two disciplines of the three tracks of climate science.	
<b>Contents</b>	2 courses must be chosen: 1.4.1 Introduction to Numerical Approaches (Behrens) 1.4.2 Sea Ice (Kaleschke) 1.4.3 Atmospheric Circulation Systems: Part I (Borth) 1.4.4 Chemistry of Natural Waters (Hartmann) 1.4.5 Aerosols (Langmann) 1.4.6 The Role of Biota in the Climate System (Hense) 1.4.7 Introduction to Social Sciences' Methods (Brüggemann, Rödder)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	None	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	oral or written examination; the specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	none
	Language:	English
	Duration/length:	maximum 90 minutes written examination, 60 minutes oral examination, 15 written pages, 20 minutes presentation
<b>ECTS credits</b>	6	
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	First semester of the MSc ICSS	
<b>Module frequency</b>	Once each winter semester	
<b>Duration</b>	1 semester	
<b>Module coordinator</b>	Track coordinators	

<b>Module abbreviation:</b> 2.5 CLITECH		
Module title: Technical Skills		
<b>Intended learning objectives</b>	Students have practical skills in programming, data analysis programs, or software development.	
<b>Contents</b>	2 courses must be chosen: 2.5.1 Scientific Software Development (Behrens) 2.5.2 Scientific Programming in Python I (Sadikni) 2.5.3 Scientific Programming in Python II (Sadikni) 2.5.4 Geographic Information Systems and Science (Wehberg) 2.5.5 MATLAB in Earth System Science (Borth, Schubert, Zhu) 2.5.6 Introduction to GAMS (Schneider) 2.5.7 Object-Oriented Programming for Scientists (Sadikni) 2.5.8 Scientific Visualization Course (Brisic)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	See specific requirements for the individual courses	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	2 ungraded course examinations; usually a practical exam (pass/fail) The specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	>80% attendance requirement during the course
	Language:	English
	Duration/length:	pass on practical
<b>ECTS credits</b>	3	
<b>Module type</b>	Required elective module for Msc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	Semester 2	
<b>Module frequency</b>	Once each summer semester	
<b>Duration</b>	1 semester or block course	
<b>Module coordinator</b>	Head of the SICSS	

<b>Module abbreviation:</b> 3.1 CLISEM	
Module title: Climate System Sciences Seminar	
<b>Intended learning objectives</b>	Students have presented important aspects of a suitable thesis topic for discussion as well as acquired an overview of current topics and research projects in all climate sciences.
<b>Contents</b>	Required seminar: 3.1.1 Climate System Science Seminar (Eschenbach)
<b>Language of instruction</b>	English
<b>Formal prerequisites</b>	Previous participation in the Climate Study Project module
<b>Recommended prerequisites</b>	See specific requirements for the individual courses
<b>Exam framework</b>	Examination type: presentation and report
	Requirements for module examination: >80% attendance requirement during the course
	Language: English
	Duration/length: oral presentation of 20–30 minutes. Report 3-5 pages (1000–1500 characters)
<b>ECTS credits</b>	3
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity
<b>Semester of study</b>	Third semester of the MSc ICSS; reference semester 3
<b>Module frequency</b>	Once annually in the winter semester or summer semester
<b>Duration</b>	1 semester or block course
<b>Module coordinator</b>	Head of SICSS

<b>Module abbreviation: 3.2 CLISTUDY</b>	
Module title: Climate Study Project	
<b>Intended learning objectives</b>	Students who have completed the module have acquired sufficient knowledge in the methodological and technical areas of their respective fields of specialization in order to begin their master's thesis.
<b>Contents</b>	Required courses: 3.2.1 Climate Study Project (Eschenbach) 3.2.2 Scientific Writing (Baehr, Hense)
<b>Language of instruction</b>	English
<b>Formal prerequisites</b>	None
<b>Recommended prerequisites</b>	See specific requirements for the individual courses
<b>Exam framework</b>	Examination type: report
	Requirements for module examination: none
	Language: English
	Duration/length: 20–25 pages written presentation
<b>ECTS credits</b>	15
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity
<b>Semester of study</b>	Third semester of the MSc ICSS; reference semester 3
<b>Module frequency</b>	Once each winter semester
<b>Duration</b>	1 semester
<b>Module coordinator</b>	Head of SICSS

<b>Module abbreviation:</b> 3.3 CLIADD		
Module title: Climate Science Additional		
<b>Intended learning objectives</b>	Students who have completed the module possess additional in-depth knowledge in their area of specialization.	
<b>Contents</b>	2–3 courses must be chosen: 3.3.1 Predictability and Predictions of Climate (Baehr) 3.3.2 Urban Climatology (Schlünzen, Grawe) 3.3.3 Principles of Active Radar and Lidar Remote Sensing (Stevens) 3.3.4 Tracer Transport Simulation Lab (Behrens) 3.3.5 Marine Biogeochemical and Ecosystem Modeling (Hense) 3.3.6 Hydrochemical Modeling (Hartmann) 3.3.7 Using the Eddy Covariance Method for Analyzing Land-Atmosphere Fluxes (Kutzbach, Wille) 3.3.8 Permafrost Soils and Landscapes . . (Pfeiffer, Kutzbach) 3.3.9 Terrestrial Ecosystem Processes within ESMs (Brovkin) 3.3.10 Microeconomics (Perino) 3.3.11 Integrated Assessment Modelling of Global Change (Held, Hokamp) 3.3.12 Decision under Uncertainty in the Integrated Assessment of the Energy-Climate Problem (Held) 3.3.13 Climate Policy: Actors, Institutions, Instruments (Aykut)	
<b>Language of instruction</b>	English	
<b>Formal prerequisites</b>	See specific requirements for the individual courses	
<b>Recommended prerequisites</b>	See specific requirements for the individual courses	
<b>Exam framework</b>	Examination type:	course specific: the specific type of examination will be announced during registration or at the beginning of the course.
	Requirements for module examination:	course specific
	Language:	English
	Duration/length:	course specific
<b>ECTS credits</b>	9	
<b>Module type</b>	Compulsory module for MSc ICSS; open for students of related MSc programs, depending on capacity	
<b>Semester of study</b>	Third semester of the MSc ICSS; reference semester 3	
<b>Module frequency</b>	Once each winter semester	
<b>Duration</b>	1 semester	
<b>Module coordinator</b>	SICCS track coordinators	

**Semester 4**

Module no. MSc thesis Module ID: MSc thesis <b>Module title: MSc Thesis in Polar and Marine Sciences and Defense</b> Module type: Required	
<b>Intended learning objectives</b>	Students possess the skills to independently draft an innovative master's thesis in a specific field of polar and marine research and to present the results of the master's thesis to a knowledgeable audience in a comprehensible manner.
<b>Contents</b>	Students write an in-depth thesis on a topic of their choosing from the field of polar and marine sciences under the joint supervision of an employee and a researcher from the POMOR network in Russia and in Germany. The thesis must address and/or critically research the topic, demonstrate the significance of the selected topic from the field of polar and marine sciences, and lead toward an extended dissertation.
<b>Language of instruction</b>	English
<b>Prerequisites for attendance</b>	Completion of 60 ECTS credits for the MSc POMOR
<b>Applicability of the module</b>	Fourth semester of the MSc POMOR
<b>Type, requirements, and language of examinations</b>	MSc thesis (80%), oral presentation and defense in English (20%)
<b>ECTS credits</b>	30 ECTS credits
<b>Course frequency</b>	Every second year in the summer semester
<b>Duration</b>	Max. 22 weeks

Abbreviations: Lecture L, Practical Course PC, Seminar S, Field Trip FT.

**Section 23:  
Effective date**

These Subject-Specific Provisions shall become effective on the day after they are ratified by the Executive University Board of the University. They apply to students commencing their studies in or after Winter Semester 2017/18.

Hamburg, 14 May 2019  
**Universität Hamburg**