



Universität Hamburg

DER FORSCHUNG | DER LEHRE | DER BILDUNG

OFFICIAL TRANSLATION OF Fachspezifische Bestimmungen für den Studiengang „Integrated Climate System Sciences (M.Sc.)”

(Amtliche Bekanntmachung Nr. 14 vom 26. Februar 2025)

**THIS TRANSLATION IS FOR INFORMATION ONLY –
ONLY THE GERMAN VERSION SHALL BE LEGALLY VALID AND
ENFORCEABLE!**

Subject-Specific Provisions for the Master of Science in Integrated Climate System Sciences

Dated 18 December 2024

On 25 February 2025, in accordance with Section 108 subsection 1 of the Hamburg higher education act (Hamburgisches Hochschulgesetz, HmbHG), dated 18 July 2001 (HmbGVBl. p. 171) as amended 19 November 2024 (HmbGVBl. p. 594, 599), the Executive University Board of the University of Hamburg ratified the subject-specific provisions (FSBs) for the Master of Science in Integrated Climate System Sciences (FSB ICSS) adopted by the Faculty of Mathematics, Informatics and Natural Sciences on 18 December 2024 pursuant to Section 91 subsection 2 number 1 HmbHG.

Preamble

These Subject-Specific Provisions supplement the provisions of the Faculty of Mathematics, Informatics and Natural Sciences' Examination Regulations dated 20 October 2021 as amended governing master of science (MSc) degree programs and provide a description of the modules for the degree program Integrated Climate System Sciences.

I. Supplemental provisions

Section 1

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

Section 1 subsection 1:

- (1) The Master of Science in Integrated Climate System Sciences (MSc in ICSS) is a consecutive, interdisciplinary, research-based degree program taught in the English language.
- (2) The MSc in ICSS follows the general program goals set out in Section 1 subsection 1 of the MIN Faculty's Examination Regulations governing MSc degree programs). In addition to these general program goals, the qualification profile requires graduates to: have a deeper understanding of the interaction between processes in the Earth system and in social systems, what is traditionally examined in a range of disciplines, and the meaning of these interactions for the climate system and for sustainable development; be able to use key methods to study climate-relevant processes and their interactions and have the skill to solve specific research questions; have the ability to plan and conduct initial independent research tasks, to document the results, and to discuss and defend their results in a colloquium; be able to apply and expand on the scientific knowledge, methods, and skills gained in climate systems; be able to implement climate-system-related knowledge as responsible action in accordance with good academic practice.
- (3) The ICSS MSc specifically prepares graduates for subsequent doctoral qualification or to take on challenging and independent activities in leading positions within or outside academia.

Section 4

Program and examination organization, modules, and ECTS credits

Section 4 subsections 1 and 3:

- (1) Detailed descriptions of all modules can be found in part II. Module descriptions
- (2) The ICSS MSc is made up of required modules amounting to 90 ECTS credits and a master's thesis module amounting to 30 ECTS credits. The required area comprises the modules The Climate System (9 ECTS credits), Climate and Society (12 ECTS credits), Basic Methods in Climate Sciences (9 ECTS credits), Climate Science Specialization (12 ECTS credits), Advanced Technical Skills (6 ECTS credits), Advancements in Climate System Sciences (12 ECTS credits), and the Climate Study Project (18 ECTS credits). The recommended process for the modules is depicted in Figure 1.
- (3) The Climate Science Specialization module is made up of required elective courses and related module components from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S). Courses and examinations amounting to a maximum of 9 ECTS credits can be counted toward the module grade.

- (4) The Advancements in Climate Systems Sciences module is made up of required elective courses and related module components from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S). Courses and examinations amounting to a maximum of 9 ECTS credits can be counted toward the module grade.
- (5) The Master's Thesis final module (30 ECTS credits) consists of the master's thesis (27 ECTS credits) and a final presentation with discussion (3 ECTS credits).

First subject semester	The Climate System (9 ECTS credits)	Climate and Society (12 ECTS credits)	Basic Methods in Climate Sciences (9 ECTS credits)
Second subject semester	Climate Science Specialization (12 ECTS credits)	Integrated Climate System Sciences (12 ECTS credits)	Advanced Technical Skills (6 ECTS credits)
Third subject semester	Advancements in the Climate System Sciences (12 ECTS credits)	Climate Study Project (18 ECTS credits)	
Fourth subject semester	Master's thesis (30 ECTS credits)		

Figure 1: Recommended order of modules for ICSS MSc

Section 5

Course types

Courses are held in English.

Section 5 subsections 1 and 2:

- (1) In addition to the courses listed in Section 5 subsection 1 of the Examination Regulations governing MSc degree programs, the following course combinations are possible in the ICSS degree program:
- combined lecture and practical course (lecture and practical course, L + PC).
- (2) Attendance is compulsory for the following types of courses:
- a) Seminars and combined lecture and practical courses, as these are generally aimed at improving students' abilities to handle criticism and to hold discussions;
 - b) Field trips, as these are designed to provide region-specific knowledge;
 - c) Internships and on-site internships, as these are intended to guide students and enable them to resolve practical problems using new methods;
 - d) Projects, as these also serve to develop social skills (e.g., the ability to work in a team).
- (3) Compulsory attendance does not apply to admission to repeat examinations.

Section 13

Completed coursework and module examinations

Section 13 subsection 4:

The following type of examination may be additionally used for module and course examinations:

Portfolio: A portfolio is a compilation of components completed during a module, evaluated, and summarized in light of overarching questions and issues. Working time is generally three months. It comprises 10–30 pages, made up of a range of media, such as, for example, term papers, reports, presentation slides, posters, annotated program code, etc.

Section 13 subsection 10:

The examination is generally done in English. If the examiner and the student agree, the examination may also be taken in German.

Section 14

Master's thesis

Section 14 subsection 2:

Students who have earned at least 60 ECTS credits may be admitted to the final module.

Section 14 subsection 4:

The master's thesis must be written in English.

Section 14 subsection 5 sentence 1:

The work required in the final module amounts to 30 ECTS credits, comprised of a master's thesis (27 ECTS credits) and a final presentation with discussion (3 ECTS credits). Students have six months to write their master's thesis. The thesis should be 30–60 pages in length.

Section 15

Evaluation of examinations

Section 15 subsection 3:

- (1) 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.
- (2) In the final module, the grade for the thesis component is weighted 80% and 20% for the grade of the presentation and discussion.
- (3) 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 final module has twice the weight.

Section 15 subsection 4:

The overall final grade "pass with distinction" is awarded if a grade of 1.0 is earned for the final module, 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. Module descriptions

Module type	Required module
Title	The Climate System
Module no.	ESW-CLISYS
Learning outcomes	Students are familiar with fundamental concepts of physical and biochemical aspects of climate systems. They have detailed knowledge of the physical and biochemical processes that are decisive for climate dynamics and biochemical exchange processes.
Module content	<p>Physical Earth System Processes: Description of the prevailing oceanic and atmospheric states and circulation Interactions between ocean and atmosphere Radiation balance Global energy budget and transportation Thermohaline circulation Climate variability for decadal to paleoclimatic time scales Observations and modeling of climate systems</p> <p>Biogeochemical Earth System Processes: Biogeochemical processes, relevant at the global level— which includes explaining hydrologic, atmospheric, extraterrestrial, geological, biological, and human causes for environmental changes over time scales of tens, thousands, and millions of years</p>
Teaching format(s) (indicated in credit hours per week)	Physical Earth System Processes (lecture): 2 credit hours per week Biogeochemical Earth System Processes (lecture and practical course): 4 credit hours per week
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	<p>Module examination: Oral examinations (max. 30 minutes)</p> <p>Examination registration prerequisites: Examination requirements will be announced at the start of the respective course.</p> <p>Examination language: English</p>
Workload in the respective module components (indicated in credit hours per week)	Physical Earth System Processes (lecture): 3 ECTS credits Biogeochemical Earth System Processes (lecture and practical course): 6 ECTS credits
Total module workload	9 ECTS credits
Module duration	One semester
Module frequency	Once a year, in the winter semester
Person responsible for module	Prof. Dr. Johanna Baehr

Module type	Required module
Title	Climate and Society
Module no.	ESW-CLISOC
Learning outcomes	Students are familiar with the fundamental concepts of economic and social aspects of climate systems. They also have detailed knowledge of the fundamental economic and social sciences processes and can apply this knowledge to climate-relevant problems.
Module content	<p>Climate-Related Economics Basics: Principles of economic social welfare like the concept of utility functions, social preferences and social planning, fundamental social welfare economic theorems, types of market failure; integrated evaluation according to climate goals, derivation of costs of political intervention; creation of greenhouse gas reports as part of the UNFCCC process based on IPCC guidelines on agriculture, forestry and other land use (AFO-LU) — which occurs, for example, in negotiations for accrediting greenhouse gas mitigation measures in the forestry sector and in forest-based industries</p> <p>Climate-Related Social Science Basics: This course introduces central social science concepts such as social roles, norms, and organizations. The example of climate change communication presents and discusses a particularly relevant example of science communication, which considers both the logic of mass media and the interaction of scientists, journalists, and other actors in public debates about climate change. The consistent theme is introducing social science thinking and how it contributes to an integrated study of climate change.</p>
Teaching format(s) (indicated in credit hours per week)	<p>Climate-Related Economics Basics (lecture and practical course): 4 credit hours per week</p> <p>Climate-Related Social Science Basics (lecture and practical course): 4 credit hours per week</p>
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	<p>Module examination: Module component examinations Climate-Related Economics Basics: written examination Climate-Related Social Science Basics: presentation and term paper</p> <p>Examination registration prerequisites: Examination requirements will be announced at the start of the respective course.</p> <p>Examination language: English</p>
Workload in the respective module components (indicated in credit hours per week)	<p>Climate-Related Economics Basics (lecture and practical course): 6 ECTS credits</p> <p>Climate-Related Social Science Basics (lecture and practical course): 6 ECTS credits</p>
Total module workload	12 ECTS credits
Module duration	One semester
Module frequency	Once a year, in the winter semester
Person responsible for module	Prof. Dr. Hermann Korte

Module type	Required module
Title	Methods in Climate Sciences
Module no.	ESW-CLIMET
Learning outcomes	Students have expanded their previous knowledge on scientific methods or technical skills with a climate-relevant focus.
Module content	<p>Students expand the knowledge gained during their bachelor's studies on the following topics and methods:</p> <p>Numerical solutions of differential equations and programming (introduction to numerical methods and concepts on evaluating accuracy and uncertainty)</p> <p>Introduction to scientific programming using Python (fundamental Python programming and application to statistics)</p> <p>Introduction to statistics (probability theory, probability density functions, parameter estimation, confidence intervals, hypothesis testing, multivariate linear regression including confidence intervals for linear extrapolations)</p> <p>Physical Earth System Processes: Expansion on contents of the Physical Earth System Processes lecture using examples</p> <p>Introduction to Social Science Methods: The course aims to introduce students with a natural sciences or geography background to the relevant quantitative and qualitative social science research methods.</p>
Teaching format(s) (indicated in credit hours per week)	<p>Numerical Solutions of Differential Equations and Programming (lecture and practical course): 2 credit hours per week</p> <p>Introduction to Scientific Programming Using Python (practical course): 2 credit hours per week</p> <p>Introduction to Statistics (lecture and practical course): 2 credit hours per week</p> <p>Physical Earth System Processes (practical course): 2 credit hours per week</p> <p>Introduction to Social Science Methods (lecture and practical course): 2 credit hours per week</p>
Language of instruction	English
Prerequisites	None
Module applicability	<p>The module is part of the following degree program(s)/profile(s):</p> <p>1. ICSS MSc</p>
Module completion	<p>Module examination: Module component examinations</p> <p>Numerical solutions of differential equations and programming: Practical examination</p> <p>Introduction to Statistics (lecture and practical course): Term paper</p> <p>Introduction to Social Science Methods (lecture and practical course): Term paper and presentation</p> <p>Physical Earth System Processes (practical course): Practical examination</p> <p>Examination registration prerequisites:</p> <p>Examination requirements will be announced at the start of the respective course.</p> <p>Examination language: English</p>

Workload in the respective module components (indicated in credit hours per week)	Numerical Solutions of Differential Equations and Programming (lecture and practical course): 3 ECTS credits Introduction to Statistics (lecture and practical course): 3 ECTS credits Introduction to Social Science Methods (lecture and practical course): 3 ECTS credits Introduction to Scientific Programming Using Python (practical course): 3 ECTS credits Physical Earth System Processes (practical course): 3 ECTS credits Students select three courses.
Total module workload	9 ECTS credits
Module duration	One semester
Module frequency	Once a year, in the winter semester
Person responsible for module	Prof. Dr. Jörn Behrens

Module type	Required module
Title	Climate Science Specialization
Module no.	ESW-CLISPEC
Learning outcomes	Students possess knowledge related to the discipline and methods of at least two of the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S).
Module content	Courses on the specialized disciplinary knowledge from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S) are offered.
Teaching format(s) (indicated in credit hours per week)	Students select courses from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S) from a comprehensive, rotating catalog. Standard teaching formats: Lecture and practical course (2/4 credit hours per week) Lecture (2/4 credit hours per week) Seminar (2 credit hours) Internship (2 credit hours per week)
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	Module examination: Module component examinations Practical presentation, term paper, or examination Course components may be accredited to a maximum of 9 ECTS credits from each of the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S). Examination registration prerequisites: Examination requirements will be announced at the start of the respective course. Examination language: English
Workload in the respective module components (indicated in credit hours per week)	3 ECTS credits for lectures with 2 credit hours per week 6 ECTS credits for lectures with 4 credit hours per week
Total module workload	12 ECTS credits
Module duration	One semester
Module frequency	Every summer semester
Person responsible for module	Prof. Dr. Christian Beer

Module type	Required module
Title	Integrated Climate System Sciences
Module no.	ESW-CLINT
Learning outcomes	Students have a deeper understanding of the connection between various physical, biogeochemical, economic, or social sciences processes in Earth systems. Students have learned to take a problem-oriented approach to process complex issues within climate systems sciences and to provide solution-oriented responses.
Module content	The module offers courses in which students learn to establish connections between various physical, biogeochemical, economic, or social science concepts and processes in Earth systems. Module lectures provide knowledge and tools for integrated learning and thinking as well as for processing complex interdisciplinary questions within climate system science.
Teaching format(s) (indicated in credit hours per week)	Students select courses from a comprehensive, rotating catalog. Standard teaching formats: Lecture and practical course (2 credit hours per week) Lecture (2 credit hours per week) Seminar (2 credit hours) Internship (2 credit hours per week) Practical course (2 credit hours per week)
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	Module examination: Portfolio Examination registration prerequisites: Examination requirements will be announced at the start of the respective course. Examination language: English
Workload in the respective module components (indicated in credit hours per week)	3 ECTS credits for lectures with 2 credit hours per week
Total module workload	12 ECTS credits
Module duration	One semester
Module frequency	Every summer semester
Person responsible for module	Prof. Dr. Jana Sillmann

Module type	Required module
Title	Advanced Technical Skills
Module no.	ESW-CLITECH
Learning outcomes	Students have mastered specific methods, techniques, and skills for use answering significant climate-relevant questions.
Module content	The courses offered cover a broad spectrum of topics in the fields of scientific computing, computer programming, data analysis, and geographic information systems (GIS).
Teaching format(s) (indicated in credit hours per week)	Students select courses from a comprehensive, rotating catalog. Standard teaching formats: Lecture and practical course (2/4 credit hours per week) Lecture (2/4 credit hours per week) Seminar (2 credit hours) Internship (2 credit hours per week) Practical course (2 credit hours per week)
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	Module examination: Module component examinations Practical examination or term paper Examination registration prerequisites: Examination requirements will be announced at the start of the respective course. Examination language: English
Workload in the respective module components (indicated in credit hours per week)	1.5 ECTS credits for lectures with 1 credit hour per week 3 ECTS credits for lectures with 2 credit hours per week 6 ECTS credits for lectures with 3 credit hours per week
Total module workload	6 ECTS credits
Module duration	One semester
Module frequency	Every summer semester
Person responsible for module	Prof. Dr. Uwe Schneider

Module type	Required module
Title	Advancement in Climate System Sciences
Module no.	ESW-CLIADVANCE
Learning outcomes	Students have deeper disciplinary and methodical knowledge from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S).
Module content	Courses on the specialized disciplinary knowledge from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S) are offered.
Teaching format(s) (indicated in credit hours per week)	Students select courses from the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S) from a comprehensive, rotating catalog. Standard teaching formats: Lecture and practical course (2/4 credit hours per week) Lecture (2/4 credit hours per week) Seminar (2 credit hours) Internship (2 credit hours per week)
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	Module examination: Module component examinations Internship report, oral examination, or written examination Course components may be accredited to a maximum of 9 ECTS credits from each of the fields of physical Earth system sciences (P), biogeochemistry (B), and economics and social sciences (S). Examination registration prerequisites: Examination requirements will be announced at the start of the respective course. Examination language: English
Workload in the respective module components (indicated in credit hours per week)	3 ECTS credits for lectures with 2 credit hours per week 6 ECTS credits for lectures with 4 credit hours per week
Total module workload	12 ECTS credits
Module duration	One semester
Module frequency	Once a year, in the winter semester
Person responsible for module	Prof. Dr. Christian Beer

Module type	Required module
Title	Climate Study Project
Module no.	ESW-CLISTUDY
Learning outcomes	Students are able to design their own initial larger-scale research projects (master's thesis) in consultation with their supervisor, to report this in writing, and to present and defend their findings before a public audience. They can develop the required basic information through literature searches and discussions with experts.
Module content	<p>Climate Study Project Preparation: This presents the structure of a scientific paper and explains the most important parts of an abstract: what, why, how. During the course, students prepare their own abstract for discussion and subsequent amendment.</p> <p>Climate Study Project: A project is conducted in the field of integrated climate systems science. Under the guidance of a supervisor, individual research is carried out in preparation for a potential master's thesis.</p> <p>Climate System Sciences Seminar: Students present and discuss their own climate study project.</p>
Teaching format(s) (indicated in credit hours per week)	<p>Climate Study Project Preparation (practical course): 2 credit hours per week</p> <p>Climate Study Project: 8 credit hours per week</p> <p>Climate System Science Seminar: 2 credit hours per week</p>
Language of instruction	English
Prerequisites	None
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	<p>Module examination: Project completion consists of a term paper on the climate study project (80%) and a presentation with a discussion in the Climate Study Project Seminar (20%).</p> <p>Examination registration prerequisites: Examination requirements will be announced at the start of the respective course.</p> <p>Examination language: English</p> <p>Academic requirements: Successful completion of the Climate Study Project Preparation practical course.</p>
Workload in the respective module components (indicated in credit hours per week)	<p>Climate Study Project Preparation (practical course): 3 ECTS credits</p> <p>Climate System Science Seminar: 3 ECTS credits</p> <p>Climate Study Project: 12 ECTS credits</p>
Total module workload	18 ECTS credits
Module duration	One semester
Module frequency	Winter semester and summer semester
Person responsible for module	Prof. Dr. Christian Beer

Module type	Final module
Title	Master's Thesis
Module no.	ESW-CLIFINAL
Learning outcomes	Students can apply key methods to study climate relevant processes and their interaction and have the skills to answer their own specific research questions. They have the ability to plan, conduct, and present their first individual research project and discuss and defend their results in a colloquium.
Module content	Students use scientific methods to independently work on a question from the field of integrated climate sciences and document the results according to academic standards. Commencing with the current status of research, solutions for scientific questions will initially be presented and then implemented. Findings must be presented in an appropriate manner and critically evaluated. The module concludes with a presentation and subsequent discussion that is open to members of the institute.
Teaching format(s)	Individual learning
Language of instruction	English
Prerequisites	Students who have earned at least 60 ECTS credits may be admitted to the final module.
Module applicability	The module is part of the following degree program(s)/profile(s): 1. ICSS MSc
Module completion	Module examination: Module component examinations Master's thesis (30–60 pages) and final presentation with subsequent discussion (20 minutes presentation, 10–15 minute discussion). The master's thesis contributes 80% of the grade of the final module and the discussion contributes the remaining 20%. Examination language: English
Workload in the respective module components (indicated in credit hours per week)	Master's thesis: 27 ECTS credits Final presentation with discussion: 3 ECTS credits
Total module workload	30 ECTS credits
Module duration	One semester
Module frequency	Winter semester and summer semester
Person responsible for module	Prof. Dr. Christian Beer

Section 23 Effective date

These subject-specific provisions become effective on the day following official publication by the University of Hamburg. They first apply to students commencing their studies in Winter Semester 2025/26.

Hamburg, 26 February 2025
University of Hamburg