Subject-specific guidelines for the Master's Program Atmospheric Science (M.Sc.)

From XXX

On YYY, the Executive Board of the University of Hamburg has approved the new version of the subject-specific guidelines for the study program "Atmospheric Science" as a study program leading to the degree "Master of Science" (M.Sc.) according to § 108 paragraph 1 of the Hamburg Higher Education Act (HmbHG), as approved by the Faculty Council of the Faculty of Mathematics, Informatics and Natural Sciences on ZZZ on the basis of § 91 paragraph 2 number 1 HmbHG of July 18, 2001 (HmbGVBl. p. 171) in the version of June 17, 2021 (HmbGVBl. p. 468).

Preamble

These subject-specific guidelines supplement the regulations of the examination code of the Faculty of Mathematics, Informatics and Natural Sciences for study programs leading to the degree "Master of Science" (MSc) dated October 20, 2021, as amended (PO M.Sc.) for the subject "Atmospheric Science".

I. Supplementary regulations to the examination code (PO MSc)

To § 1
Study goal

To § 1 Paragraph 1:
(1) The Master's program "Atmospheric Science" is a consecutive, research-oriented, degree program taught in English.

(2) The Master's program "Atmospheric Science" pursues the general study objectives according to § 1 paragraph 1 PO MSc of the MIN Faculty. In addition to these general study objectives, the study of meteorology at the Master's level is intended to provide students with in-depth knowledge in the field of atmospheric physics, to prepare them specifically for weather and climate research, and to give them the skills

- to independently apply and expand scientific knowledge, methods and abilities,
- for independent advanced training and
- to act responsibly in their field of expertise, following the rules of good scientific

(3) The program prepares students for a career with a strong research orientation. The first year, which serves to further deepen and broaden their knowledge, is therefore

followed by a semester of research-based learning, in which students, embedded in a research group, are being prepared for their research work. Afterwards, they begin their six-month master's thesis, in which a complex problem from meteorology or climate research is to be solved.
Upon completion of the program, graduates of the Master's degree program in Atmospheric Science will have acquired the following subject-specific competencies, knowledge, and skills:

- They can independently apply the numerical and experimental methods commonly used in meteorology and climate research, generate observational or model data, critically examine it, interpret it scientifically, and translate it into forecasts.
- They have learned to further develop methods and to present new findings in an appropriate manner, both orally and in writing.
- They have acquired the ability to view, analyze, and predict climate and environmental changes in the atmosphere from a mathematical and scientific perspective and have developed an awareness of the economic and/or political relevance of the statements.
- They are prepared to pursue a doctoral degree in the field of meteorology or in a related field, or to take up a managerial position outside the university.

(4) Complementary subject students are provided with knowledge from sub-fields of the subject meteorology.

To § 4
Study and examination structure, modules and credits

To § 4 Paragraphs 2 and 3:
(1) "Atmospheric Science" studies physics of the atmosphere. The Master's program "Atmospheric Science" is thus an already specialized degree program. It comprises compulsory modules from the field of meteorology and climate research amounting to 69 CP, a compulsory elective area of 30 CP and elective modules from meteorology or other complementary subjects amounting to 21 CP (total = 120 CP).

(2) In terms of their content, the modules can be assigned to the following four categories:

1. Acquiring specialized knowledge in the field of meteorology and climate research (24 CP),
2. Acquiring additional knowledge in the fields of meteorology and climate research of the student's choice ("Advanced Core Electives") (30 CP),

3. Acquiring additional knowledge in supplementary subject areas of the student's choice (elective area) (21 CP),
4. Preparation for and execution of the research (45 CP).

(3) A compact description of all modules can be found under II. Module Descriptions of these subject specific guidelines. This description specifies learning objectives, teaching methods, prerequisite, scope of work and the examination modalities. In addition to the modules described in Appendix II, further suitable modules can be applied for in the elective area "Advanced Core Electives" to the examination board.

(4) Additional modules beyond the scope of 120 LP can be completed voluntarily. Upon application to the examination board, the grades of additionally completed examinations will be included in the Master's certificate. However, they do not contribute to the overall grade.

(5) Complementary subject students take individual modules and acquire knowledge from sub-areas of meteorology. The scope of the complementary subject studies is specified for the students by the examination regulations of their major subject. The modules that fill the frame given by the major subject are determined by the chairperson of the examination board after consultation between the complementary subject student and the study advisor for the subject meteorology.

To § 5
Lecture types

To § 5 Paragraph 1:
The teaching language of the degree program is English. If students want to take courses in the elective area in which the teaching language is German, they must meet the required German language proficiency.

To § 10
Deadlines for module examinations and retaking of module examinations

To § 10 Paragraph 1:
For re-examinations, a type of examination that differs from the initial examination may be established.

To § 13
Study performance and module examinations

To § 13 Paragraph 4:
The types of examinations are specified in the respective module descriptions in Appendix II. If several types of examinations are foreseen in a module, the specific type

of examination will be determined and announced by the examiner at the beginning of the course.

To § 13 Paragraph 10:
Examinations in the elective area are conducted in German or English while examinations in the other modules of the program are conducted in English.

To § 14
Master's thesis

To § 14 Paragraph 1:
An obligatory part of the Master's thesis is a colloquium consisting of an oral presentation and a scientific discussion on the contents of the thesis. The presentation is considered in the evaluation of the master thesis to a share of 1/4. The presentation should have been given no later than 6 weeks after submission of the written thesis.

To § 14 Paragraph 2:
Students who have earned at least 60 credit points can be allowed to write their Master's thesis.

To § 14 Paragraph 4:
The Master's thesis is written in English.

To § 14 Paragraph 5 Sentence 1:
The workload for the Master's thesis corresponds to 30 credit points, the duration of the work is 6 months.

To § 15
Evaluation of the examination performance

To § 15 Paragraph 3 Sentence 5:
If a module examination consists of several partial examinations, the (overall) grade is calculated as an average of the grades for the partial examinations based on credit points. In the module "Master's thesis" the grade of the thesis counts for 75 % and the grade of the presentation and discussion for 25 % in the evaluation of the module.

To § 15 Paragraph 3 Sentence 9:
The overall grade of the Master's examination is calculated as a mean of all module grades weighted by credit points, with the module "Master's thesis" counting double.

To § 15 Paragraph 3 Sentence 10:
No grades are awarded for the modules "Atmospheric Study Project" and "Experimental Meteorology". Examination performances from the elective area are not included in the overall grade. For the module "Advanced Core Electives" the following

applies: only the best graded examinations with a total of 30 CP will be taken into account for the overall grade.

To § 15 Paragraph 4:
The overall grade "Passed with distinction" is awarded if the Master's thesis is graded with 1.0 by both reviewers, the Master's colloquium was graded with at least 1.3, the overall average grade is at least 1.3, and no module exam was graded with less than 2.3.

To § 23
Entry into force

These subject-specific guidelines come into force after being published in the Official Announcements of the University of Hamburg. They apply for the first time to students who begin their studies in the winter semester 2023/24. Students who have started their studies earlier can change to these examination regulations upon application.

Hamburg, XXX
University of Hamburg

						Courses				Exams			
Recommended semester	**Offered at**	**Duration (1 or 2 semesters)**	**Module type: compulsory (C), Advanced Core Electives (ACE) or elective (E)**	**Module number/abbreviation**	**Module requirements**	**Module title**	**Course title**	**Course type: Lecture (L), Exercise (E), Seminar (S)**	**Semester hours per week**	**Pre-requisite for examination**	**Exam type**	**graded**	**Credit points**
1	WS	1	C	MET-M-ADYN	-	**Atmospheric Dynamics**				Successfully completed homework	Oral examination	yes	6
							Atmospheric Dynamics	L	2				
							Atmospheric Dynamics	E	2				
Intended learning outcomes: Students will be able to explain atmospheric dynamics through equations and concepts of increasing complexity, and thus results of complex weather and climate models. Students will learn to interpret complex atmospheric phenomena in observations and numerical models in terms of concept and simplified models that describe scales, and relevant dynamical regimes that can be solved mathematically.													
2	SS	1	C	MET-M-BLM		**Boundary Layer Modeling**					Written examination	yes	6
							Boundary Layer Modelling	L	2				
							Boundary Layer Modelling	E	2				
Intended learning outcomes: Students learn the properties and dominant processes in convective and stable regimes and are familiar with surface effects, turbulence, and mixing. Students will simultaneously learn different modeling approaches, such as mixed-layer models, RANS models, LES models, and direct numerical simulation (DNS).													

1	WS	1	C	MET-M-RC		**Radiation and Climate**					Written examination	yes	6
							Radiation and Climate	L	2				
							Radiation and Climate	E	2				
Intended learning outcomes: Students will comprehend radiative transfer theory and be able to apply it to understand and predict the Earth's climate.													
2	SS	1	C	MET-M-EXP	-	**Experimental Meteorology**					Project completion	no	6
							Experimental Design	S	2				
							Experiment (Field trip or Lab experiment)	E	3				
Intended learning outcomes: Upon completion of the module, students will have knowledge and skills in the areas of experimental design, practical execution of experiments, and analysis of large data sets. They are able to evaluate multivariate measurement data sets to test meteorological theories. They can correctly assess the significance of observations.													
1-3		3	ACE	MET-M-ACE	-	**Advanced core electives**					Partial examinations according to the chosen course of the respective advanced core elective module	yes	30
		1	ACE				Atmospheric Physics	L/E	4		Written examination	yes	6
	WS	1	ACE				Urban Climatology	L/E	2		Written examination	yes	3
	SS	1	ACE				Climate Dynamics	L/E	2		Written examination	yes	3
	SS	1	ACE				Internal Waves and Instabilities	L/E	4		Written examination	yes	6
	WS	1	ACE				Atmospheric Remote Sensing	L/E	4		Oral examination	yes	6
		1	ACE				Fluid Modelling of atmospheric flow and dispersion	L/P	4		Internship completion	yes	6

	SS	1	ACE				Numerical Prediction of the Atmosphere and Ocean	L/E	4		Project completion	yes	6
		1	ACE				Tropical Clouds and Convection	L/E	4		Homework	yes	6
	W&S		ACE				Minor courses related to meteorology or climate research of the MSc OCP, ICSS and Geophysics as well as further specialization courses of the MSc Atmospheric Science after approval by the examination board.	L/E	As offered		According to the study program	yes	As offered
Learning outcomes: Building on the basic knowledge of their previous studies, students acquire deeper insights into special topics of meteorology and climate research according to their interests.													
1+2+3	WS	2	E	WF	-		**Elective**				According to the chosen subjects	no	21
Learning outcomes: In the elective module, students broaden their competencies and knowledge acquired in the Master's program.													
3	WS	1	C	FS	-		**Atmospheric Study Project**				Written report or presentation	no	15
							Joint seminar	S	2				
							Working group seminar	S	2				
							Working group internship	P	6				
Learning outcomes: In-depth knowledge in the special meteorological or climatological field in which the master's thesis will later be written.													
4	SS	6 Mon	C	MA	-see §14		**Master Thesis**				Master's thesis (75%) with colloquium (25%)	yes	30
Learning outcomes: Ability to independently address a scientific question using scientific methods and document according to scientific standards.													