Discipline-Specific Regulations for Study and Examinations for the Master's Program in Astrophysics at the University of Potsdam

As of January 20, 2016

The Faculty Committee of the Faculty of Science at the University of Potsdam has approved on January 20, 2016, the following degree and examination regulations on the basis of Article 9 Para 5, Article 19 Para 1, Article 22 Para 1–3, and Article 31 in combination with Article 72 Para 2 (1) of the Brandenburg Higher Education Act (BbgHG) of April 28, 2014 (Law and Ordinance Gazette [GVBl.] I/14, [no. 18]), last amended by Article 2 of the Act of July 1, 2015 (Law and Ordinance Gazette [GVBl.] I/15 [no. 18]) in combination with the Ordinance on the Design of Examination Regulations to Guarantee the Equivalency of Studies, Examinations, and Degrees (University Examination Ordinance - HSPV) of March 4, 2015 (GVBl. II/15 [no. 12]), and with Article 14 Para 1 (2) of the Basic Constitution of the University of Potsdam dated December 17, 2009 (Bulletin UP no. 4/2010, p. 60) in the third amended version of the Basic Constitution of the University of Potsdam (GrundO) of April 22, 2015 (Bulletin UP no. 6/2015, p. 235) and Article 1 Para 2 of the new version of the general study and examination regulations for Master's programs at the University of Potsdam not related to teacher education of January 30, 2013 (BAMA-O) (Bulletin UP no. 3/2013, p. 35), last amended on February 26, 2014 (May 21, 2014 Bulletin UP 3/2014, p. 35):[1]

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[1] Approved by the President of the University of Potsdam on Xxxxx XX, 2016.

§ 1 Applicability

(1) These regulations apply to the Master's program in Astrophysics at the University of Potsdam. These discipline-specific regulations supplement the new version of the General Regulations for Study and Examinations for Bachelor's and Master's Degrees (not for teachers in training) at the University of Potsdam (BAMA-O).

(2) In the event that these regulations contradict the BAMA-O, then the provisions in the BAMA-O supersede these regulations.

§ 2 Degree

The Faculty of Science at the University of Potsdam awards the degree of "Master of Science" ("M.Sc.") to students who have completed the necessary credit points and graduation requirements.

§ 3 Objectives of Master's Program

(1) The Master's program in Astrophysics at the University of Potsdam is research-oriented. It is designed to enable students to extend and deepen the knowledge of physics and mathematics they acquired in their Bachelor's programs in light of the current state of astrophysical research. The objective of the Master's program is for the student to develop a specialty in astrophysics and achieve scientific self-sufficiency in order to pursue problems in basic or applied research successfully. By completing the Master's degree, the graduate has proven the capacity to work in scientific research.

(2) The graduate can work in scientific research at universities and research institutes; at research and development departments of companies, particularly in the high-tech and information technology sectors; in science communication; and in media and PR. Yet the skills for analytical thinking and computer-aided problem-solving acquired in the program also open avenues for employment in seemingly unrelated fields, such as banking or management, administration, and politics. Because the program is conducted in English, graduates are qualified for the worldwide employment market.

(3) The students:

- Have deeper knowledge of the composition and evolution of the universe and its components.

– Possess a deep understanding of the interrelationships and principles of physics, enabling them to penetrate and analyze complex astrophysical phenomena.

– Are capable of independently developing research-related astrophysical questions, identifying methods to answer them, and adapting them to concrete problem-solving; of formulating astrophysical issues in English self-sufficiently; and of publishing independent research results appropriately in writing.

– Possess teamwork skills and can debate discursive problems.

§ 4 Admission Prerequisites; Application Deadlines and Documents

(1) The following special admission prerequisites apply to the Master's program in Astrophysics:

(a) An undergraduate academic degree in physics adding up to 180 credit points; academic degrees in other scientific subjects, provided they are related to physics.

(b) Proof of knowledge in the fields of physics and mathematics adding up to 60 credit points, at least 6 credit points of which in astrophysics. When necessary, an examination is conducted on a case by case basis.

c) Proof of English-language skills that correspond at least to Level C 1 of the European Framework for Languages. Article 4 Para 2 of ZulO governs the specifics.

(d) In a deviation from Article 4 Para 4 of ZulO, German language skills need not be demonstrated.

(2) The Examining Board issues decisions regarding credentials on a case-by-case basis.

(3) Further specifics of the application procedure are regulated by the General Admission Regulations for Master's programs at the University of Potsdam not related to teacher education (ZulO).

(4) The application for the Master's program in Astrophysics, when matriculating as of the first semester, can begin in either the winter or summer semester. The application for the Master's program in Astrophysics, when matriculating as of a later semester, can begin in either the winter or summer semester.

(5) In addition to the application materials listed in Article 5 Para 3 of ZulO, the following application materials shall be submitted:

- Proof of the requisite language skills (Para 1 and 2 in connection with Article 4 of the admission regulations [ZulO])
- Proof of a degree in an appropriate subject/degree program
- Proof of credit points in accordance with Para 1 (b).

§ 5 Duration and Organization of Master's Program

(1) The Master's program in Astrophysics is offered at the University of Potsdam as a single-discipline program with a standard period of study (full-time program) of 4 semesters and 120 credit points (CP).

(2) The Master's program is subdivided as follows:

Mandatory modules	60 CP
Research training, introductory project	30 CP
Master's Thesis	30 CP

§ 6 Part-Time Program

The Master's program in Astrophysics is suitable as a part-time program. A part-time program requires advising from the relevant faculty so that an individualized plan of study can be created. Proof of this advising must be attached to an application in accordance with Article 3 of the Regulations for Part-Time Studies at the University of Potsdam (Part-Time Regulations). The provisions of the Part-Time Regulations also apply.

§ 7 Modules and the Course of Study

(1) The Master's program in Astrophysics is comprised of the following components:

Master's program		
Module number	**Name of module**	**CP**
I Mandatory Modules (60 credit points)		
PHY-750	Astrophysics I	12
PHY-751	Astrophysics II	6
PHY-735	Advanced Physics	12
PHY-755	Methods of Modern Astrophysics	12
PHY-765	Topics in Advanced Astrophysics	12
PHY-775	Supplementary Topics	6
II Preparatory Phase for the Master's Thesis (30 CP)		

PHY-941	Introductory Project	18
PHY-942	Research Training	12
Total CP for modules to be completed		**90**

(2) The language of instruction in the Master's program in Astrophysics is English. Modules are offered solely in English.

(3) The descriptions of the modules named in Para 1 are given in the Module Catalog in Appendix 1 of these regulations.

(4) A sample course of study for the master's program is provided in Appendix 2 of these regulations.

§ 8 Stay Abroad

If a stay abroad is intended during the Master's program, the second and fourth semester according to the sample course of study are recommended.

§ 9 Passes

In the Master's program in Astrophysics, students have two passes that can be used for module exams that they have failed.

§ 10 Master's Thesis

(1) As soon as the student has completed at least 75 percent of the total credit points to be earned in the degree program, excluding the credit points for the thesis (72 points), he or she must immediately propose a topic for his/her Master's thesis.

(2) The Master's thesis, including the oral defense, is equivalent to 30 credit points.

(3) In a deviation from Article 30 Para 12 of BAMA-O, the Master's thesis is to be written in English.

(4) In a deviation from Article 30 Para 12 of BAMA-O, the oral defense is likewise conducted in English.

§ 11 Application, Termination, and Transfer Regulations

(1) Article 4 of these regulations takes effect on April 1, 2016. All remaining provisions take effect on October 1, 2016.

(2) These regulations apply to all students who enroll in the Master's progam in Astrophysics at the University of Potsdam after these regulations go into effect.

Appendix 1: Module catalog

The descriptions of the program's modules listed in Article 7 Para 1 and the tables below are governed by the statutes of the module catalog of the Faculty of Science as a supplement to the Bachelor's and Master's programs at the University of Potsdam (MK MNF). Supplementary regulations and/or deviations from the MK MNF are indicated in the tables that follow.

List of modules:

Module number:	Module name:	CP	Mand./ Elec.	Prerequisites
PHY-750	Astrophysics I	12	Mand.	None
PHY-751	Astrophysics II	6	Mand.	None
PHY-735	Advanced Physics	12	Mand.	None
PHY-755	Methods of Modern Astrophysics	12	Mand.	None
PHY-765	Topics in Advanced Astrophysics	12	Mand.	None
PHY-775	Supplementary Topics	6	Mand.	None
PHY-941	Introductory Project	18	Mand.	None
PHY-942	Research Training	12	Mand.	None

CP = Number of credit points; MM = mandatory module; EM = elective module

Appendix 2:
2.1 Recommended course of study for the Master's program in Astrophysics beginning in the winter semester

1st sem.	2nd sem.	3rd sem.	4th sem.	Competency
PHY-750 **Astrophysics I** *Mandatory module* Lecture: Stars and Stellar Evolution	Lecture: Galaxies and Cosmology 4V2S2Ü 12 CP			Deeper knowledge of advanced astrophysics
PHY-751 **Astrophysics II** *Mandatory module* Lab	Seminar 3P2S 6 CP			Occupation-specific key competences
PHY-735 **Advanced Physics** *Mandatory module* 2 chosen lectures + 1 chosen seminar 4V2S3Ü 12 CP				Deeper knowledge of advanced physics
PHY-755 **Methods of Modern Astrophysics** *Mandatory module* 1 sem. + 1 lecture of student's choice	2 chosen lectures 6V2S 12 CP			Occupation-specific key competences
	PHY-765 **Topics in Advanced Astrophysics** *Mandatory module* 4 chosen lectures 4V4S 12 CP			Specialization field
PHY-775 **Supplementary Topics** *Mandatory module* 1 chosen lect./sem.	1 chosen lect./sem. 2V2S 6 CP			Supplementary subject
		PHY-941 **Introductory Project** *Mandatory module* 4P2S 18 CP	**Master's Thesis**	Specialization area and Master's thesis
		PHY-942 **Research Training** *Mandatory module* 3 days/week 12 CP	30 CP	
30 CP	30 CP	30 CP	30 CP	120 CP

2.2 Recommended course of study for a Master's program in Astrophysics beginning in the summer semester

1st sem.	2nd sem.	3rd sem.	4th sem.	Competency
PHY-750 **Astrophysics I** *Mandatory module* Lecture: Galaxies and Cosmology	Lecture: Stars and Stellar Evolution 4V2S2Ü 12 CP			Deeper knowledge of advanced astrophysics
PHY-751 **Astrophysics II** *Mandatory module* Lab	Seminar 3P2S 6 CP			Occupation-specific key competences
	PHY-735 **Advanced Physics** *Mandatory module* 2 chosen lectures + 1 chosen seminar 4V2S3Ü 12 CP			Deeper knowledge of advanced physics
PHY-755 **Methods of Modern Astrophysics** *Mandatory module* 1 sem. + 1 lecture of student's choice	2 chosen lectures 6V2S 12 CP			Occupation-specific key competences
PHY-765 **Topics in Advanced Astrophysics** *Mandatory module* 4 chosen lectures 4V4S 12 CP				Specialization field
PHY-775 **Supplementary Topics** *Mandatory module* 1 chosen lect./sem.	1 chosen lect./sem. 2V2S 6 CP			Supplementary subject
		PHY-941 **Introductory Project** *Mandatory module* 4P2S 18 CP	**Master's Thesis**	Specialization area and Master's thesis
		PHY-942 **Research Training** *Mandatory module* 3 days/week 12 CP	30 CP	
30 CP	30 CP	30 CP	30 CP	120 CP

READING VERSION OF MODULE DESCRIPTIONS
The module descriptions are not part of the Regulations; they are integrated into the First Amendment to the Module Catalog.

PHY-750: Astrophysics I	Number of credit points (CP): 12
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The lecture "Stars and Stellar Evolution" deepens students' knowledge of the core areas of stellar astrophysics, specifically stellar atmospheres, stars' composition and evolution, and star populations. The lecture "Galaxies and Cosmology" deepens students' knowledge of (extra)galactic astrophysics, specifically the composition and evolution of galaxies, the formation of cosmic structures, cosmology, and the early universe. ***Objectives:*** 1. Subject competencies • The students possess a deeper understanding of the composition and evolution of stars, galaxies, and the cosmos as a whole. • The students are able to reflect upon the relationships between the subfields. • The students are able to draw scientifically founded conclusions related to the subfield. 2. Methodological competencies • The students can pose questions of their own on topics in stellar and extragalactic astrophysics and examine them using appropriate methods. • The students are capable of applying appropriate methods and procedures to solving complex tasks in stellar and extragalactic astrophysics. 3. Performance competencies • The students are capable of discussing complex issues with their fellow students during the tutorials. • The students develop strategies for solving the tutorial assignments and can present these comprehensibly.
Module (partial) exam(s) (number,	Written exam, 120 min
Independent study time (in hours):	240

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Galaxies and Cosmology (seminar)	1	-	-	-
Stars and Stellar Evolution (seminar)	1	-	-	-

Galaxies and Cosmology (seminar and tutorial)	2/1	-	Successful completion of exercises	-
Stars and Stellar Evolution (seminar and tutorial)	2/1	-	Successful completion of exercises	-
Offered:		Lecture/tutorial: Stars and Stellar Evolution: every winter semester Lecture/tutorial: Galaxies and Cosmology: every summer semester		
Prerequisite for taking the module:		None		
Teaching unit:		Physics		

PHY-751: Astrophysics II	Number of credit points (CP): (CP): 6
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The Astrophysics Lab Course includes quantitative astrophysical measurements made through telescopes as well as their scientific evaluation. The Astrophysical Seminar covers current topics in astrophysical research. ***Objectives:*** 1. Subject competencies • The students possess a deeper understanding of astronomical observation methods. • The students are able to reflect upon the relationships between astronomical observation methods and scientific questions in astrophysics. 2. Methodological competencies • The students are capable of planning, executing, and evaluating astronomical observations. • The students can assess, discuss, and present original publications in astrophysics. • The students can pose questions of their own on topics in astrophysics and examine them using appropriate methods. 3. Performance competencies • The students can discuss their work and express it in writing. • The students can present and defend original publications in front of the other seminar members using appropriate presentation media.• The students are capable of working in teams and pursuing a question jointly.
Module (partial) exam(s) (number,	Seminar presentation, 30 min
Independent study time (in hours):	105

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Seminar (seminar)	2	-	-	-
Lab (lab)	3	Preparing observation logs	-	-

Offered:	LC: Lab course in astrophysics: every semester S: Seminar in astrophysics: every semester
Prerequisite for taking the module:	None
Teaching unit:	Physics

PHY-735: Advanced Physics	Number of credit points (CP): 12
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** Students select two lectures + tutorials and one seminar + tutorials in the field of advanced physics. Examples include lectures/seminars in the topic areas of general relativity, particle physics, plasma physics, and quantum physics. ***Objectives:*** 1. Subject competencies • The students possess a deeper understanding of important subfields of modern physics. • The students are able to reflect upon the relationships between the subfields of advanced physics and astrophysics. 2. Methodological competencies • The students can pose questions of their own on topics in advanced physics and examine them using appropriate methods. • The students are capable of applying mathematical methods and procedures to solving complex tasks in advanced physics. 3. Performance competencies • The students are capable of discussing complex issues in physics with their fellow students during the tutorials. • The students develop strategies for solving the tutorial assignments and can present these comprehensibly.
Module (partial) exam(s) (number,	Oral exam (45 min)
Independent study time (in hours):	225

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Lecture and associated tutorial (lecture and tutorial)	2/1	-	Successful completion of exercises	-
Seminar and associated tutorial (seminar)	2/1	-	Successful completion of exercises	-
Lecture and associated tutorial (lecture and tutorial)	2/1	-	Successful completion of exercises	-

Offered:	Every semester
Prerequisite for taking the module:	None
Teaching unit:	Physics

PHY-755: Methods of Modern Astrophysics	**Number of credit points (CP): 12**
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The "Scientific Writing in Astrophysics" seminar imparts skills and strategies for composing scientific texts in the field of astrophysics. In addition, students select three lectures related to the methods of modern astrophysics. Examples include lectures on the topics of astronomical instruments, spectroscopy, computational astrophysics, statistical methods in astrophysics, astronomical distance determination, and radioastronomy. ***Objectives:*** 1. Subject competencies • The students possess a deeper understanding of modern astrophysical research methods. • The students are able to reflect upon the relationships between scientific questions in astrophysics and methodological approaches to answering them. 2. Methodological competencies • The students can classify existing methods in astrophysical research and apply them to a concrete problem. • The students are capable of identifying and characterizing mathematical, physical, and conceptual aspects of the methodology of astrophysical research. 3. Performance competencies • The students are capable of discussing complex methodological issues with their fellow students. • The students develop solution strategies for improving astrophysical methods and can present these comprehensibly.
Module (partial) exam(s) (number, form, scope):	Portfolio exam consisting of a term paper (20 pages) and a report independently expressing the competencies acquired during the module and summarizing the key aspects in a scientifically appropriate manner.
Independent study time (in hours):	240

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Lecture (lecture)	2	-	-	-
Lecture (lecture)	2	-	-	-
Lecture (lecture)	2	-	-	-
Scientific Writing in Astrophysics Seminar	2	-	-	-

Offered:	L: every semester; S: Scientific Writing in Astrophysics: every summer semester
Prerequisite for taking the module:	None
Teaching unit:	Physics

PHY-765: Topics in Advanced Astrophysics	**Number of credit points (CP): 12**
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The student selects four classes (each comprising of a lecture + seminar) on specialized topics in advanced astrophysics. Examples include classes on the topic areas of the composition and structure of stars, the physics of the sun, planetary science, stellar dynamics, interstellar and intergalactic medium, galactic development, active galactic nuclei, and cosmology. ***Objectives:*** 1. Subject competencies • The students possess a deeper understanding of specialized topics in advanced astrophysics. • The students can fully penetrate the content of current research literature on specialized topics in advanced astrophysics and place it in a broader scientific context. 2. Methodological competencies • The students can discuss and present original publications in astrophysics scientifically. • The students can pose questions of their own on specialized fields of astrophysics and self-sufficiently develop research projects using appropriate methods. 3. Performance competencies • The students can present and explain the content of original publications to other students. • The students are capable of self-sufficiently researching original publications in order to achieve a deeper specialized understanding.
Module (partial) exam(s) (number, form, scope):	Oral exam (45 min)
Independent study time (in hours):	240

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	2	-	-	-
Lecture and seminar (lecture and seminar)	2	-	-	-
Lecture and seminar (lecture and seminar)	2	-	-	-
Lecture and seminar (lecture and seminar)	2	-	-	-

Offered:	Every semester
Prerequisite for taking the module:	None
Teaching unit:	Physics

PHY-775: Supplementary Topics	Number of credit points (CP): (CP): 6
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The students select a lecture and seminar on supplementary fields of astrophysics. In addition to physics classes, examples include lectures/seminars on topics in mathematics, biology, earth sciences, and computer science. ***Objectives:*** 1. Subject competencies • The students possess a basic understanding of subject areas related to astrophysics. 2. Methodological competencies • The students can develop questions of their own in fields supplementary to astrophysics. 3. Performance competencies • The students can transfer specialized knowledge from fields associated with astrophysics to the context of astrophysical questions.
Module (partial) exam(s) (number, form, scope):	An examination in one of the following forms: Oral exam, 20 min Term paper, 10 pages
Independent study time (in hours):	120

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Lecture (lecture)	2	-	-	-
Seminar (seminar)	2	-	-	-

Offered:	Every semester
Prerequisite for taking the module:	None
Teaching units offered:	Physics (50%) Biology/Biochemistry (10%) Chemistry (10% Earth sciences (10%) Computer science (10%) Mathematics (10%)

PHY-941: Introductory Project	Number of credit points (CP): 18
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The students select an upper-level seminar and an introductory project in the same topic area. The topic of the introductory project generally corresponds to their specialization area for their Master's thesis. ***Objectives:*** 1. Subject competencies • The students are capable of familiarizing themselves with the current of state of research in a specific subfield of their specialization areas. • Having done so, the students can work self-sufficiently on an assigned scientific question. 2. Methodological competencies • The students can summarize the findings of the introductory project concisely in a report. • The students are capable of compiling the findings from the introductory project for a presentation and specialized discussion. 3. Performance competencies • The students are capable of discussing complex issues in physics with others. • The students develop strategies of their own for preparing specialized literature, expressing scientific issues, and using media effectively.
Module (partial) exam(s) (number,	Seminar presentation, 45 min
Independent study time (in hours):	380

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Upper-level seminar (seminar)	2	-	-	-
Lab (15 weeks) (lab)	Supervision: 30 hr	Lab report	-	-

Offered:	Every semester
Prerequisite for taking the module:	None
Teaching unit:	Physics

PHY-942: Research Training	Number of credit points (CP): 12
Module type (mandatory or elective	Depends on course of study
Content and objective of module:	***Contents:*** The students carry out a supervised independent study and a guided lab in the field of the Master's thesis. The supervision and guidance are provided in regular consultations with the supervisor(s). ***Objectives:*** 1. Subject competencies • The students are capable of familiarizing themselves with the current state of research in a specific subfield of their specialization areas. • Having done so, the students can work self-sufficiently on an assigned scientific question. 2. Methodological competencies • The students can summarize the findings of the introductory project concisely in a report. • The students are capable of compiling the findings from the introductory project for a presentation and specialized discussion. 3. Performance competencies • The students are capable of discussing complex issues in physics with others. • The students develop strategies of their own for preparing specialized literature, expressing scientific issues, and using media effectively.
Module (partial) exam(s) (number, form, scope):	An examination in one of the following forms: Oral consultation, 30 min, not graded Lab report, 20 pages, not graded
Independent study time (in hours):	330

Courses (type of teaching)	Contact time (in semester hours)	Supplementary exam work (Number, form, scope)		Module (partial) exam(s) (Number, form,
		For completing the module	For admission to the module exam	
Research lab (3 days/week) (lab)	Supervision: 30 hr	-	-	-

Offered:	Every semester
Prerequisite for taking the module:	None
Teaching unit:	Physics