Announcement

Academic year 2022/2023 – issued on 4 May 2023 – number 108

Any designations of functions are neutral in gender.

Curricula

108 Curriculum for the master's programme in Astronomy (2023 version)

At its meeting on 27 April 2023, the Senate approved the Curriculum for the master's programme in Astronomy (2023 version) specified below, which was resolved on 17 April 2023 by the Curriculum Committee, a body holding decision-making power, and established in accordance with section 25, para. 8, no. 3 and para. 1, no. 10a of the 2002 Universities Act.

The legal basis is the 2002 Universities Act and the section of the Statutes of the University of Vienna governing university studies as amended from time to time.

§ 1 Objectives and qualification profile

(1) The aim of master's programme in Astronomy at the University of Vienna is to provide students with advanced knowledge of the methodology and theory in the fields of astronomy and astrophysics as well as with a specialised education in subject areas of this research field. Students demonstrate that they can meet this educational objective by means of a master's thesis.

(2) Beyond a bachelor's qualification, graduates of the master's programme in Astronomy at the University of Vienna are qualified to independently conduct research-related projects in astronomy, and to critically reflect on and independently use the available specialist literature. They have received training in using technically sophisticated measuring and observation instruments as well as modern large-scale astronomical equipment. They have also acquired competences to analyse, model and interpret complex systems and have developed a systematic natural sciences mindset allowing them to deal with complex problems.

In the courses of the degree programme, students address contents and methods meeting the current state of research in the relevant discipline. The focus is on the critical assessment and analysis of literature and data. The master's programme in Astronomy serves the further consolidation of the competences acquired and content taught in the bachelor's programme.

The core lectures of the master's programme are allocated to the following two subject areas:

- Galaxies and Universe
- Inter-Stellar Medium, Stars and Planets
- Scientific Methods of Astrophysics

By completing the core lectures, students acquire a solid education in a broad spectrum of research topics, complemented by specialised courses in the research areas covered by the research area of astrophysics.

(3) The knowledge and skills acquired during the master's programme in Astronomy also prepare students for further degree programmes.

§ 2 Duration and scope

(1) The workload for the master's programme in Astronomy comprises 120 ECTS credits. This is equivalent to a degree programme duration of four semesters.

(2) The programme is deemed completed if 42 ECTS credits as defined in the provisions on compulsory modules, 48 ECTS credits as defined in the provisions on elective modules, 26 ECTS credits as defined in the provisions on the master's thesis and 4 ECTS credits as defined in the provisions on the master's examination have been obtained.

§ 3 Entry requirements

(1) To be admitted to the master's programme in Astronomy students must have completed an eligible bachelor's programme or an eligible degree programme at least at the same level of university education at a recognised Austrian or foreign post-secondary educational institution.

(2) The bachelor's programme in Astronomy at the University of Vienna is certainly eligible.

(3) To compensate for significant disciplinary differences, supplementary examinations can be stipulated, which have to be completed until the end of the second semester of the master's programme. The Rectorate may specify which supplementary examinations are a prerequisite for taking examinations specified in the Curriculum of the master's programme.

(4) If the significant disciplinary differences according to para. 3 exceed the extent of 30 ECTS credits, this is not considered an eligible degree programme and the student is not admitted to the master’s programme.

(5) The language of instruction of the master's programme in Astronomy is English only. Therefore, students must have English language proficiency corresponding to level B2 (Common European Framework of Reference for Languages). Regarding the level of language proficiency, the regulations of the University of Vienna apply.

§ 4 Academic degree

Graduates of the master's programme in Astronomy are awarded the degree "*Master of Science*", abbreviated as MSc. Where the academic degree is stated this must be after the name.

§ 5 Structure – Modules with allocated ECTS credits

(1) Overview

The master's programme is structured in the following four parts:

1) Group of elective modules: Core (48 ECTS credits)
The group of elective modules is subdivided into three main fields of astronomy: Galaxies and Universe; Interstellar Medium (ISM), Stars and Planets; and Scientific Methods of Astrophysics

The knowledge acquired in the group of elective modules Core provides students with a solid foundation for starting to work on their master's thesis in one of the three fields of astronomy. Students should complement this basic knowledge by completing specialisation courses in the relevant field.

2) Group of compulsory modules: Specialisation (34 ECTS credits)
The group of compulsory modules enables students to acquire advanced knowledge in the research fields, and comprises two compulsory modules:
The compulsory module Specialisation in Current Research Topics (22 ECTS credits) allows students to further specialise in a current research topic in the field of astronomy. Students have the opportunity to consolidate their knowledge of another advanced research area and complete an additional module from the group of elective modules Core or select courses from the various elective courses offered every semester.

The compulsory module Related Sciences (12 ECTS credits) can be used as an extension in topics outside the discipline and/or as a consolidation of topics related to natural sciences, technology, mathematics or computer science at the University of Vienna or other universities.

3) Group of compulsory modules: Master's Thesis Seminars (8 ECTS credits)
This group of compulsory modules consists of the compulsory module Preparatory Seminar comprising 4 ECTS credits and the compulsory module Research Seminar comprising 4 ECTS credits.

4) Master's Thesis (26 ECTS credits) and Master's Examination (4 ECTS credits)

(1.1) Group of elective modules: Core

Subject to availability, students select six of the elective modules (comprising 8 ECTS credits each) from the three fields of astronomy. Students must complete at least one elective module per field.

Section	Elective modules	ECTS credits
Galaxies and Universe	Physical Properties of Galaxies	8
	Formation and Evolution of Galaxies	8
	Early Universe and Structure Growth	8
	Dynamics of Galaxies	8
ISM, Stars and Planets	Star Formation: From Molecular Clouds to Protostars	8
	Interstellar Medium and Milky Way	8
	Structure and Evolution of Planetary Systems	8
	Solar and Stellar Astrophysics	8
Scientific Methods of Astrophysics	Methods of Computational Astrophysics	8
	Data Science in Astrophysics	8
	Astronomical Observation Methods	8
	Observational Practice Course	8

(1.2) Group of compulsory modules: Specialisation

Compulsory modules	ECTS credits
Specialisation in Current Research Topics	22
Related Sciences	12

(1.3) Group of compulsory modules: Master's Thesis Seminars

Compulsory modules	ECTS credits
Preparatory Seminar	4
Research Seminar	4

(2) Module descriptions

(2.1) Group of elective modules: Core

This group of elective modules includes the following modules:

Field: Galaxies and Universe

PEG	Physical Properties of Galaxies (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students gain a detailed insight into the field of galaxies from a phenomenological perspective and are familiarised with different methods for measuring the physical properties of galaxies. Contents covered include: luminosity/mass distribution of stars, gas and dust; kinematics of stars and gas; frequency of star/gas occurrence; history of star formation; chemical enrichment; scaling relations of galaxies. The module addresses various analysis methods and tools for measuring these properties of galaxies by means of multi-wavelengths observations.	
Module structure	VU on Physical Properties of Galaxies, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

EEG	Formation and Evolution of Galaxies (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students gain a detailed insight into the formation and development of galaxies from a theoretical and observation perspective. Contents covered include: global cosmic development of luminosity, mass, size, star formation, metallicity, kinematics and structure of galaxies; nuclear activity in galaxies; the role of the environment of galaxies, external gravitational and hydrodynamical mechanisms, such as tidal forces and ram pressure, as well as internal mechanisms, such as stellar mechanisms and AGN feedback in the regulation of galaxy evolution.	
Module structure	VU on Formation and Evolution of Galaxies, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

FRU	Early Universe and Structure Growth (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students acquire a profound understanding of the first stages of the universe as well as a detailed insight into structure formation and growth from a theoretical and observation perspective. Contents covered include: homogeneous and inhomogeneous universe; the chronology of the universe: big bang, inflation, big bang nucleosynthesis, recombination and the cosmic microwave background radiation, reionisation; structure formation and growth; dark matter; expansion and dark energy.	
Module structure	VU on Early Universe and Structure Growth, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

DYN	Dynamics of Galaxies (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students acquire a detailed insight into the theoretical foundations of star and gas dynamics as well as the associated observations at different wavelengths. Contents covered include: stars and gases in galaxies; gravitational potential and densities; stellar dynamics, stellar distribution functions; dynamic mass measurements; extragalactic archaeology; gas dynamics; shock fronts; stellar mass output; dynamic interactions of interstellar gas phases, circumgalactic medium with galactic winds and gas flow, dynamic environmental influences.	
Module structure	VU on Dynamics of Galaxies, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

Field: ISM, Stars and Planets

ENT	Star Formation: From Molecular Clouds to Protostars (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students acquire knowledge of detailed physical processes that lead to the formation of stars. Contents covered include: molecular clouds (observed properties; stability and collapse; internal structure); feedback from stars with high and low mass; young stellar objects (astronomical surveys and classification by spectral energy distribution); initial mass distribution; star formation, clusters and associations; star formation in a galactic context.	
Module structure	VU on From Molecular Clouds to Protostars, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

MIL	Interstellar Medium and Milky Way (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students gain a detailed insight into the state-of-the-art physical description of the ISM and its components. Contents covered include: ISM components, structure and dynamics; multiple-phase ISM; observations (extinction, continuum and line emission); dust; atomic and molecular gas; astrochemistry; dynamics and structure of the Milky Way; initial conditions for the formation of stars.	
Module structure	VU on Interstellar Medium and Milky Way, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of all continuous assessment courses (pi) specified in the module (8 ECTS credits)	

PLA	Structure and Evolution of Planetary Systems (elective module)	8 ECTS credits
Prerequisites	None	
Module outcomes	Students obtain a detailed insight into the theories of planetary systems. Contents covered include: protoplanetary disks, debris disks and planetary systems; accretion; development and dynamics of dust; collisional cascades; interaction between the star and disks and planets.	
Module structure	VU on Structure and Evolution of Planetary Systems, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

STE	Solar and Stellar Astrophysics (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students gain a detailed insight into the theory of stellar physics. Contents covered include: stellar nucleosynthesis and the nuclear fusion stages; chemical development of stars; variability; magnetic fields; atmosphere, winds and interaction between stars and exoplanets; early and final development stages of stars; multiple-star systems.	
Module structure	VU on Solar and Stellar Astrophysics, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of all continuous assessment courses (pi) specified in the module (8 ECTS credits)	

Field: Scientific Methods of Astrophysics

COA	Methods of Computational Astrophysics (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students familiarise themselves with the implementation of numerical simulations of astrophysical objects and learn to assess the associated advantages and disadvantages. Contents covered include: numerical methods and their application to astrophysical problems; development of own simulations.	
Module structure	VU on Methods of Computational Astrophysics, 8 ECTS credits, 4 SSt., pi (pi)	

Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)
Language	English

DAT	Data Science in Astrophysics (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Students learn to work effectively with large datasets using Python. They are able to describe data and relate them to models. Contents covered include: large datasets from observations and simulations, aspects of modern statistics and data science, including machine learning; practical applications of important Python libraries; deep learning models.	
Module structure	VU on Data Science in Astrophysics, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

ABE	Astronomical Observation Methods (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Upon completion of this module, students have an understanding of advanced, state-of-the-art observation methods. Contents covered include: spatial, temporal and high-resolution spectrometry observations, integral field spectroscopy, non-optical astronomy up to space observation.	
Module structure	VU on Astronomical Observation Methods, 8 ECTS credits each, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

BEP	Observational Practical Course (elective module)	8 ECTS credits
Prerequisite	none	
Module outcomes	Upon completion of this module, students are able to plan, implement and analyse observations and answer concrete astrophysical questions. Contents covered include: astronomical data from own observations and/or from archives of large astronomical observatories; analysis using current software packages.	
Module structure	PR, 8 ECTS credits, 4 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (8 ECTS credits)	

Group of compulsory modules: Specialisation

VAF	Specialisation in Current Research Topics (compulsory module)	22 ECTS credits
Prerequisite	none	
Module outcomes	Students have the opportunity to consolidate their knowledge of individual fields of astronomy according to their choice.	
Module structure	Subject to availability, students choose astronomy courses with non-continuous and/or continuous assessment comprising 22 ECTS credits. They are advised to select courses from elective modules that they have not completed yet. However, double recognition is not permitted. The courses eligible for this module are listed in the course directory. Courses that are not listed there require prior approval from the directorate of studies.	
Proof of performance	Passing of all course examinations (npi) and continuous assessment courses (pi) specified in the module (22 ECTS credits in total)	
Language	English or German	

BEN	Related Sciences (compulsory module)	12 ECTS credits
Prerequisite	none	
Module outcomes	According to their choice, students acquire advanced knowledge in disciplines that complement their degree programme in a meaningful way.	
Module structure	Subject to availability, students select courses (npi and/or pi) comprising 12 ECTS credits in total. Students may select courses from other bachelor's or master's curricula of the University of Vienna (or other Austrian or foreign universities) with a relation to the subject (technology, mathematics, natural sciences or computer science). The selection of the concrete courses has to be approved by the directorate of studies in advance.	
Proof of performance	Passing of all course examinations (npi) and continuous assessment courses (pi) specified in the module (12 ECTS credits in total)	
Language	English and/or depending on the course selected	

Group of compulsory modules: Master's Thesis Seminars

VOR	Preparatory Seminar (compulsory module)	4 ECTS credits
Prerequisite	none	
Module outcomes	Students are familiar with a wide range of projects from which they can choose the topic of their master's thesis. They are able to conduct comprehensive literature search on the chosen topic, formulate relevant academic questions and approach them systematically. The students are able to write and present a research proposal. Students submit their master's thesis project after they have selected a supervisor and research topic.	
Module structure	SE, 4 ECTS credits, 2 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (4 ECTS credits)	
Language	English	

FOS	Research Seminar (compulsory module)	4 ECTS credits
Prerequisite	VOR	
Module outcomes	Students are able to work with observation data and/or develop theoretical models and simulations to answer scientific questions in the field of astronomy. Students acquire the necessary knowledge to present their findings orally and in writing and answer research questions logically and based on evidence. Work in small groups enables intensive discussions and feedback conversations.	
Module structure	SE, 4 ECTS credits, 2 SSt. (pi)	
Proof of performance	Passing of the continuous assessment course (pi) specified in the module (4 ECTS credits)	
Language	English	

§ 6 Master's thesis

(1) The master's thesis serves to demonstrate the student's ability to achieve adequate standards of content and methodology when independently addressing academic topics. The assignment for the master's thesis must be so chosen that the student can reasonably be expected to complete it within six months.

(2) The topic of the master's thesis must be taken from one of the compulsory modules and/or elective modules. If a different topic is selected or if there is uncertainty regarding the allocation of the selected topic, the competent body responsible for study matters decides on whether or not it is admissible.

(3) The master's thesis comprises 26 ECTS credits.

§ 7 Master's examination

(1) To be admitted to a master's examination the student must have successfully passed all required modules and examinations and the master's thesis must have been positively assessed.

(2) The master's examination is a public defence and an examination on the academic disciplines related to the master's thesis as well as an examination covering one additional subject area from another field not covered in the master's thesis. Grading will be conducted as stipulated in the Statutes of the University of Vienna.

(3) The master's examination is conducted before an examination committee in accordance with the section of the Statutes of the University of Vienna governing university studies.

(4) The master's examination comprises 4 ECTS credits (2 ECTS credits per examination subject).

§ 8 Mobility during the master's programme

The competent body responsible for study matters is responsible for the recognition of academic achievements completed abroad.

§ 9 Course classification

(1) All courses with non-continuous assessment (npi) have to be offered as one of the following types of courses:

Lectures (*Vorlesungen, VO*) [non-continuous assessment] serve the purpose of imparting knowledge primarily through lectures by a teacher that can be combined with interactive elements. Lecturers answer comprehension questions. Students must consolidate the course contents beyond the classes through self-study. Instructions for self-study and/or supplementary literature facilitate continuous and detailed learning. The proof of performance is a written or an oral examination.

(2) All courses with continuous assessment (pi) have to be offered as one of the following types of courses:

Combined lectures and exercises (Vorlesungen verbunden mit Übungen, VU) [continuous assessment] are courses with continuous assessment that combine the acquisition of subject-specific knowledge and/or methodological knowledge in the lecture part with their application in the exercise part. A VU is a lecture (VO) accompanied by exercises. The lecturer decides on the temporal sequence of lecture-type and exercise-type parts as needed. The lecture part and the exercise part must be completed simultaneously. Achieving the learning outcomes of a VU also requires independent study outside the designated course hours. The proof of performance is based on multiple written or oral student assignments during the course or on independently completing and submitting assignments.

Seminars (SE) [continuous assessment] serve as guidance for the independent work on and discussion of academic questions taking current specialist literature into account. Seminars aim at giving students the ability to gain detailed knowledge of problems of astrophysics through the study of specialist literature and data sources. Students also learn to present their findings in an intelligible manner in an oral presentation.

Students are assessed on the basis of multiple written or oral assignments during the course.

Practical courses (*Praktika, PR*) [continuous assessment] complement lectures and aim at consolidating practical skills and knowledge. Students are assessed on the basis of multiple written or oral assignments during the course.

§ 10 Courses with a limited number of participants and registration procedure

(1) The following general limits on the number of students apply in the following courses:

Combined lectures and exercises – 30
Practical course – 24
Preparatory seminar – 8
Research seminar – 4

For courses including exercises, only the exercise parts are subject to a limited number of participants.

(2) Modalities concerning the registration for courses and examinations as well as the allocation of places in courses are governed by the stipulations of the Statutes of the University of Vienna.

(3) Courses with continuous assessment from other curricula that students attend as part of this Curriculum are subject to the limited number of participants as specified in the related curriculum.

§ 11 Examination regulations

(1) Proof of performance in courses
The lecturer of a course is responsible for making the necessary announcements according to the stipulations in the Statutes.

(2) Examination content
The examination content relevant to preparing and holding examinations must be in line with the required number of ECTS credits. This also applies to module examinations.

(3) Examination procedure
The examination procedure is subject to the stipulations of the Statutes of the University of Vienna.

(4) No double recognition and no dual use
Courses taken and examinations passed in the degree programme, which constitute entry requirements for the master's programme, can only be recognised in the master's programme if there is no significant difference between the learning outcomes of the master's programme and the learning outcomes of the bachelor's programme. Courses taken and examinations passed that are used, in particular, for qualitative entry requirements and on which the master's programme is based, cannot be recognised due to significant differences in the acquired competences. Courses taken and examinations passed from another compulsory or elective module of the degree programme cannot be recognised within another module within the same degree programme.

This also applies to recognition procedures.

(5) Examination results must be allocated to the relevant module by the stated ECTS figure and must not be allocated to different proofs of performance.

§ 12 Entry into force

This Curriculum will enter into force upon announcement in the University Gazette of the University of Vienna as of 1 October 2023.

§ 13 Transitional provisions

(1) This Curriculum applies to all students who commence their degree programme as of the winter semester of 2023.

(2) If, at a later stage of the degree programme, courses are no longer offered which were compulsory under the original curricula, the competent body responsible for study matters decides ex officio (equivalence regulation) or at the request of the student which courses and examinations have to be completed instead.

(3) Students who have started the master's programme in Astronomy before this date may voluntarily accept the provisions of this Curriculum at any time by simple confirmation.

(4) Students who started the master's programme in Astronomy, which entered into force prior to this Curriculum (University Gazette of 30 June 2016, 44th edition, no. 304 as amended) are entitled to complete their degree programme by 31 October 2025.

(5) The competent body responsible for study matters specified in the organisational regulations is entitled to determine in general or on a case-by-case basis which of the courses taken and examinations passed will be recognised for this Curriculum.

On behalf of the Senate:
The chairperson of the curriculum
committee S t a s s i n o p o u l o u

Appendix

Recommended path through the master's programme:

Semester	Module	ECTS credits	Σ ECTS
1st	3 elective modules from the group of elective modules Core	8	30
		8	
		8	
	Group of compulsory modules Specialisation	6	
2nd	2 elective modules from the group of elective modules Core	8	30
		8	
	Group of compulsory modules Specialisation	14	
3rd	1 elective module from the group of elective modules Core	8	26
	VOR	4	
	Group of compulsory modules Specialisation	14	
4th	FOS	4	34
	Master's Thesis	26	
	Master's Examination	4	