Faculty of Science

ASTM30, Astronomy: Planetary Systems, 7.5 credits

Astronomi: Planetsystem, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2023-12-11. The syllabus comes into effect 2023-12-11 and is valid from the autumn semester 2024.

General information

The course is a compulsory course for second-cycle studies for a Degree of Master of Science (120 credits) in astrophysics.

Language of instruction: English

Main field of study	*Specialisation*
Astrophysics	A1N, Second cycle, has only first-cycle course/s as entry requirements
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The overall goal of the course is that students aquire knowledge and skills to be able to describe, evaluate and critically discuss current scientific results and problems, as well as methods and instrumentation, for the exploration of planets and planetary systems, both in our own solar system and around other stars (exoplanets).

- Aims 1-8, 10-13 target the intended learning outcome 1a in the programme syllabus.
- Aims 6, 8-10, 12 target the intended learning outcome 1b in the programme syllabus.
- Aims 6-8, 10-12 target the intended learning outcome 2 in the programme syllabus.
- Aim 9 targets the intended learning outcome 3.II in the programme syllabus.

- Aims 6-7, 12-13 targets the intended learning outcome 4.I in the programme syllabus.
- Aims 7-8 targets the intended learning outcome 4.III in the programme syllabus.
- Aim 7 target the intended learning outcome 6.I in the programme syllabus.
- Aims 8, 12 targets the intended learning outcome 7 in the programme syllabus.

Knowledge and understanding

On completion of the course, the student shall be able to:

1. describe the internal structure as well as the surfaces and atmospheres of planets.
2. describe the orbits and compositions of minor bodies of the solar system.
3. describe methods for detection of and instrumentation to study exoplanets.
4. describe theories of the origin and evolution of planets and planetary systems.
5. describe the diversity of the planet population and the conditions for planets where life should be able to exist.

Competence and skills

On completion of the course, the student shall be able to:

6. Carry out an independent literature study within research areas close to the front line of science.
7. Present modern research in the course topic in oral and/or written form.
8. Discuss and reflect on a sample of the recent literature.
9. Carry out computer-based analysis of typical problems underlying the research area.
10. Apply theoretical frameworks underlying physical processes in planetary systems and planet-forming disks.

Judgement and approach

On completion of the course, the student shall be able to:

11. Reflect on recent advances and fundamental limitations of exoplanet searches and studies.
12. Critically review recent literature on the objects of study (planets, planet-forming disks, or exoplanets).
13. Report on the diversity of the exoplanet population and the connection with planet formation theory.

Course content

The course describes the giant planets of the solar system, terrestrial planets, their atmospheres, moons and rings, as well as dwarf planets, comets and other minor bodies; their physical and chemical properties, probable origin and possible evolution. In addition, the orbits of planets and minor bodies around the sun and the processes that influence these are discussed. Current and planned methods and instruments to discover and analyse exoplanets are evaluated and existing data studied, also including reflections over the possibility of life on these.

Course design

The teaching consists of lectures, exercises, project work and compulsory hand-in exercises. Participation in project work and exercises and thereby integrated other teaching is compulsory.

Assessment

The examination consists of hand-in exercises during the course, the project report with presentation and a written exam at the end of the course.

Students who do not pass a regular assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Grades

Grading scale includes the grades: Fail, Pass, Pass with distinction
To pass the entire course, participation in all compulsory parts, passed hand-in exercises, passed project report and presentation and passed exam are required.

The grading scale is Fail, Pass, Pass with Distinction for all components.

The final grade is determined by averaging the results in the different parts of the examination with equal weights.

Entry requirements

To be admitted to the course, students must have 75 credits in Physics and 45 credits in Mathematics, or a Bachelor of Science in Physics, in both cases including knowledge corresponding to either ASTB01, Introduction to astrophysics, 7.5 credits, or ASTC11 Astrobiology, 7.5 credits, as well as English 6/B. Students that have been admitted to the masterprogram in Astrophysics fulfill these requirements automatically.

Further information

The course replaces ASTM20, Astronomy: Planetary systems, 7.5 credits, and cannot be credited towards a degree together with this course.

The course is given by the Department of physics at Lund University.