Faculty of Science

MNXA31, Explore the Universe - An Introduction to the Fascinating World of Astronomy, 3 credits

Utforska universum - En introduktion till astronomins fascinerande värld, 3 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Education Board of Faculty of Science on 2025-05-30. The syllabus comes into effect 2025-05-30 and is valid from the spring semester 2026.

General information

The course is offered as a freestanding course.

Language of instruction: English

Main field of study	*Specialisation*
-	G1N, First cycle, has only upper-secondary level entry requirements

Learning outcomes

This course provides you with a fundamental understanding of astronomy. You will learn about the motions of the night sky, concepts of time, and how telescopes and observational methods work. The course covers how to measure the distances to stars and their motions through space. You will explore the solar system and the properties of the Sun, the life cycle of stars, the Milky Way and other galaxies, as well as the overall structure and properties of the universe.

Knowledge and understanding

After completion of the course, the students shall be able to:

- describe in general the fundamental principles of astronomy, including the structure and dynamics of the solar system, stars, galaxies, and the universe as a whole

- explain how light and telescopes are used to gather information about celestial objects
- give a general account of how distances, motions, and physical properties of astronomical bodies are determined through observations and physical models.

Competence and skills

After completion of the course, the students shall be able to:

- use celestial coordinate systems and time concepts to navigate the night sky and explain the apparent motions of celestial bodies
- interpret basic astronomical observations and relate them to phenomena such as lunar phases, eclipses, seasons, and tidal forces.

Judgement and approach

After completing the course, the student shall be able to:

- reflect on and evaluate the role of observations in astronomy, as well as the limitations of methods used to interpret them.
- discuss the significance of astronomy in both scientific and cultural contexts, particularly in relation to our understanding of the universe.

Course content

The course is an introductory course in modern astronomy. The components included are:

- Introduction to the night sky: celestial sphere, coordinate systems, and timekeeping
- Motions of celestial objects: diurnal motion, annual motion, and planetary orbits
- Solar system structure: planets, moons, comets, asteroids, and physical processes (e.g., tides, eclipses)
- Properties of stars: classification, brightness, temperature, and distance measurements
- Stellar evolution: birth, main sequence, red giants, white dwarfs, neutron stars, and black holes
- The Milky Way: structure, stellar populations, and interstellar medium
- External galaxies: types, structure, and motions
- Introduction to cosmology: expanding universe, redshift, and the Big Bang
- Observational methods: telescopes, detectors, and spectroscopy
- Practical applications: naked-eye observations, star maps, and exercises in astronomical problem-solving

Course design

The teaching consists of lectures, hand-in exercises, demonstrations and observation exercises. The hand-in exercises and participation in observation exercises and demonstrations are compulsory.

Assessment

The assessment is done in the form of a written exam at the end of the course, through passed hand-in exercises during the course, and by participation in mandatory components.

Students who fail an 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
For the grade Pass on the whole course, the student must have passed the exam and the hand-in exercises as well as participated in all the compulsory components.

Entry requirements

General requirements and studies equivalent of course English 6 from Swedish Upper Secondary School.

Further information

The course cannot be included in a degree together with ASTA03 Basic Astronomy - Introductory Course
in Astronomy, 7.5 credits.

The course is given by the Department of Physics, Lund University.