



**LUND**  
UNIVERSITY

Faculty of Science

## **ASTA33, Astronomy: Galaxies and Cosmology, 7.5 credits**

*Astronomi: Galaxer och kosmologi, 7,5 högskolepoäng*

First Cycle / Grundnivå

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### **Details of approval**

The syllabus was approved by Study programmes board, Faculty of Science on 2007-06-14 to be valid from 2007-07-01, autumn semester 2007.

### **General Information**

The course is an elective course for first-cycle studies for a Bachelor of Science in physics.

*Language of instruction:* Swedish

*Main field of studies*

Physics

*Depth of study relative to the degree requirements*

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

### **Learning outcomes**

On completion of the course, the student is expected to be able to:

in detail be able to

- describe, also quantitatively, the evolution of a stellar population (including IMF, HR-diagram and integrated spectra)
- explain the importance of the cosmological distance scale and be able to use different indicators of distance in given problems
- describe the evolution of the Universe under different conditions (e.g. presence of dark energy) based on Einstein's field equations
- explain observational limitations on the exploration of the Universe

have general knowledge about

- and have good knowledge about the structure and chemical evolution of the Milky Way
- how star formation takes place and its influence on galaxies
- knowledge of the galaxies and their structure, including how the star formation history of galaxies can be explored
- how galaxies are formed and evolve with special focus on modern theories of galaxy formation
- how we explore the Universe on its largest scales and how these studies relate to theories of the evolution of the Universe

## Course content

Properties of the Milky Way and other types of galaxies regarding structure, chemical evolution and the interplay between stars and the interstellar medium. Methods for distance and mass determination. Dark matter. Hubble's law and the expansion of the Universe. Observations and descriptions of models of active galactic nuclei, especially quasars. The mass density and geometry of the Universe. Theoretical models of the Universe, comparisons with observations. Nucleosynthesis in the early Universe. Cosmological background radiation. Dark energy.

## Course design

The teaching consists of lectures and practical exercises. The lectures include scientific problems, research methods and research results concerning galaxies and cosmology. The practical exercises can include observation and laboratory experiments, computer simulations and problem-solving as well as literature assignments. The compulsory practical exercises are intended to give familiarity with instruments and methods as well as individual work within the subject area. The presentation of the practical exercises can take place in both written and oral form. The presentation of the practical exercises constitutes a part of the examination. Other examination is generally in terms of a written test at the end of the course.

## Assessment

Students who do not pass the regular exam are offered a new possibility shortly after the regular exam.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

## Grades

Marking scale: Fail, Pass, Pass with distinction.

To pass the entire course, approved examination, approved laboratory reports and passed written assignments and participation in all compulsory parts are required.

The final grade is determined by combining the results of the different parts of the examination.

## **Entry requirements**

For admission to the course, knowledge equivalent to FYSA21 is required (Physics 2, 30 credits)

## **Further information**

The course can not be credited towards a degree together with AST214 Galaxies and cosmology, 5p or AST314 Galaxies and cosmology 5p.

## Subcourses in ASTA33, Astronomy: Galaxies and Cosmology

Applies from H13

- 0711 Laboratory exercise, 1,5 hp  
Grading scale: Fail, Pass
- 0712 Other compulsory elements, 1,0 hp  
Grading scale: Fail, Pass
- 0713 Examination, 5,0 hp  
Grading scale: Fail, Pass, Pass with distinction

Applies from H07

- 0701 Galaxies and Cosmology, 7,5 hp  
Grading scale: Fail, Pass, Pass with distinction