



LUND
UNIVERSITY

Faculty of Science

ASTM12, Astronomy: High Energy Astrophysics, 7.5 credits

Astronomi: Högennergiastrafysik, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2007-03-01 to be valid from 2007-07-01, autumn semester 2007.

General Information

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

Language of instruction: English and Swedish

If needed, the course is given in English in its entirety.

Main field of studies

Astrophysics

Physics

Depth of study relative to the degree requirements

A1N, Second cycle, has only first-cycle course/s as entry requirements

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Learning outcomes

The aims of the course are that, upon completion of the course, the student should have acquired the following knowledge and skills: The student should in detail be able to account for

- the physical processes that occur in all types of supernovae and in gamma ray bursts
- how supernovae and gamma ray bursts are used for cosmological studies
- how double stars evolve and how mass transfer between stars takes place

have knowledge of

- different types of double stars that contain compact objects
- different types of galactic nuclei
- those objects that can emit gravitational radiation
- ongoing research within high energy astrophysics.

Using the knowledge acquired, the student should be able to independently take on a complex problem, break it down into its essential components, implement a solution and reflect on the results.

Course content

The course contains the following parts:

An overview of the evolution of massive stars. Core collapse supernovae. Supernovae of type Ia and their importance as standard candles in cosmology. Mass transfer between double stars. X-ray double stars. Radio pulsars and millisecond pulsars. The origin of compact objects. Hypernovae and gamma ray bursts. Galactic nuclei. Gravitational radiation.

Course design

The teaching consists of lectures, laboratory sessions, group work and project work. Participation in laboratory sessions, group work and project work and other connected teaching is compulsory.

Assessment

The examination consists of laboratory reports and project work and a written and oral test at the end of the course. Students who do not pass the regular exam are offered a re-exam 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, a passed project report and participation in all compulsory parts are required.

The final grade is determined by weighing the results in the different parts of the course.

Entry requirements

The prerequisites required for admission to the course are: English B and knowledge equivalent to FYS31 (Physics 3, Modern physics), 30 credits.

Subcourses in ASTM12, Astronomy: High Energy Astrophysics

Applies from H13

- 1301 Project, 1,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 1302 Project and Presentation, 1,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 1303 Examination, 4,5 hp
Grading scale: Fail, Pass, Pass with distinction

Applies from H07

- 0701 High Energy Astrophysics, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction