Faculty of Science

# ASTM12, Astronomy: High Energy Astrophysics, 7.5 credits

*Astronomi: Högenergiastrofysik, 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 (N 2007/149). The syllabus comes into effect 2007-07-01 and is valid from the 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:* Swedish and English
If needed, the course is given in English in its entirety.

| *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 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.

## Grades

Grading scale includes the grades: 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 FYSA31 (Physics 3, Modern physics), 30 credits.