UNIVERSITY OF GOTHENBURG

DEPARTMENT OF PHYSICS

ASM520 Stellar Physics, 7.5 credits

Stjärnornas fysik, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2013-10-21 and was last revised on 2018-08-16 to be valid from 2018-08-16, autumn semester of 2018.

Field of education: Science 100%
Department: Department of Physics

Position in the educational system

The course ASM520 is a programme course in the Physics Master Programme, as well as a single subject course at University of Gothenburg.

The course can be part of the following programmes: 1) Physics and learning, Master's Programme (N2FOL), 2) Complex Adaptive Systems, Master's Programme (N2CAS), 3) Physics of Materials and Biological Systems, Master's Programme (N2PMB) and 4) Physics, Master's Programme (N2PHY)

Main field of studies	*Specialization*
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

Admission requirements are the same as for the Physics Master's Programme.

Learning outcomes

After having taken "Stellar Physics" the student should be able to:

- describe what can be learned about stars and their evolution from observations
- describe stellar atmospheres and use radiative transfer models of their properties

- write the equations of stellar structure and explain them
- derive the characteristic timescales of stellar evolution
- describe the evolutionary tracks for stars of different masses
- describe radiative transport in stellar interior
- describe the nuclear processes taking place in stellar interior and the role of the stars in the chemical evolution of the universe
- describe convection in a star and list the consequences of it for stellar evolution
- describe the end stages of stellar evolution: white dwarfs, neutron stars and black holes

Course content

Observable properties of stars. Stellar atmospheres and radiative transfer. Equations of state. Degenerate matter. Radiative and convective energy transport. Nuclear reactions. Differential equations of stellar structure and their boundary conditions. Numerical models. Protostars and star formation. Stellar evolution. The Main Sequence. Stability and pulsations. Chemical evolution on the Main Sequence. Post-Main-Sequence evolution. Mass-loss, winds and explosions. Binary stars. Stellar rotation. Endpoints of stellar evolution: white dwarfs, neutron stars, pulsars, and stellar black holes.

Computer codes for constructing stellar models will be available so that students can perform numerical experiments.

Form of teaching

The course includes lectures and excercises.

Language of instruction: English

Assessment

Written exam.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Course evaluation

The results of the evaluation will be communicated to the students and will function as a guide for the
development of the course.

Additional information

The course is given jointly with Chalmers University of Technology. The Chalmers code for the course is RRY040.