UNIVERSITY OF GOTHENBURG

PHYSICS

ASM510 Modern astrophysics, 7.5 higher education credits

Modern astrofysik, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2011-08-22 and was last revised on 2017-05-22 to be valid from 2017-05-22, spring semester of 2017.

Field of education: Science 100%
Department: Physics

Position in the educational system

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

Mathematics 30 c (including multivariable calculus), basic physics(including mechanics, electromagnetism, quantum physics).

Learning outcomes

After completion of the course the student should have ability to:

- give an overview of the origin, structure and evolution of the Universe and its contents (planets, stars, galaxies),

- explain how basic properties of cosmic objects are measured (e.g. distances, sizes, masses and temperatures),

- explain methods to discover exoplanets,

- perform calculations (based on observational data) of temperatures and ages of solar system bodies, masses and radii of exoplanets and binary stars, magnitudes and luminosities, cosmic distances, masses of galaxies, and the expansion of the Universe,

- explain the basic physics and equations of stellar structure,

- review stellar evolution, and relate it to observations (including the Hertzsprung-Russell diagram),

- analyze radioastronomical observations to study the structure and kinematics of the Milky Way

- use kinematics to explain the basic structure of galaxies (spirals, ellipticals),

- review the present cosmological model and the evidence for it (including evidence for dark matter and dark energy),

- explain properties of radiation from different cosmic sources

Course content

The emphasis is on physical understanding and on principles for how important properties of cosmic objects are measured. Several branches of physics are utilized (mechanics, quantum physics, statistical physics, nuclear physics, electromagnetism). Order of magnitude estimates will be used frequently.

- The Solar system (overview, geology and atmospheres, formation),

- Exoplanets: discovery and properties

- Stars (observational results, stellar structure and evolution, binary stars, compact stars)

- The Milky Way (basic structure, interstellar medium, star clusters, kinematics and structural components)

- Galaxies and galaxy clusters (galaxy classification and observational results, basic galactic kinematics and dynamics, active galactic nuclei, galaxy interactions and

galaxy evolution),

- Cosmology (expansion of the universe, abundances of elements, the cosmic microwave background, the big bang, cosmological models)

Form of teaching

The course includes lectures, problem solving sessions and computational and/or observational exercises.
The examination includes written examination and compulsory assignment.

Language of instruction: English

Assessment

Grades

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

Course evaluation

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Additional information