



PHYSICS

ASM400 Astrophysical Dynamics, 7.5 higher education credits

Astrophysical Dynamics, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2008-09-16 and was last revised on 2017-05-18 to be valid from 2017-05-18, spring semester of 2017.

Field of education: Science 100%

Department: Physics

Position in the educational system

The course ASM400 is a programme course in the Physics Master Programme, as well as a single subject course at the University of Gothenburg.

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

Physics

Specialization

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

Entry requirements

To be eligible for the course the student needs knowledge in mathematics and physics equivalent to a Bachelor degree. Applicants must prove knowledge of English: English B level or English proficiency equivalent to IELTS 6.5 no part under 5.5 or TOEFL 575 p, TWE score 4.5 is also required.

Learning outcomes

Students who have followed the course ASM400 Astrophysical dynamics will be:

- familiar with the dynamics of fluids in astrophysics and cosmology,
- understand the similarities and differences between gas dynamics, stellar dynamics and plasma physics.

Course content

This course covers several multi-disciplinary issues of modern research on astrophysical dynamics, and thus also of interest to physicists, mathematicians and engineers. The major topic is gas dynamics, viewed in context with stellar dynamics and plasma physics. Besides, the course gives a friendly introduction to WAVELETS, which are becoming an increasingly powerful tool not only for processing signals and images but also for analyzing fractals and turbulence, and which promise to have important applications to dynamical modeling of disc galaxies.

The course covers the following topics:

- basics about fluids
- the equations of motion, simple applications, illustrated with experiments
- instabilities, turbulence, astrophysical fractals
- interstellar medium and galaxies in the Universe
- shocks; magnetic fields
- gas dynamics vs. stellar dynamics and plasma physics
- birth, life (and death?) of a galaxy: a step-by-step problem.
- multi-scale relations in disc galaxies: spirals, bars and central super-massive black holes.
- wavelets: an innovative powerful tool for scientists.

The students will learn actively through interaction with the teacher and with each other. The students will play an active role in the course, not only during lectures and exercises, which will involve them in thinking and discussing, but also at the exam: the students will teach each other important astrophysical applications of the material learned in the course.

Form of teaching

The examination is in the form of a seminar. The topic is chosen by the student from a selected list of issues with strong impact on modern research.

Language of instruction: English

Assessment

A student who has failed a test twice has the right to change examiner, unless weighty argument can be adduced. The application shall be sent to the board of the department and has to be in writing.

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 FAS010.