Department of Astronomy

Stockholm University

Syllabus

for course at advanced level

Stellar Atmospheres
Stjärnatmosfärer

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	AS7017
Valid from:	Spring 2010
Date of approval:	2010-05-17
Department	Department of Astronomy
Main field:	Astronomy
Specialisation:	A1F - Second cycle, has second-cycle course/s as entry requirements

Decision

This syllabus has been approved by the Board of the faculty of Science at Stockholm University 2010-05-17.

Prerequisites and special admittance requirements

To enter this course a Bachelor's degree in physics, or similar, is required. In addition, knowledge similar to the courses Stjärnornas struktur och utveckling, AN, 7,5 hp (AS7010) and Astrofysikaliska spektra, AN, 7,5 hp (AS7006) is required. Also required is knowledge equivalent to Swedish upper secondary school course English B, or equivalent to one of the following tests; Cambridge CPE and CAE: Pass, IELTS: 6.0 (with no part of the test below 5.0), TOEFL (paper based): 550 (with minimum grade 4 on the written test part), TOEFL (computer based): 213, TOEFL (internet based): 79.

Course structure

Examination code	Name	Higher Education Credits
HELA	Stellar Atmospheres	7.5

Course content

The course deals with the basic physics of stellar atmospheres and methods to treat radiative transfer in stellar atmospheres. The course explores the basics needed for modelling stellar atmospheres such as continuum opacities, the source function, formation of spectral lines, curves of growth, approximate methods such as Milne-Eddington, coherent scattering, non-LTE with complete redistribution and basic numerical methods. The VAL III model and its physical processes is treated as an example of different relevant radiative processes.

Learning outcomes

Upon completion of the course, students are expected to be able to
- describe basic radiative transport and formation of spectral lines relevant for stellar atmospheres. This includes among other things coherent scattering, two-level non-LTE with complete redistribution as well as basic numerical methods for solving such problems.
- show understanding for the outcomes of radiation transport calculations in a stellar atmosphere and describe these in terms of different opacities, optical depths and source functions.

Education

Instruction consists of lectures and seminars. Participation in seminars and any associated integrated instruction is compulsory. In the event of special circumstances, the examiner may, after consultation with the

teacher concerned, grant a student exemption from the obligation to participate in certain compulsory instruction.

Forms of examination

a. The course is examined as follow: Knowledge assessment takes the form of a written or oral exam, presentation of literature studies through semianrs and/or reports, or alternatively, oral presentation of solutions to hand-in exercises. If the instruction is in English, the examination may also be conducted in English.
b. Grades will be set according to a seven-point scale related to the learning objectives of the course:
A = Excellent
B = Very good
C = Good
D = Satisfactory
E = Adequate
Fx = Fail, some additional work required
F = Fail, much additional work required
c. The grading criteria will be distributed at the beginning of the course.
d. In order to pass the course, a minimum grade of E is required together with:
• participation in exercises and the seminars and presentations of other students
• a pass on the written report for the practical laboratory work.
e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. As student who has received a passing grade on an examination may not retake the examination to attain a higher grade. A student who has failed the same examination twice is entitled to have another examiner appointed, unless there are special reasons to the contrary. Such requests should be made to the department board.
The course includes at least two examinations opportunities per year when the course is given. At least one examination opportunity will be offered during a year when the course is not given.
f. Students awarded the grade Fx are given the opportunity to improve their grade to E. The examiner decides the supplementary assignments to be performed and the pass mark criteria. The supplementary assignments will take place before the next examination session.

Interim

Students may request that the examination be conducted in accordance with this course syllabus even after it has ceased to be valid. However, this may not take place more than three times over a two year period after the course instruction has ended. Requests must be made to the departmental board. The provision also applies in the case of revisions to the course syllabus (and revisions of the course literature).

Limitations

The course may not be included in examinations in combination with the course Stellar Atmospheres, 5 p (AI1160)

Misc

The course can be read as part of the master programme in astronomy but can also be read as a separate course.

Required reading

The course literature is decided by the department board and published on the Department of Astronomy's website at least two months before the start of the course.