Department of Astronomy

Stockholm University

# Syllabus

for course at first level

**Astrophysical Spectra**
**Astrofysikaliska spektra**

**7.5 Higher Education Credits**
**7.5 ECTS credits**

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|---|---|
| **Course code:** | AS5004 |
| **Valid from:** | Spring 2018 |
| **Date of approval:** | 2018-01-15 |
| **Department** | Department of Astronomy |
| **Main field:** | Astronomy |
| **Specialisation:** | G2F - First cycle, has at least 60 credits in first-cycle course/s as entry requirements |

## Decision

This syllabus has been approved by the Board of the Faculty of Science at Stockholm University 2018-01-15.

## Prerequisites and special admittance requirements

To enter this course knowledge corresponding to the first two years of a Bachelor's degree in physics, or similar, is required. This should include at least 15 HECs in quantum physics corresponding to Quantum Mechanics, 7.5 hp (FK5020) and Atomic & Molecular Physics, 7.5hp (FK5023).

## Course structure

| Examination code | Name | Higher Education Credits |
|---|---|---|
| HELA | Astrophysical spectra | 7.5 |

## Course content

The course treats the fundamentals of the formation of spectral lines in astrophysical objects. It deals with the transport of radiation through astrophysical media where absorption and emission processes together with hydromagnetic effects take place. It also treats the use of analytical and numerical models to perform calculations of the formation of synthetic spectra. All these concepts are used in applications to stellar atmospheres and interstellar gas.

## Learning outcomes

Upon completion of the course, students are expected to be able to
• show good understanding for how to solve the radiation transfer equation in different astrophysical contexts
• describe the origin of emission and absorption of radiation in different astrophysical media
• interpret astrophysical spectra
• apply analytic methods to quantitatively calculate properties of gas which emits and absorbs radiation, as well as know which situations numerical modeling is necessary.

## Education

Instruction consists of lectures, exercises and laboratory work.
Participation in the laboratory work 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 participated in certain compulsory instruction.

**Forms of examination**

a. The course is examined as follows: Knowledge assessment takes the form of written examination and 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 = Sufficient
Fx = Fail
F = Fail

c. The grading criteria will be distributed at the start of the course.
Late submission of the hand-in exercises will have consequences for the final course grade, which are described in more detail in the course's grading criteria.

d. In order to pass the course, students must receive a passing grade on all course units, have the written report on the laboratory work approved and participate in all mandatory instruction.

e. Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still provided. The number of examination opportunities is not limited. Other mandatory course elements are equated with examinations. A student who has received a passing grade on an examination may not retake this 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 departmental board.
The course includes at least two examination 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 apply. However, this may not take place more than three times over a two year period after 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.

**Limitations**

The course may not be included in examinations in combination with coursesT ”Astrofysikaliska spektra, gk, 5p” (AI1380) or "Astrofysikaliska spektra, 7.5hp" (AS7006).

**Misc**

The course is a part of the Bachelor's programme in Astronomy, but can also be read as a separate course.

**Required reading**

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