

# Syllabus

for course at advanced level

**Astrophysical Radiation Processes**  
**Astrofysikaliska strålningsprocesser**

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

<b>Course code:</b>	AS7005
<b>Valid from:</b>	Autumn 2019
<b>Date of approval:</b>	2006-09-27
<b>Changed:</b>	2016-01-18
<b>Department</b>	Department of Astronomy
<b>Main field:</b>	Astronomy
<b>Specialisation:</b>	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 2006-09-27, and was revised 2008-04-07.

## Prerequisites and special admittance requirements

To enter this course knowledge corresponding to a Bachelor's degree in physics, or similar, is required. In addition, knowledge about spectra and radiation transfer corresponding to what is taught in Astrophysical spectra, AN, 7,5hp (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	Astrophysical Radiation Processes	7.5

## Course content

The course includes the most common types of continuum radiation that are observed in astronomy, thermal as well as non-thermal. Using special theory of relativity and classical theory of radiation, including Maxwell's equations, retarded potentials, multipole radiation, spectral distribution and Larmor's formula, the origin of free-free radiation, synchrotron radiation and Compton radiation is described.

## Learning outcomes

It is expected that the student after taking the course will be able to: show good understanding for classical radiation theory; Maxwell's equations, the wave equation and its solutions, potential theory and multipole radiation - describe relativistic radiation theory - describe the origin and properties of blackbody radiation, free-free radiation, synchrotron radiation and Compton radiation - to solve astrophysical problems where these radiation mechanisms are involved.

## Education

The education consists of lectures, practical laboratory work, exercises and reports. Participation in the practical laboratory work and group education associated with this is compulsory. An examiner may rule that a student is not obliged to participate in certain compulsory education if there are special grounds for this after consultation with the relevant teacher.

**Forms of examination**

a. Examination for the course is in the following manner: measurement of knowledge takes place through: Written and/or oral examination, and/or hand-in exercises.

b. Grading is carried out according to a 7-point scale related to learning objectives: A = Excellent B = Very Good C = Good D = Satisfactory E = Sufficient Fx = Fail F = Fail c. Grading criteria for the course will be distributed at the start of the course. d. A minimum grade of E is required to pass the course, together with: participation in compulsory lectures and a pass grade on written reports for laboratory exercises. e. Students who fail to achieve a pass grade in an ordinary examination have the right to take at least further four examinations, as long as the course is given. The term “examination” here is used to denote also other compulsory elements of the course. Students who have achieved a pass grade on an examination may not retake this examination in order to attempt to achieve a higher grade. Students who have failed to reach a pass grade on two occasions have the right to request that a different teacher be appointed to set the grade of the course. A request for such appointment must be sent to the departmental board.

**Interim**

Students may request that the examination is carried out in accordance with this syllabus even after it has ceased to apply. This right is limited, however, to a maximum of three occasions during a two-year-period after the end of giving the course. A request for such examination must be sent to the departmental board.

**Limitations**

The course may not be included in a degree together with the courses ”Astrofysikaliska strålningsprocesser gk, 5p” (AI1260), or the equivalents.

**Misc**

The course is a component of the Master's programme in Astronomy, but it can also be taken as an individual course.

**Required reading**

Course literature is decided by the departmental board and is described in an appendix to the syllabus.