Translation of Curriculum Statement for Graduate Level (Third-level) Education

Astronomy with specialization in Astrophysics

Swedish title: Astronomi med inriktning mot astrofysik

TNASTR01

Swedish Curriculum adopted by the Board of the Faculty of Science and Technology (Board for Third-level Education) on 2012-08-28.

The Curriculum Statement for Third-level Education consists of three parts: a general part, this subject specialized curriculum statement, and each doctoral student's individual study plan.

Objective

The goal of PhD education is to develop competence and experience necessary to carry out an independent and critical scientific studies including the ability to plan, perform and present the results of research project. PhD training should give a broad methodological training and knowledge about latest research in astronomy and astrophysics. It should provide a good picture of the modern problems as well as in-depth understanding and competence in some specific area of astronomical research.

The doctoral student shall also be able to present her/his own goals and results orally and in writing to different target groups in English and, in the case of Swedish-speaking doctoral students, in Swedish.

Subject description

Astrophysics studies physical properties and processes in/on/around objects in Space. The emphasis is on understanding the physical processes in objects, their structure and evolution. A broader training is given with a general PhD program Astronomy. This specialization is closely connected to other disciplines like space, plasma, particle, nuclear, atomic and theoretical physics and, therefore, advanced knowledge in these disciplines can often by used to solve astrophysical problems. Large-scale numerical simulations and advanced observations taken with modern equipment at large international observatories or with space telescopes are central for this
field. Astrophysical research in Uppsala is focused on stars, galaxies, Solar system and cosmogony and to large extend is carried out in collaborations with research groups in other countries.

Information about the current research projects at the Division can be found by attending seminars and colloquia and from researchers involved in PhD education. For further information follow the “Education” link at the Division web page: http://www.physics.uu.se/astro/en

Eligibility

Basic Eligibility
The basic eligibility for third level education is described in the general part of the curriculum statement.

Special Eligibility

A special eligibility for a third level program in Astronomy requires successfully passed examination of a sufficiently wide range of astronomical courses corresponding to 75 higher education credits. In special cases exceptions can be made. Examples of education that can provide eligibility without 75 HE points in astronomy are civil engineering in Technical Physics and Physics within the Natural Sciences or if an equivalent knowledge was acquired in a country with a different credit system.

Admission

Applicants for third level program in Astronomy must submit an application to the head of the Department of Physics and Astronomy. Positions in third level programs are announced internationally and are normally filled once or twice per year.

In connection with the admission it must be stated how it is planned to finance the student and her/his research.

Program structure

In connection with the admission, each doctoral student and her/his supervisor shall draw up an individual study plan after consultation with the professor in charge of the third level program. The plan is to be approved by the head of the department (by delegation of the Faculty Board), in connection with the admission.
The individual study plan shall be reviewed jointly by the doctoral student and her/his supervisor, annually, and be provided with a summary of the achieved results and the plans for the coming year. Significant changes and any disagreement on the individual study plan shall be reported to the head of the department or, if deemed necessary, to the Board for Third-level Education.

Courses
Within the third level program there may be different kinds of courses, such as lectures, literature studies, practical training, field studies, etc. The courses are intended to provide a wider overview of the field and to complement the specialized competence acquired as part of the research work. The individual study plan for PhD studies must include:

- Two or three overview courses corresponding in total to 20 HE points and covering some of the 3 research areas pursued at the Division (A): physics of planetary systems, stellar physics, physics of galaxies and cosmology. Every such course should be sufficiently broad and correspond to at least 5 HE points.
- Four courses of the total of 30 HE points dealing with methodology (M) of research (for example, observational methods, radiative processes, astronomical statistics, numerical methods in astronomy) or specific (S) astronomical/astrophysical objects (e.g. courses focused on comets, the Sun, cosmogony, stellar evolution, supernovae, active galaxies, galaxy formation, particle astrophysics etc.) Both M and S course must be included in the study plan.
- One general Physics, Math or Computer science course (F) of at least 5 HE points selected among PhD courses given at Uppsala University
- One 5 HE point course of a more general kind, e.g. theory of science, history of Astronomy or presentation technique.

Obs: Other courses including those at other places and other areas can in some cases be included upon the approval by the examiner.

Requirements for doctoral degree
The requirements for doctoral degree consist of on one hand passed examinations in the courses included in the approved individual study plan of each doctoral student, and on other hand passed public defense of the doctoral thesis. The program leading to the doctoral degree
amounts to 240 higher education credits (four years of full-time studies), of which the thesis part amounts to a minimum of 120 higher education credits and the course part to a minimum of 60 higher education credits.

Requirements for licentiate degree
A stage of at least 120 higher education credits (two years of full-time studies) in the third level program may be completed with a licentiate degree. The requirements for this are that the doctoral student both has passed the examinations included in the program stage and has got an academic paper amounting to a minimum of 60 higher education credits passed. The course part amounts to a minimum of 40 higher education credits.

Other
In the first few months PhD student is given a possibility to actively follow the work of all research groups at the Division for Astronomy and Space Physics. He/she will be given a possibility to do small projects with some groups and will be provided with all necessary supervision. The goal is to simplify the choice of the PhD project.

It is very important that PhD students follow closely the development in all fields of research during the whole period of their education. This is done through regular reading of the scientific journals and attending seminars and colloquia. Students should also follow the research relevant to astronomy, astrophysics, space physics and physics in general carried out at other divisions and departments.

The value of a PhD in astronomy in the job market depends not only on the content of dissertation but also on the competence and expertise acquired during studies, work at the Department and applied skills acquired in the process, e.g. software development, computer techniques, applied physics, statistics etc.