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

Physics with specialization in Ion Physics

Swedish title: Fysik med inriktning mot jonfysik

TNFYSI12

Swedish Curriculum adopted by the Board of the Faculty of Science and Technology (Board for Third-level Education) on 2010-03-17. Translation approved on 2010-08-10.

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

Supervision and thesis work will make the student well prepared to carry out independent scientific research. After the education, the student will be familiar with scientific questions and methods in Ion Physics and will have reached thorough knowledge within the specific area of the thesis. The student will be able to critically assess his/her own scientific work and that of others. 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.

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Subject description

Ion Physics studies interaction of fast ions (energy>1 MeV/amu) and photons with solids and gas at an atomic and molecular level. The research is focused on basic investigations of fundamental physics beside applications in different mass spectrometric analytical methods. Ion formation and fragmentation, development of instruments and methods as well as experimental and theoretical studies of ion induced nano structuring, materials modification and trace element analysis,
are examples of activities within the research program. The program has an implicit interdisciplinary nature. The research is closely related to a 5 MV tandem accelerator and a 350 kV high current ion implanter. Examples on ongoing projects:

- Accelerator mass spectrometry with applications in radio nuclide dating in archaeology, geology and oceanography etc.
- Accelerator based elemental analysis and depth profiling of semi conductors and fusion reactor walls.
- Ion induced materials modification and nano structuring. Focus is presently on defects in silicon and metal oxides.
- Improvements of methods and instruments for ultra sensitive detection techniques applied in pharmacy and medicine in collaboration with academy and industry.

Information on activities in the Ion Physics division is continuously available at www.angstrom.uu.se/ionphysics/.

Eligibility

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

Special Eligibility
Special eligibility is assigned to a candidate who has taken courses within all relevant areas in the subject with sufficient breadth and depth. Thus, special eligibility is considered for candidates with one of the following merits:

a) has obtained a master degree in physics or civil engineering from a Swedish technical University/College and hence taken courses within the relevant areas of the subject
b) in a different way has gained knowledge principally to the same extent as in a), irrespectively of the country of study

Admission
Applicants for third level program in physics or engineering science with specialization in Ion Physics must submit an application to the head of the Department of Physics and Astronomy. Admissions to places in third level programs normally take place six times per year.
In connection with the admission it must be stated how it is planned to finance both the personal maintenance of the doctoral 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 wider insights into the subject as a complement to the specialist competence acquired in the research work.

The doctoral student is encouraged to follow the courses Scientific Writing, 1p, and Introduction to Ångström Laboratory for new PhD students, 2p.

The range of courses offered is revised continuously.

**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 40 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 30 higher education credits.