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

Theoretical physics

Swedish title: Teoretisk fysik

TNTEFY00

Swedish Curriculum adopted by the Board of the Faculty of Science and Technology (Board for Third-level Education) on 2008-10-01. Revision on 2021-05-12. Translation approved 2021-05-12.

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

Based on the undergraduate education in theoretical physics, the research level education will give extended insight into important areas of the subject of physics and in-depth knowledge of theoretical physics.

Through supervision and thesis work the doctoral student will be well prepared for independent and critical research, or for some other professional activity with high demands on methodologic thinking, deep theoretical insights and research experience.

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

In the division of theoretical physics the main part of the research lies within string theory, quantum field theory, theoretical particle and astro-particle physics, dynamical systems, mathematical physics and condensed matter theory. Research with applications in condensed matter physics is also conducted.

In theoretical particle and astro-particle physics research is focused on studies of the standard model and its consequences for the newborn universe. Within the theory of dynamical systems, the activity is concentrated to studies of models with both chaotic and integrable
behaviour, with applications in the quantum theory of integrable and non-integrable systems, as well as in the study of certain biological systems.

Information on the research topics in the program is available at https://www.physics.uu.se/research/theoretical-physics/.

Eligibility

Basic Eligibility

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

Special Eligibility

A person has special eligibility for a third level program in theoretical physics if she/he has passed examinations in courses of physics or in courses of areas of relevance for theoretical physics, ranging a minimum of 90 HE credits, or if she/he has acquired the equivalent knowledge abroad. Further information on the prerequisites is provided by the director of studies for the doctoral program.

Admission

Applicants for third level program in theoretical physics must submit an application to the head of the Department of Physics and Astronomy. Admissions to places in third level programs take place normally two 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. Upon admission to postgraduate education, the Swedish title of the degree is to be specified in the application. Postgraduate education in Theoretical Physics shall lead to a filosofie doktorsexamen or, alternatively, a teknologie doktorsexamen. The English rendering will, in both cases, be a licentiate/doctorate degree of philosophy. According to decision (TEKNAT 2012/215) the degree title should be determined by the contents of the postgraduate education and not by the undergraduate degree of the postgraduate student.
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 courses included in the individual study plan may partly be selected among the coordinated research courses offered by the physics section or from the courses available from the department of mathematics and are chosen together with the supervisor.

A course in research ethics of at least 2 higher education credits is mandatory for licentiate and doctoral degree. A course in university educational theory is also mandatory for doctoral students who teach at basic and advanced level.

The range of courses offered The selection of courses offered is under continuous revision. A selection of courses included is: Quantum field theory I and II, Symmetry in physics, The mathematical methods of physics II, Statistical physics, String theory.

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 part of the course amounts to a minimum of 30 higher education credits.