Translation of Subject Curriculum (Study Plan) for Third-cycle (PhD) Education

Mathematical statistics

Swedish title: Matematisk statistik

TNMAST00

Swedish curriculum adopted by the Board of the Faculty of Science and Technology (Third-cycle Educational Board) on 2014-05-14

The Study Plan for third-cycle studies consists of three parts: a general part, this subject specific study plan, and each doctoral student's individual study plan.

Objective

The graduate level education should further expand the insights into the most important parts of the subject with the undergraduate education as starting point as well as lead to deep knowledge in at least one of its special areas. Through guidance and thesis work, the student will be well prepared to work as an independent researcher with the ability to critically analyze and evaluate the research of others or in other professions that require deep insights into the subject and research experience. The thesis should demonstrate independent thinking and include new results.

By conducting a degree project guided by a supervisor, the doctoral student shall also be able to present her/his 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

The main parts of Mathematical Statistics, as studied and researched within a Mathematics Department, are Probability Theory, Stochastic Processes, Stochastic Analysis and Stochastic Dynamical Systems. It also includes that part of Statistics which is most relevant to the mathematical methodology and the theory of Statistics. These areas are further subdivided into a vast number of subfields. Mathematical Statistics both depends on and influences all other areas of Mathematics.

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Information about current research at the Department of Mathematics is available at its homepage [http://www.math.uu.se/](http://www.math.uu.se/)

**Eligibility**

**Basic Eligibility**
The basic eligibility for third-cycle studies is described in the general part of the study plan.

**Special Eligibility**
A person who has passed at least 90 higher education credits worth of courses in mathematical statistics or in subjects relevant for mathematical statistics, or who has corresponding education from abroad, has special eligibility. Normally, a thesis of at least 15 higher education credits is also required.

Examples of educational programs which give special eligibility are the following:

- Bachelor's program in mathematics (provided that basic eligibility is fulfilled)
- Bachelor's program in mathematical statistics (provided that basic eligibility is fulfilled)
- Master's program in mathematics
- Master's program in mathematical statistics

For other programs additional mathematics courses may be needed for special eligibility. For questions in individual cases contact the Graduate Chair.

**Admission**
Applicants for third-cycle studies in mathematics with specialization in mathematical statistics must submit an application to the Head of the Department of Mathematics. Admission to doctoral studies takes place normally one time per year.

At the time of admission, the department must provide a financial assistance plan demonstrating sufficient support to cover the maintenance of the applicant as well as her/his research.
Program structure

At the time of admission, each doctoral student and her/his supervisor shall draw up an individual study plan after consultation with the professor in charge of third-cycle studies. The plan is to be approved by the Head of the Department (by delegation of the Faculty Board) at the time of admission.

The individual study plan shall be annually reviewed by the doctoral student and her/his supervisor jointly, and supplemented with a summary of the achieved results and the plans for the coming year. Significant changes as well as any disagreement on the individual study plan shall be reported to the Head of the Department or, if deemed necessary, to the Third-cycle Educational Board.

Courses

The third-cycle studies may include different kinds of courses, such as lectures, literature studies, practical training, field studies, etc. The courses are intended to provide necessary background for the thesis work as well as wider insights into the subject and thereby serve as a complement to the more specialized thesis work. To achieve the required width, a basic course in probability theory, a basic course in stochastic processes and a basic course in statistics are always included. Other courses may either be graduate level or advanced level courses in mathematical statistics or other subjects relevant for education.

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

Advanced level courses can account for at most 30 higher education credits of a licentiate degree and 45 higher education credits of a PhD degree.

The range of courses offered is revised continuously. Examples of advanced courses are the following: Measure-theoretic Probability Theory, Stochastic Processes, Stochastic Differential Equations, Stochastic Geometry, Markov Processes, Measure Theory, Integration Theory, Theoretical Statistics, Stochastic Networks, Partial Differential Equations, Mathematical Analysis.

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The courses in the individual study plan are to be decided by the student and the main supervisor.

The student is expected to participate in other research activities at the department, in particular in research studies and guest lectures.

Requirements for doctoral degree
The requirements for the doctoral degree consist of passed examinations in the courses included in the approved individual study plan of each doctoral student, as well as a passed public defense of the degree project. The studies awarded a doctoral degree comprise 240 higher education credits (four years of full-time studies), of which the doctoral thesis comprises 120 higher education credits and the course part 120 higher education credits.

Requirements for licentiate degree
A doctoral student who has acquired at least 120 higher education credits (two years of full-time studies) is eligible for a licentiate degree. The requirements consist of passing the examinations included in the program stage and receiving a passing grade on an academic paper of at least 60 higher education credits. The part of the course amounts to a minimum of 60 higher education credits.

Other
Research in mathematics is often conducted in cooperation with researchers from other countries and other subjects as well as in other languages. It is therefore essential that the student has the ability to read scientific works from other disciplines and languages other than English. The student should be able to write mathematical texts in Swedish and in English.

The thesis work is individual but cooperation with other graduate students is very valuable. This is encouraged e.g. through graduate student seminars.

During the education graduate students should take part and present their research results at international research conferences.

In order to widen the educational and research perspective and learn about applications, contacts with other subjects within the department and the university are valuable. This applies to Pure Mathematics, including Analysis, Algebra, Geometry and Applied Mathematics, as
well as to subjects outside the department, e.g., Computer Science, Statistics, Astronomy, Physics, Biology, Medicine, and geo sciences.

The graduate students should also take notice of the mathematical activities at the Mittag-Leffler Institute, Stockholm University and the Royal Institute of Technology in Stockholm.