



Reg. no. SU FV-  
3669-19

## General study plan for the PhD programme in Statistics

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### 1. Decision

This general study plan for the PHD programme in Statistics was established by the Faculty Board of the Social Sciences at Stockholm University on 2007-05-31 and revised on 2019-12-17. The general study plan applies from 2020-01-01.

### 2. Subject Description

Statistics is the part of applied mathematics that studies methods of collection, analysis and presentation of data with the purpose of quantifying uncertainty and making inferences about underlying populations and mechanisms. Statistical methods are used within all empirical sciences, and problem formulations and challenges from these fields are an important driver of innovation within statistical science. The strong development of computers has made the solution of increasingly complex problems possible and has contributed to a renaissance in the field.

### 3. Goals of the Education

All admissions to the doctoral education in statistics programme are intended for studies terminating in a doctoral degree. In exceptional circumstances, the Faculty Board of the Social Sciences may decide to admit students for studies terminating in a licentiate degree.

A doctoral student of Statistics may obtain a licentiate degree as part of their doctoral education. The licentiate phase is not a compulsory part of the doctoral degree.

#### 3.1 Doctoral Degree

The doctoral degree is awarded after the student has completed a programme comprising 240 credits within a subject that is eligible for doctoral studies.

##### Knowledge and understanding

For a doctoral degree, the candidate should

demonstrate in-depth knowledge and a systematic understanding of the area of research, as well as profound and current specialist knowledge of a limited part of the area of research, and demonstrate familiarity with general scientific method and the methodology of the area of research in particular.

## Faculty Board of the Social Sciences



### Skills and abilities

For a doctoral degree, the candidate should:

- demonstrate skills in scientific analysis and synthesis and the ability to self-criticise and assess new and complex phenomena, questions and situations,
- demonstrate the ability to identify and draft research problems independently, critically, creatively and with scientific precision, and plan and execute research and other qualified activities with suitable methods within set deadlines, as well as assessing and evaluating such tasks,
- demonstrate their ability to significantly contribute to scientific development in the form of a thesis,
- demonstrate an ability to present and discuss research and research findings with authority, orally and in writing, in national and international contexts in dialogue with the scientific community and broader society,
- demonstrate an ability to identify the need for further knowledge, and
- demonstrate the capacity to contribute to the development of society and support the studies of others in the context of research and teaching as well as other qualified professional contexts.

### Ability to make assessments and approach

For a doctoral degree, the candidate should:

- demonstrate intellectual independence and scientific integrity, and an ability to make ethical assessments with regard to research, and
- demonstrate in-depth insight into the value of science and its limitations, its value in society as well as people's responsibility for how it is used.

### Scientific Thesis (Doctoral Thesis)

For a doctoral degree, the candidate should write and gain approval for a scientific thesis (doctoral thesis) comprising at least 150 ECTS credits.

## **3.2 Licentiate Degree**

A licentiate degree is awarded either when the student has completed an education of at least 120 ECTS credits within a third-cycle subject, or after the student has completed 120 ECTS credits of an education that will be completed with a doctoral degree, if the university decides that it can issue licentiate degrees.

### Knowledge and understanding

For a licentiate degree, the student should:

- demonstrate knowledge and a systematic understanding of the area of research as well as current specialist knowledge of a limited part of the area of research, and demonstrate familiarity with a general scientific method and the methodology of the area of research in particular.

### Skills and abilities

For a licentiate degree, the student should:



demonstrate the ability to identify and draft research problems independently, critically, creatively and with scientific precision, and plan and execute research and other qualified activities with suitable methods within set deadlines, as well as assessing and evaluating such tasks, demonstrate an ability to present and discuss research and research findings with authority, orally and in writing, in national and international contexts in dialogue with the scientific community and broader society, and demonstrate skills required in order to take part in research and development work or work independently on tasks that require qualified statistical competence.

#### Ability to make assessments and approach

For a licentiate degree, the student should:

demonstrate an ability to make ethical assessments of his/her own research,  
 demonstrate an insight into the value of science and its limitations, its value in society as well as people's responsibility for how it is used, and  
 demonstrate the ability to identify his/her need for further knowledge and to take responsibility to promote his/her competence.

#### Scientific Dissertation

For a licentiate degree, the candidate should write and gain approval for a scientific dissertation comprising at least 75 ECTS credits.

## 4. Eligibility and Prerequisites

### 4.1 Basic Eligibility

To meet the basic eligibility requirements for the doctoral programme, candidates must

- hold a Master's degree,
- have completed 240 ECTS credits, of which 60 ECTS credits must consist of second-cycle courses, or
- otherwise have gained equivalent knowledge domestically or abroad.

The university may exempt individual applicants from the requirement for basic eligibility where specific grounds apply. Any decisions regarding exemption are made by the Board of the Department of Statistics.

### 4.2 Special Eligibility

Apart from general eligibility, there are specific eligibility requirements for the doctoral programme in statistics. To meet the special eligibility requirements, candidates must hold **90 ECTS credits in Statistics or equivalent**. At least 15 of these 90 ECTS credits should consist of an independent dissertation.

Furthermore, English proficiency is required for special eligibility. Language proficiency includes the ability to read, speak and write in English.



The eligibility requirements can also be met by candidates who have acquired equivalent competences abroad or domestically.

The level of equivalence is assessed by the Board for Doctoral Education at the Department of Statistics and decisions are made by the Department Board at the Department of Statistics.

## 5 Advertisement of Vacancies and Admission

Applications for the doctoral programme in statistics are usually opened each spring semester, subject to the availability of funding. When vacancies for the doctoral education are advertised, the last application date is 25 April. Vacancies are advertised on Stockholm University's website at the latest one month prior to the last application date. Information is provided on the department's website ([www.statistics.su.se](http://www.statistics.su.se)). By this date, the applicant must have submitted their application, including a description of possible areas of research for their thesis, a résumé, letters of reference where applicable, previous dissertations/publications, and other academic or professional certificates, including official grade and degree transcripts.

Admission decisions regarding the doctoral programme in statistics are made by the Department Board of the Department of Statistics. The Department Board may not delegate admission decisions. The Department Board may only admit applicants who will be given a doctoral studentship.

Admission decisions concerning doctoral programmes with other sources of funding than doctoral studentships are made by the Faculty Board of the Social Sciences.

More information about exceptions pursuant to chapter 7, section 37 of the Swedish Higher Education Ordinance can be found in the guidelines for doctoral education of the Faculty of Social Sciences.

### 5.1 Evaluation and Selection Criteria

The Board for Doctoral Education at the Department of Statistics prepares the applications and submits proposed candidates to the Department Board, who make the final decision regarding admission.

The selection of applicants who meet the basic and special requirements is made based on their ability to benefit from the education.

The selection criteria used are as follows:

- grades for completed courses and academic papers
- total of completed course credits in mathematics
- total of completed course credits in a particular subject



- quality of academic paper(s)
- programming knowledge
- ability to work independently
- proposed research area stated in the application
- methodological and scientific maturity
- ability to communicate and cooperate

The fact that an applicant is considered able to transfer credits from prior courses and study programmes or for professional or vocational experience may not alone give the applicant priority over other applicants (Cf. SFS 2010:1064, chapter 7, section 41).

## 6 Contents and Structure of the Programme

A doctorate degree requires four years of full-time study, and the programme is structured accordingly. Thus, it is assumed that the doctoral student will commit fully to their studies, but also maximise the utility of any tuition and supervision. The doctoral student may request to reduce their work to a part-time capacity, however never less than 50% of full-time capacity, i.e. eight years.

The doctoral student may be offered to teach or undertake other tasks at the department by up to 20% of full-time capacity over an academic year. In these cases the programme is extended accordingly to up to five academic years.

The length of the programme to achieve a doctoral degree is four years of full-time studies, which comprises 240 ECTS credits. The programme consists of a course part consisting of 90 ECTS credits and a thesis consisting of 150 ECTS credits. A licentiate degree may be awarded after 120 ECTS credits, out of which 45 ECTS credits must comprise courses and 75 ECTS credits must comprise an academic paper.

All doctoral students who are admitted to the doctoral programme in statistics must follow the current general syllabus. Any collaborations in the form of cotutelle, individual doctoral students' participation in research academies or externally financed projects may only affect the individual differences in the programme that are documented in the individual syllabus.

The detailed structuring of the studies is determined in item 6.3, as well as in the individual syllabus.

### 6.1 Individual Study Plans

An individual study plan shall be drawn up for each doctoral student enrolled in the Department of Statistics. This plan shall contain the undertakings made by the doctoral student and the higher education institution, a financing plan and a timetable for the doctoral student's study programme. The study plan should be adopted by



the Department Board of the Department of Statistics in consultation with the doctoral student and his or her supervisor.

The individual study plan shall be reviewed annually in consultation with the doctoral student and his or her supervisor, and amended by the university where necessary.

Detailed information about the adoption, management and review of individual study plans may be found in chapter 6, sections 29 and 30 in the Swedish Higher Education Ordinance, Guidelines for third-cycle education at Stockholm University, as well as Guidelines from the Board of Human Science and the Faculty of Social Sciences.

## 6.2 Supervision and Other Resources

Each doctoral student shall be assigned at least two supervisors; one principal supervisor and one assistant supervisor. The principal supervisor shall be an employee of the faculty and have a reader's qualifications. At least one of the supervisors should have undergone formal training in supervision or have competence that is deemed equivalent by the Faculty Board. The supervisor is nominated by the Department Board.

The doctoral student is entitled to supervision as defined in the individual study plan. If a doctoral student substantially neglects his or her undertakings in the individual study plan, the vice-chancellor shall decide, pursuant to Chapter 6, section 30 of the Swedish Higher Education Ordinance, that the doctoral student is no longer entitled to supervision and other study resources. A doctoral student who so requests shall be allowed to change supervisor. Such requests should be made in writing to the Department Board.

The supervisors should advise and guide the student when selecting special courses and designing, planning and executing the thesis work. Furthermore, the supervisors are responsible for on-boarding the doctoral student. The main supervisor and the doctoral student should meet regularly. At least once per semester, they should assess if the studies are progressing as planned. It is the responsibility of the supervisors to ensure that these meetings take place. If the doctoral student is absent or the meeting cannot take place, the Prefect should be informed. Further details about supervision and other resources are determined in the individual study plan.

The doctoral student should be provided with a place of work and equipment and any other conditions that are necessary for him or her to perform their tasks.

## 6.3 Courses and Examination

The course portion of the programme comprises 90 ECTS credits, of which 30 credits are mandatory. The following courses are mandatory for licentiate and doctoral degrees (examples of possible content in bullets):

- *Probability Theory 7.5 ECTS credits*
  - Characteristic functions
  - Multivariate normal distribution theory

- Stochastic convergence
- *Statistical Inference 7.5 ECTS credits*
  - Principles of inference
  - Theory of likelihood
  - Inference theory for exponential families
  - Bayesian inference
  - Asymptomatic methods
- *Statistical Computation 7.5 ECTS credits*
  - Principles of numerical computation
  - Numerical matrix algebra
  - Function optimisation
  - Simulation techniques
- *Stochastic processes, 7.5 ECTS credits*
  - Markov chains in discrete and continuous time
  - Poisson processes
  - Normal processes

Courses in methodology are required in addition to the mandatory courses, which, together with previously studied courses, will broaden the student's education. Individual exams are held for each course. These may be either oral or written. The exam format for each course is detailed in the individual study plan. The results are assessed using the grades of pass or fail.

The course portion may also contain special tasks or specialisation courses, which are designed to facilitate the dissertation/thesis process.

The main part of the course credits should consist of theoretical statistics.

A doctoral student who teaches first-cycle or second-cycle courses as part of their education should be trained in university pedagogics or acquire equivalent knowledge elsewhere. The course is studied as part of the student's professional duties at the faculty and is not part of the course portion of the third-cycle programme.

### 6.3.1 Credit Transfer

Courses completed, or other knowledge or skills acquired, prior to the start of the third-cycle education may be transferred if:

- the courses are considered second-cycle, and
- if the courses are not prerequisites for the third-cycle programme
- the total extent of the transferred credits do not exceed 15 ECTS credits.
- the financed portion of the programme is shortened correspondingly, according to the principle of one week per 1.5 completed ECTS credits.



The student's application to transfer credits should be made in a form and submitted to the Head of Department for third-cycle education.

The Department Board decides on matters regarding credit transfers.

The transferred credits for a licentiate degree may not exceed 10 ECTS credits. The financed portion of the programme is shortened correspondingly, according to the principle of one week per 1.5 completed ECTS credits.

### **6.3.2 Other Compulsory Components**

The doctoral student should normally present their thesis at seminar at the department at least once during their final year as a doctoral student.

### **6.4 Doctoral Thesis and Thesis Defence**

The thesis should be based on independent research and should document the doctoral student's ability to approach a scientific problem by designing or applying a suitable methodology. The thesis should be of a quality that is comparable to articles in peer-reviewed journals. The thesis may either be designed as a monograph or as a compilation of academic papers with a longer introductory chapter (kappa). Works where the student is a co-author may be included in the thesis. The thesis shall be written in English with an abstract in both English and Swedish.

When the thesis work is approaching its conclusion, the responsible professor at the department shall, in consultation with the supervisor, consider whether a thesis defence can be advised. This advice shall be issued in writing.

The thesis shall be presented and defended in public and shall be assessed by a grading committee that is specifically appointed for each thesis. At least one member of the grading committee shall have a post at another university. The public defence shall be conducted in English or Swedish. The publication of the doctoral thesis (known as "nailing") should take place three weeks prior to the date of the public defence.

The thesis is awarded the grade of pass or fail, and the grading should reflect the content of the thesis as well as the public defence thereof. A licentiate or doctoral degree is awarded to students who have passed all courses in their study plan and achieved a passed grade for their dissertation or thesis respectively.

The chairperson of the public hearing, faculty examiner and grading committee are appointed by the Dean, based on the recommendations of the professor from the department (in consultation with the Prefect).





The faculty examiner shall have a reader's competence and the grading committee shall meet all the requirements of the faculty.

### **6.5 Licentiate Dissertation and Dissertation Seminar**

The licentiate dissertation should be examined in a public seminar by an opponent with a doctoral degree or higher and with sufficient knowledge about important fields and methods for the dissertation.

The dissertation should have been made available at the department and university library for at least two academic weeks prior to the seminar. Information about the examination of the dissertation should be sent to other departments in the same field at other national universities.

The dissertation will be awarded the grade of fail or pass. The licentiate dissertation is graded by a nominated examiner and in some cases a grading committee consisting of three teachers, of whom one represents the academic field; other members must hold a doctoral degree or higher. The same person may act as the opponent and examiner. The supervisor may not participate in the grading process.

The guidelines apply equally to doctoral students who leave with a licentiate degree and doctoral students who use the licentiate degree as a milestone in their doctoral studies.

## **7 Interim regulations**

Doctoral students admitted based on previous general syllabuses may still complete their degree in accordance with these documents, provided the current higher education ordinance is followed. Applications should be made to the Department Board. The individual study plan will be amended where applicable.

## **8 Miscellaneous**