

GENERAL STUDY PLAN FOR RESEARCH EDUCATION (THIRD LEVEL HIGHER EDUCATION) IN SOIL SCIENCES at the Faculty of Natural Resources and Agricultural Sciences at the Swedish University of Agricultural Sciences (SLU)

1. Objective and purpose of the programme

The objective of the programme is to familiarise research students with general scientific tools, as well as the research methods that are typical of soil sciences. The subject of soil sciences includes soil composition, various chemical, physical and biological processes in the soil, soil as the basis of plant production, the interaction of the soil, plants and atmosphere, how soil and plants react to environmental degradation and cultivation methods, and the use, management and care of water (see the annex for details about the individual specialisations). The purpose is to meet the qualifications for research education specified by Chapter 6, Sections 4-5 of the Higher Education Ordinance (HEO).

Students are also to acquire knowledge about, and an attitude to, ethical issues associated with research in the subject. In addition, students are to obtain education in, and experience of, pedagogy and research information.

Research education can lead to both a degree of Licentiate and a degree of Doctor. The degree of Licentiate can be credited toward continuing studies for a degree of Doctor.

2. Eligibility

People are eligible for admission to research education who have taken a second level (Master level) qualification and meet the requirements for basic eligibility (Chapter 7, Section 39 of HEO (2006:1053)), i.e., at least 240 higher education credits, including 60 credits at the second level (Master level) or acquired essentially the same knowledge in some other way, either in Sweden or abroad. The Faculty Board may exempt an individual applicant from the requirement for basic eligibility if special grounds exist. In such cases, SLU demands that the applicant has taken a first level (Bachelor level) qualification and presents a written account of an independent project the scope of which is equivalent to 15 higher education credits and the content of which corresponds to the knowledge and skills required for a degree project toward a degree of Master, or a relevant independent project of similar difficulty and extent. The project should be written in English.

Those who are admitted must also meet the special eligibility requirements adopted for the subject (Chapter 7, Section 40 of HEO (2006:1053)). Special eligibility in the subject of soil sciences requires 60 higher education credits in the subject of soil sciences or equivalent knowledge. The eligibility of anyone who has taken a qualification in a main subject other than soil sciences or studied at a university other than SLU is reviewed individually on the basis of the above requirements.

3. Selection and admission

Applicants are to be selected on the basis of their ability to benefit from the research education programme (Chapter 7, Section 41 of HEO (2006:1053)). The head of the department to which the applicant wishes to be admitted as a research student proposes admission to the Faculty Board. The board makes admissions decisions.

4. Scope, content and organisation

4.1 Scope

The programme for a degree of Doctor consists of four years of full-time studies (240 higher education credits). Two years of full-time studies (120 higher education credits) are required for a degree of Licentiate.

4.2 Content

The programme contains two primary components: a scientific project and course-related studies.

Scientific project

During the period of education, the research student is to conduct an independent research project that is presented in a compilation thesis or monograph. The compilation thesis comprises a summary of 3-5 papers (1-2 for licentiate theses) ready for publication in forums with review procedures. The research student shall be the primary author and have made the most essential contribution to at least two of the papers. Writing of the doctoral thesis shall correspond to studies totalling at least 160 higher education credits, while writing of the licentiate thesis shall correspond to studies totalling at least 80 higher education credits. If the thesis' papers have multiple authors, the contribution of the research student should be clearly specified in the thesis.

Some of the studies may be completed abroad or at another department/university in Sweden. The research student should be given the opportunity to participate in international courses and conferences.

Coursework

Courses should consist of 45-60 credits for a degree of Doctor, and 25-30 credits for a degree of Licentiate. Both general basic courses (10-15 credits) and those that provide greater depth in the subject (30-50 credits) are included. Both teacher's training and the writing of scientific articles are integral to the programme. Thus, the programme should include basic courses in pedagogy and participation in instruction at the basic level, as well as basic courses in the philosophy of science and scientific writing. See the annex for mandatory components.

4.3 Organisation

The individual study plan (Chapter 6, Section 36 of HEO (2006:1053)) for research education is drawn up in consultation between the research student and supervisor/supervisor group during the application process for admission. The faculty's guidelines for research education specify what should appear in the individual study plan. Evaluation and any modifications of the plan are to be on an annual basis. The research student and supervisor shall attest in writing that they have read the plan and any modifications to it. The study plan signed by the research student and supervisor is subsequently ratified in writing by the head of the department.

Evaluations shall be performed when 50% and 75% of the net period of studies has been used by reporting to the department's committee for research education. At the half-time (50%) evaluation the student also hands in a revised individual study and gives a seminar based on his/her research achievements.

5. Examination

A doctoral thesis must be defended orally in public and assessed by a grading committee consisting of three or five members appointed by the Faculty Board. A licentiate thesis is to be defended orally at a public seminar and approved by a grading committee appointed by the Faculty Board. The grading committee consists of three members.

The faculty's guidelines for research education specify the provisions that apply to the examination of doctoral theses and licentiate theses at the Faculty of Natural Resources and Agricultural Sciences.

The degrees of Doctor and Licentiate require that the student receives a grade of Pass on examinations and the thesis. A doctoral thesis must be defended orally in public and receive a grade of Pass by a grading committee consisting of three or five members. A licentiate thesis must be presented to a seminar and receive a grade of Pass by a grading committee consisting of three or five members appointed by the head of the department.

6. Supervision

Anyone admitted as a research student is entitled to supervision throughout the period of study, i.e., full-time studies toward a degree of Doctor for four years. Each student is assigned at least two supervisors, one of whom is the principal supervisor (Chapter 6, Section 31 of HEO (2006:1053)). Without a decision having been made in each individual case, the principal supervisor must have documented qualifications as a docent and hold a position at SLU. Assistant supervisors are not subject to this formal requirement for qualifications. At least one of the assistant supervisors must hold a position at SLU. At least one assistant supervisor should be obtained from outside the department.

The supervisor group consists of the principal supervisor and one or more assistant supervisors. The supervisors assist the research student on both practical and theoretical issues, while continually monitoring the progress of studies in cooperation with the student. The supervisors are also to help the student select literature and courses. The student must keep the supervisors up to date about the progress of studies so that corrections can be made when needed.

7. Additional information

Additional information about research education appears in Swedish Code of Statutes 2006:1053, including information about study grants in 1995:938 with amendments 1998:81 (reprint), as well as 1998:161 and 2006:1053. Information about research education at SLU appears in Guidelines for research education (third level programmes) in the Faculty of Natural Resources and Agricultural Sciences (Reg. no. SLU ua 40-1244/08).

APPENDIX

1. Specialisations in the third level upper education subject of soil sciences

The Department of Soil and Environment offers third level upper education in the subject of soil sciences with the opportunity to choose the following specialisations.

Environmental Physics

Environmental physics deals with transport and storage of water, heat and related substances in the soil-plant-atmosphere system. The specialisation includes studies concerning interactions among soil, plants and the atmosphere, as well as individual components of the system relevant to its overall function.

Agricultural Water Management

Agricultural Water Management includes water issues associated with cultivation and the landscape with a focus on water as a factor of production and its regulation by means of technical measures. Among the topics covered are regulation of soil water through drainage and irrigation, soil care and improvement, and international and urban soil and water issues.

Soil Management

An overarching goal of soil management is to develop sustainable management systems with as little harmful environmental impact as possible while taking the finances of individual farmers into consideration. Among the intermediate goals are to optimise soil structure, improve germination conditions, minimise plant nutrient losses, make weed control more efficient and reduce energy consumption.

Soil Biology

Soil biology concerns organisms of the soil, the processes regulated by the organisms, and the factors that affect organisms and processes. Among the topics covered are the interaction of organisms with crops and growers, the organic substance as a fertility factor, and the use of organic fertilizers.

Soil Chemistry and Soil Science

This specialisation deals with the minerogenic and organogenic components of the soil in terms of their chemical and structural composition and its role in exchange processes with vegetation (crops) and the surrounding water environment. Because soil is a key component in understanding biogeochemical flows, it is studied from an ecosystem perspective. Soil chemistry and soil science explores both arable and forest soil at the national and international level. The basic topics are mineralogy, soil chemistry and soil science, as well as the parts of ecosystem ecology that deal specifically with biogeochemical cycles.

Water Quality Management

This specialisation concerns the influence of cultivation on surface water and groundwater, particularly the fundamental mechanisms that govern substance and material flows.

Soil Fertility and Plant Nutrition

This specialisation deals with the occurrence of essential and other minerals, binding conditions and release in the soil. Also covered are the mineral requirements of plants, the function of minerals in plants and their impact on harvests and the quality of harvested products. Additional topics are symptoms of deficiency in cultivated plants, determination of nutritional and lime requirements, fertilizers and liming materials, and short-term and long-term measures for soil care and maintenance.

2. The following components are mandatory for all research students admitted to the Department of Soil and Environment at SLU

Introductory course (7 higher education credits, mandatory for studies toward a degree of Licentiate and a degree of Doctor). During the first year (preferably the first six months) of research education, the research student shall independently perform a search of the literature in the selected subject, describe it in an introductory research essay (10-15 pages in English) and present it to the supervisor group and other interested researchers on the same team. In addition, the student is to write a summary description of the project (½ of an A4 page in English) that is suitable for publication on the department's website. Following endorsement by the principal supervisor, the description of the project and the introductory research essay are submitted to the department's Committee for Research (Third level Higher) Education for its approval.

Seminar course (previously 5 higher education credits, 5.5 credits as of 1 February 2006), mandatory for studies toward a degree of Doctor. The course includes the research student's half-time seminars.