

# **GENERAL STUDY PLAN FOR RESEARCH EDUCATION (THIRD LEVEL HIGHER EDUCATION) IN BIOLOGY WITH SPECIALISATION IN ECOLOGY at the Faculty of Natural Resources and Agricultural Sciences at 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 biology with specialisation in ecology, which covers interactions between organisms and their biotic and abiotic environment, from the level of individual organisms to ecosystems. The mission of research is to produce knowledge for applied ecology and its theoretical background. 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 for Biology with specialisation in ecology normally requires at least 90 higher education credits in biological subjects, including a grade of Pass in basic and supplementary courses in the specialisations that are part of ecology. A grade of Pass on a degree project of at least 15 higher education credits is also required. Depending on the research project involved in pursuing the degree of Doctor, additional requirements may be set or exemption may be granted from particular requirements for previous education.

## **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*

###### *Doctoral thesis*

During the period of education, the research student shall conduct an independent research project, presented in a doctoral thesis that normally represents at least 180 higher education credits. A compilation thesis, or in special cases a monograph, is appropriate. The thesis should be written in English or another language relevant to the subject. A compilation thesis should contain 3-5 papers. The research student shall be the primary author of at least one paper. All papers are to be of sufficient quality as to be publishable in international scientific journals that use a peer review system. Normally at least one paper is accepted or published in such a journal. The summary of a compilation thesis shall place the project in an international scientific context and present a synthesis of the various papers.

###### *Licentiate thesis*

During the period of education, the licentiate is to conduct a research project to be presented in a licentiate thesis that normally represents approximately 90 higher education credits. A compilation thesis, or in special cases a monograph, is appropriate. The thesis should be written in English or another language relevant to the subject. A compilation thesis should contain two papers. The licentiate student should be the primary author of at least one paper. All papers are to be of sufficient quality as to be publishable in international scientific journals that use a peer review system. The thesis may contain a brief summary that places the papers in an international scientific context.

If the papers of the thesis have multiple authors, the contribution of the research student must be clearly specified in the thesis.

###### *Coursework*

The coursework shall consist of 45 higher education credits for a degree of Doctor and 25 higher education credits for a degree of Licentiate. Coursework shall include suitable basic courses (approximately 1/3 of the course credits), as well as individually selected courses on special subjects (approximately 2/3 of the course credits).

The strongly recommended basic courses are pedagogy , statistics, theory of science and ecological methodology. The courses on special subjects, including literature courses, are to be chosen so as to provide the research student with a broad foundation in the subject of ecology, as well as considerable depth. Appendix 1 contains a description of courses for the Department of Ecology.

The student is to actively participate in, and partially lead, seminars, workshops, discussion groups and other activities.

### **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 (detailed descriptions of evaluations for the Department of Ecology appear in Appendix 2).

## **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.

## **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. At least one of the assistant supervisors must hold a position at SLU.

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).

## **Specific requirements for 4. Scope, content and organisation for the Department of Ecology**

The specific requirements below apply jointly to the research education subject of Biology with specialisations in ecology, conservation biology and entomology at the Department of Ecology at SLU in Uppsala.

### *Coursework*

In addition to the strongly recommended courses described in Section 4.2 of the general study plans, the student shall take courses on special subjects for more in-depth familiarity with the research education subject. The courses are to be taken as literature courses (each book represents a maximum of 4 higher education credits in the subject but not in the doctoral project) or as courses on special subjects/long workshops. Literature courses may well be coordinated among the research students to include joint studies and regular discussion sessions.

Below is a more detailed description of the components for which credits are awarded as part of research education.

*Introductory research essay:* The essay is to represent an introduction to the thesis project. The student is to acquire better prerequisites for identifying fruitful fields of research by summarising and analysing literature that pertains to a significant portion of the thesis project or a theoretical problem. The overall objective of the essay is to serve as an exercise in critical thinking and writing. It goes without saying that the essay cannot comprehensively summarise a field of research. Most important is to identify central theories and the general state of knowledge in the area, as well as questions that can promote the evolution of the area. Thus, students are welcome to present their own opinions about central issues. The student chooses the topic of the essay in consultation with the supervisor. The supervisor shall initially help in the selection of literature and work with the student to establish a suitable plan and scope for the project. The essay is to be written during the first year of study.

An introductory research essay for a degree of Doctor (7.5 higher education credits, maximum of 40 references and 15 pages) is recommended but not required.

An introductory research essay for a degree of Licentiate (4.5 higher education credits, maximum of 20 references and 10 pages) is recommended but not required.

*Courses on literature and special subjects:* The courses involve studies that provide greater breadth and depth in the research education subject, as well as other disciplines relevant to the research student's familiarity with the subject. The person responsible for third level education at the department is to be pre-notified of and approve coordinated literature courses (i.e. two or more research students read the same book) before they begin. Other courses on special subjects may be applied for when they are available. The research student may attend courses at SLU but is also encouraged to participate in courses arranged by other universities and

departments in or outside of Sweden. The student is to choose courses on literature and special subjects in consultation with the supervisor.

*Participation in seminars* – arranged either by the department or another department. A rule of thumb is that participation in approximately 12 literature seminars or 20 ordinary seminars is good for 1 higher education credit. Attendance must be documented. Active participation in seminars is worth a maximum of 3 higher education credits if attendance has been recorded.

Study results are assessed by means of examinations or other accounting in connection with the courses. The degrees of Doctor and Licentiate require that the student receives a grade of Pass on examinations and the thesis.

*Other components of research education*

In addition to completing the components of research education described above, the student should participate in and gain experience of other research and department activities. Thus, the student should:

- Actively participate in the department's seminar and lecture activities
- Be encouraged to apply for courses and seminars arranged by other departments
- Be encouraged to actively participate in international conferences/symposia
- Be encouraged to maintain international contacts
- Apply for at least basic research grants
- Actively participate in research activities, such as project planning, project management, supervision of degree projects, etc.
- Have some instruction at the basic education level

## **Evaluations for research education at the Department of Ecology**

### **Evaluation sessions**

Twice during the period of education (in the first year and at half-time), the student is to give internal seminars at which the thesis project is discussed. Plans, ongoing activities and completed work are to be presented at the seminars. Researchers, research students and other interested parties may attend the seminars, which are held at the department. When 75% of the period of education has been used, the research student and supervisors are to arrange an internal session for the final evaluation. The purpose of the evaluations is to discuss the student's plans and results so that the ongoing thesis project can evolve as well as possible.

Students are expected to orally present the results of their own research during the department's mini-symposia. The presentation shall be in English and last 10-15 minutes.

#### *First-year evaluation*

This evaluation, which is held during the first net year of study, primarily describes the research project and how it will be addressed. Detailed instructions appear in the department's doctoral handbook, "The Guide to the Galaxy of Science".

#### *Half-time evaluation*

This evaluation is to be held after half of the net period of studies has been completed, i.e., after approximately 24 months of full-time studies. Prior to the seminar, the research student gives a revised study plan and manuscript to the supervisor group, the person(s) responsible for research education at the department, the head of the department and possibly to an external reviewer. One recommendation is to have an external reviewer (with a degree of Doctor at another department of SLU or another university). Detailed instructions for the evaluation appear in the department's doctoral handbook, "The Guide to the Galaxy of Science". If the student's level of activity is reduced due to instruction, other employment at the department, leave of absence, parental leave or long-term sickness absence, the evaluation may be postponed.

#### *75% evaluation*

The research student is to arrange a longer internal session lasting approximately half a day when 75% of the net period of studies has been completed. The session involves a constructive discussion by the research student, all supervisors and 1-2 reviewers outside the group of the progress and final phase of the doctoral project. Other interested parties may also be invited. The research student describes the results achieved so far and how the thesis is to be structured, leading to a discussion of each paper and paper. In addition, the time until the oral defence is planned. Brief minutes are prepared and given to the person responsible for research education.

### **Individual study plan**

The individual study plan is revised annually in consultation between the research student and supervisors. The evaluation is performed in consultation between the research student and person responsible for research education. The plan shall specify whether the programme targets a degree of Licentiate or a degree of Doctor.

## **Examination**

### *Oral defence of the doctoral thesis*

A "count-down schedule for theses" is to be read well ahead of the defence (shall be available on a department server). The research student and supervisors review what is to be done the last six months before the defence.