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## General syllabus for the doctoral programme in the subject of:

### BIOLOGY with specialisations

Valid as of 1 July 2016

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Department(s) to which the study plan applies  
See annex 1

Subject code:  
See annex 1

The objectives and design of courses in this subject may vary between faculties (see point 3. Miscellaneous).

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Within the subject of biology (“biologi”) living organisms are studied from molecular level up to process and ecosystem level. The subject includes living organisms’ structure function, growth, evolution, identification, taxonomy, and how they spread and interact with other living organisms and the environment. At SLU anthropogenic aspects of biology and biological natural resources are of special interest.

#### *Regulations for third-cycle (doctoral) education at SLU*

Third-cycle (doctoral) education is regulated by the Higher Education Ordinance (SFS 1993:100) and the Ordinance for the Swedish University of Agricultural Sciences (SFS 1993:221).

In addition, SLU has regulations for the following:

- Recruitment and admission, in Admission regulations for third-cycle (doctoral) education (SLUID: SLU ua 2018.1.1.1-930)
- Joint programmes leading to a double or joint degree
- Supervision
- Scope and content of programmes
- Planning and follow-up of programmes
- Procedure when a course or programme is unsatisfactory
- Examination
- Degrees.

These can be found in Guidelines for third-cycle (doctoral) education (SLUID: SLU ua 2018.1.1.1-4677).

A general syllabus must indicate the following: the main content of the programme, specific entry requirements and any other regulations required. All general syllabuses must be approved by the faculty board.

The programme is organised in a way that allows doctoral students to meet the qualitative targets for third-cycle courses and programmes specified in the *Higher Education Ordinance's Annex 2 – Qualifications Ordinance*:

***Qualitative targets according to the Qualifications Ordinance: Degree of Doctor***

***Outcomes For the Degree of Doctor the third-cycle student shall***

*Knowledge and understanding*

- *demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field, and*
- *demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular.*

*Competence and skills*

- *demonstrate the capacity for scholarly analysis and synthesis as well to review and assess new and complex phenomena, issues and situations autonomously and critically;*
- *demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work;*
- *demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research;*
- *demonstrate the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general;*
- *demonstrate the ability to identify the need for further knowledge and*
- *demonstrate the capacity to contribute to social development and support the learning of others both through research and education and in some other qualified professional capacity.*

*Judgement and approach*

- *demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics, and*
- *demonstrate specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.*

**Outcomes**

**For a Degree of Licentiate the third-cycle student shall**

*Knowledge and understanding*

- *demonstrate knowledge and understanding in the field of research including current specialist knowledge in a limited area of this field as well as specialised knowledge of research methodology in general and the methods of the specific field of research in particular.*

*Competence and skills*

- *demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake a limited piece of research and other qualified tasks within predetermined time frames in order to contribute to the formation of knowledge as well as to evaluate this work;*
- *demonstrate the ability in both national and international contexts to present and discuss research and research findings in speech and writing and in dialogue with the academic community and society in general, and*
- *demonstrate the proficiency required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.*

*Judgement and approach*

- *demonstrate the ability to make assessments of ethical aspects of his or her own research;*
- *demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and*
- *demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.*

## **1. Programme content and scope**

The programme contains two main elements: research and coursework.

### **Research**

While studying, the doctoral student is expected to conduct independent research which is to be presented in a compilation thesis written in English.

### **Courses**

The student is required to take courses of 30–60 higher education credits (HEC) for a doctoral degree and 15–30 HEC for a licentiate degree. This must include suitable general courses as well as elective subject courses.

*2. Specific entry requirements*

Those admitted must meet the following specific entry requirements.

Specific entry requirements for the subject of biology are at least 90 HEC in biology-related subjects, at least 30 of which at second-cycle level.

*3. Miscellaneous*

Each faculty offering the third-cycle subject can choose to specify specialisations or requirements in addition to the general syllabus. These requirements must be documented in an appendix.

*4. Appendixes*

Appendix 1 – Faculty of Natural Resources and Agricultural Sciences

## APPENDIX 1

## Specific entry requirements at the Faculty of Natural Resources and Agricultural Sciences

### Courses

According to the current guidelines for doctoral education (SLU ua 2018.1.1.1-4677), all doctoral and licentiate degrees at SLU must include credit awarding courses of philosophy of science and research ethics at PhD-level. These courses should also cover rules on cheating and plagiarism.

### Subject codes and definitions

#### Biolog

Within the subject of biology (“biologi”) living organisms are studied from molecular level up to process and ecosystem level. The subject includes living organisms’ structure function, growth, evolution, identification, taxonomy, and how they spread and interact with other living organisms and the environment. At SLU anthropogenic aspects of biology and biological natural resources are of special interest.

Departments offering this specialisation	Subject code
Soil and Environment	NJBIOL00
Agricultural Research for Northern Sweden	NJBIOL03
Aquatic Science and Assessment	NJBIOL04
Forest Mycology and Plant Pathology	NJBIOL05
Ecology	NJBIOL06
Plant Biology	NJBIOL07
Crop Production Ecology	NJBIOL08

#### Biology with specialisation in ecology

Ecology is the study of how organisms interact with each other and their environment. The subject covers the study of relations between individuals of a species, their relations with other organisms and their abiotic environment. The biological adaption of single organisms, their importance for the transport of matter and energy through ecosystems and biodiversity in relation to the environment are also studied.

Departments offering this specialisation	Subject code
Ecology	NJBIEK00 and NJBIOL01
Aquatic Resources	NJBIEK01
Forest Mycology and Plant Pathology	NJBIEK02
Aquatic Science and Assessment	NJBIEK03
Crop Production Ecology	NJBIEK04

**Biology with specialisation in entomology**

Entomology is the study of insect biology at all levels, from the molecular to the role insects play in the ecosystem. The subject also comprises applied research on the specific role of pests and beneficial insects in agricultural systems.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
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Ecology	NJBIEN00
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**Biology with specialisation in microbiology**

Microbiology is the study of the physiology, metabolism, genetics, evolution and ecology of microorganisms. This specialisation covers the study of model organisms and isolates of individual microorganisms, populations and microbial communities as well as processes at organism and system level.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
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Molecular Sciences	NJBIMI00
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Forest Mycology and Plant Pathology	NJBIMI01
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**Biology with specialisation in molecular biology**

Molecular biology is the study of biological structures and processes at molecular and cellular level, including concepts and methodology from biophysics, biochemistry, bioinformatics, genetic engineering and microscopy.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
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Molecular Sciences	NJBIMO00
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**Biology with specialisation in biotechnology**

Biotechnology is the study of how organisms and/or biological components such as enzymes and other proteins are used in various applications.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
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Molecular Sciences	NJBITE00
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**Biology with specialisation in conservation biology**

Conservation biology studies the effects of human activity on biodiversity and develops practices that counteract unwanted effects. This covers problem-solving and developing theories related to assessing threats, and managing and restoring biodiversity.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
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Ecology	NJBINA00
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**Biology with specialisation in plant pathology**

Plant pathology is the study of organisms that cause diseases (pathogens) and how the interactions between these organisms and their host plant and environment lead to disease. The interplay between the pathogen and its host is studied at different

levels of integration, including studies that lead to measures for controlling plant diseases.

<b>Departments offering this specialisation</b>	<b>Subject code</b>
Forest Mycology and Plant Pathology	NJBIVÄ00
Crop Production Ecology	NJBIVÄ01