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

### SOIL SCIENCE

Valid as of 1 January 2019  
Compare ID: SLU ua 2019.3.2.1-4177

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Department to which the study plan applies  
See annexe 1

Subject code:  
See annexe 1

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

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The subject of soil science (“markvetenskap”) includes the study of soil composition, different chemical, physical and biological processes in the soil, soil as the basis for plant production and soil-plant-atmosphere interactions. This includes the study of water flows, water quantity and quality, as well as the management of water as a resource in the landscape and how soil and plants respond to different agricultural practices and environmental disturbances.

#### *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 study programme is unsatisfactory
- examination
- qualifications.

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 Annexe 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*

**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.*

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

The programme contains two main elements: research and coursework.

### **Research**

The student should conduct independent research work to be presented in a compilation thesis written in English.

A compilation thesis comprises 3–5 papers. All the papers must be of such a standard that they may be published in peer-reviewed international scientific journals. These journals should be available in one of the databases Web of Science, Web of Knowledge or Scopus. The summarising chapter (“kappa”) of a compilation thesis must place the student's work in an international academic context and provide a synthesis of the various papers.

### **Courses**

The student is required to undertake coursework which corresponds to 30-60 higher education credits (HEC) for a Degree of Doctor, and 15-30 HEC for a

Degree of Licentiate. 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.

The specific entry requirements for the subject soil science are normally knowledge corresponding to at least 60 HEC in subjects relevant to soil science, of which at least 30 HEC at Master's level. For persons who have received a degree in a main subject other than soil science, or who have studied at a university other than SLU, eligibility is assessed on a case-to-case basis based on the requirement above.

## **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, specific entry requirements

## APPENDIX 1

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

#### 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.

Some departments require credit-awarding components such as an introductory paper and/or seminar course. If this is the case, this is governed at department level through a decision by the head of department.

#### Subject codes and definitions

##### Soil science

The subject of soil science (“markvetenskap”) includes the study of soil composition, different chemical, physical and biological processes in the soil, soil as the basis for plant production and soil-plant-atmosphere interactions. This includes the study of water flows, water quantity and quality, as well as the management of water as a resource in the landscape and how soil and plants respond to different agricultural practices and environmental disturbances.

Departments offering this specialisation	Subject code
Ecology	NJMARK02
Soil and Environment	NJMARK01
Crop Production Ecology	NJMARK03

##### Soil science specialising in biogeophysics

Biogeophysics (“biogeofysik”) is the study of the transport and storage of water, heat and related matter (nutrients and other substances) in the soil-plant-atmosphere continuum. This includes studies of physical soil processes and their role for various biological and chemical processes as well as interactions between soil, plants and the atmosphere.

Departments offering this specialisation	Subject code
Soil and Environment	NJMBIO00

### Soil science specialising in soil chemistry

Soil chemistry (“markkemi”) is the study of chemical processes in soil. Soil is a key component for understanding the biogeochemical flows, which are studied at different levels from a molecular level to entire ecosystems, in both arable land and forests.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMAKE01

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### Soil science specialising in soil biology

Soil biology (“markbiologi”) is the study of the soil's organisms, the processes that are governed by these organisms and the factors that affect organisms and processes.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMABI00

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### Soil science specialising in water quality management

Water quality management (“vattenvårdslära”) is a subject characterised by synthesis. This subject studies how soil characteristics in interaction with soil use, cultivation measures, hydrology and climate conditions control the availability and flow of nutrients and pesticides in soil and in the agricultural landscape.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMAVA00

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### Soil science specialising in plant nutrition

The specialisation plant nutrition (“växtnäring”) studies the mineral needs of crop plants, the function of minerals in plants, deficiency symptoms and the effect on crops and product quality. The specialisation also covers minerals in the soil with regard to presence, availability, their effect on soil fertility and the use of organic fertilisers.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMAVAX00
Agricultural Research for Northern Sweden	

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### Soil science specialising in soil mechanics and soil management

Soil mechanics and soil management (“markmekanik och jordbearbetning”) study the impact of physical and biological processes and cultivation measures on the structure and structural dynamics of soil. The specialisation also covers the study of the impact of soil structure on physical, biological and chemical functions and processes in the soil as well as the development of sustainable soil management systems.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMAJO00

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### Soil science specialising in agricultural water management

Agricultural water management (“jordbrukets vattenhushållning”) comprises studies of hydrological soil processes and hydrotechnical measures for optimising water management and sustainable agricultural production. The specialisation includes groundwater regulation through drainage and irrigation, soil maintenance and soil improvement as well as international and urban soil and water issues.

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<b>Departments offering this specialisation</b>	<b>Subject code</b>
Soil and Environment	NJMJA00

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