Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Faculty of Veterinary Medicine and Animal Science

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General syllabus for the doctoral programme in the subject of animal science

Approved by the Faculty Board on 14 December 2012

Responsible departments:
- Department of Animal Environment and Health
- Department of Animal Nutrition and Management
- Department of Animal Breeding and Genetics

The Faculty's doctoral programme is comprehensively regulated by the following documents. The numbers are used to indicate references to these documents in the text:
1. Higher Education Ordinance (SFS 1993:100 et seqq.)
2. Admission regulations for third-cycle (doctoral) education, adopted by the Board on 6 November 2012 (Journal no. SLU ua Fe.2012.4.4-3467)
3. Guidelines for third-cycle (doctoral) education (Journal no. SLU ua Fe.2012.4.4-3218)

1. Purpose and objectives
The doctoral programme results in a licentiate degree or a doctoral degree. The licentiate degree may be credited towards a doctoral degree. The content and scope of the programme shall be adjusted so that, upon completion of the degree, the student will have fulfilled the outcomes specified in the Higher Education Ordinance (1) Appendix 2.

The subject of animal science is defined as the science of animals which serve human ends. This also encompasses those varieties of wild animals which are used to expand our knowledge of domesticated animals. Research and education in animal science aims to contribute towards a greater understanding of the sustainable use of domesticated animals. The objective of this doctoral programme is to acquaint the student with the general tools of science, as well as the research methods typical for the subject.

The doctoral programme in animal science is offered with a choice of specialisations in ethology, genetics and breeding, molecular genetics, animal hygiene or nutrition and management. Programmes without a stated specialisation are multidisciplinary, systems-focused or focused on zoo-ecological research into animals and their environment or the interplay between animals and humans.

The specialisation *ethology* focuses on the study of the behaviour of domesticated animals, which also encompasses the evolutionary development of animal behaviour and the influence of internal and external factors on animal behaviour.

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The subject also involves studying of the functions of various behaviours in our domesticated animals in order to better understand how behavioural disturbances arise and how natural behaviour can be promoted.

Within the specialisation *genetics and breeding*, the focus is on expanding our knowledge of how genetic resources may be used in a manner that is sustainable in the long-term, the significance of genetic variations on the way various combinations of traits are expressed, and methods for the study of variation and its use in making general modifications to traits. The research also aims to give increase our understanding of the interplay between genetic resources and production systems.

The specialisation *molecular genetics* involves the study of the organisation, evolution and function of the gene pool. The molecular processes that underlie the expression of traits in animals and humans are studied with the aim of understanding the relationship between genes and phenotypes. The topics studied include: genomes and genetic structure, stability, recombination, replication, regulation of genetic expression, molecular evolution and bioinformatics.

The specialisation *animal hygiene* comprises the science of how external factors in an animal's natural and cultural environment influence its health, as well as measures for preventing illnesses caused by the environment and promoting the health and protection of animals. This specialisation also encompasses hygienic aspects of the relationship between animal husbandry and the environment.

The specialisation *nutrition and management* focuses on improving our knowledge of the utility of feed resources and on taking into consideration the animal's needs and potential in animal husbandry. There is also a focus on feed evaluation and nutrient use in animals in different phases of their lives and of production, as well as on the relationship between animal husbandry and animal production/performance, reproduction and health, product quality and the environmental impact of animal husbandry.

2. Entry requirements

The entry requirements for admission to the doctoral programme are regulated by Chapter 7 of the Higher Education Ordinance (1). The applicant's knowledge of the English language is documented through Eng B in the national upper secondary school programme in English or an approved, comparable language test (TOEFL, IELTS or Cambridge ESOL) in accordance with the requirements set out at: www.universityadmissions.se (2).

The specific entry requirements for the subject are knowledge corresponding to at least 120 higher education credits in biology subjects, of which a total of at least 30 credits must be in animal science. The student must have demonstrated the ability to work independently, that is through an advanced study project corresponding to at least 15 higher education credits. Applicants with a different, comparable educational background may be eligible; this will be decided by the head of department on a case-by-case basis.

3. Selection and admission

Selection from amongst the eligible applicants and admission are regulated by the Higher Education Ordinance (1), Chapter 7, and by SLU's admission regulations. Admission is granted by the Faculty, following the recommendation of the head of the department to which the student will be assigned and in which their principal supervisor is active.

4. Scope, content and planning

The scope, content and planning of the doctoral programme are regulated by the Higher Education Ordinance (1), Chapter 6, and by the SLU guidelines (3). A programme leading to a doctoral degree corresponds to four years of full-time study (240 higher education credits). For a licentiate degree, the corresponding time of study is at least two years (120 higher education credits).

The scope of the thesis is described in the SLU guidelines (3). The thesis must be a compilation thesis, written in English.

A licentiate thesis must contain at least one and preferably no more than two composite papers. The composite papers must be of such quality that they are eligible for publication in a peer-reviewed international scientific journal. The student must be the lead author of at least one composite paper.

A doctoral thesis must contain at least three and preferably no more than five composite papers, at least one of which must be accepted by or published in a peer-reviewed international scientific journal. The composite papers must be of such quality that they are eligible for publication in an international peer-reviewed scientific journal. The doctoral student must be the lead author of at least two of the papers, and should also be the lead author of the paper which has been accepted for publication/published.

The basic courses are general courses for all doctoral students, regardless of subject and specialisation. It is recommended that the basic courses cover the following subjects to an extent which is motivated by the intended degree and the programme's specialisation:

- laboratory animal science
- philosophy of science, ethics, research methods and information retrieval
- biometry
- teaching, learning and oral presentation
- project management/leadership
- scientific writing and publication

Subject courses are intended to give depth and breadth to the student's knowledge of his/her subject, specialisation and research area. These courses will provide an introduction to the research area and good knowledge about the subject. Subject courses are chosen following a discussion between the student and supervisor, which allows the student leeway to make a selection based on their individual interests.

Students specialising in ethology or animal hygiene should participate in the relevant portions of the department's Bachelor's programme in animal ethology, animal hygiene, animal protection and animal science, if the corresponding knowledge has not already been acquired.

For students specialising in genetics and breeding, the basic subject courses offered by the department for doctoral students (or other courses with equivalent content) should be included: molecular domestic animal genetics, quantitative genetics, statistical methods in animal breeding as well as the preservation and use of domestic animals' genetic resources. For the licentiate degree, at least one of these courses should be included.

For students specialising in molecular genetics, the basic subject course in quantitative genetics offered by the department for students (or other courses with equivalent content) should be included. This course (or other course equivalent in content) should also be included for the licentiate degree.

For students specialising in nutrition and management, at least two of the subject courses offered by the department for students (Nutrition – feeding, Nutrition – metabolism, Analytical methods, Animal Husbandry and Management) or other courses with equivalent content should be included.

The coursework will comprise 30–70 higher education credits for the doctoral degree, 15 of which should be from basic courses. For the licentiate degree, the coursework will comprise 15 to 35 higher education credits, 7.5 of which should be from basic courses. At least one course with an international profile should be included in the programme of study.

The student will be required to follow relevant international research through independent literature study, and participate in seminar series. Over the course of the first year of the programme, the student must write an introductory essay, written in accordance with the SLU guidelines for doctoral education (3). In addition, it is expected that the student attach themselves to the relevant graduate school, as well as being an active participant in seminars and conferences that are connected to their research and education.

5. Supervision

Matters concerning supervision are regulated by the Higher Education Ordinance (1), Chapter 6, and by the SLU admission regulations (2) and guidelines (3). The supervisory group must be composed of supervisors who have sufficient skills and knowledge in the subject (and the possible specialisation) to ensure that the doctoral programme is of good quality.

6. Follow-up

The programme must be followed up at least once per year. The yearly follow-up is conducted by the student and his/her supervisors. The follow-up is registered in LADOK, and the individual study plan is entered in the journal and archived by the department.

The introductory essay, written by the student in his/her first year, is approved by the principal supervisor and this is documented in the individual study plan.

In connection with the half-time follow-up, the student must deliver a half-time seminar. The half-time follow-up is documented in a half-time report that is sent to the Faculty, together with the current study plan. In the half-time report, the student and the supervisors summarise and comment on substantial changes that have been made to the original study plan, as well as the commitments and responsibilities of the student and the supervisors. In addition, the department submits an assessment of whether the student has completed 50 per cent of the programme and of whether the conditions will allow the programme to be completed according to the current plan.

7. Examination
Matters concerning examination, public defence of the thesis and the licentiate seminar are regulated by the Higher Education Ordinance (1), Chapter 6, and by the SLU guidelines (3).

8. Title of qualification
The title of the qualification is determined by the degree the student has obtained to fulfil the entry requirements, for example, Doctor of Philosophy in Veterinary Medicine for veterinarians, Doctor of Philosophy in Agriculture for agronomists and Doctor of Philosophy in Biology for biologists.