Reg. No.: HNT2021/300

Faculty of Health, Science and Technology

Curriculum for Third-Cycle Education in Biology

(Forskarutbildning i Biologi)

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Curriculum Approval

The curriculum was approved by the Faculty Board of Health, Science and Technology 2021-06-03 and is effective from 2021-06-03.

General stipulations for third-cycle education are provided in the *Higher Education Act* and in the *Higher Education Ordinance*. The Licentiate/Doctoral programme is offered to the extent permitted by available funding.

1. General Information

Biology is the study of life and involves all levels of organization, from molecular to the ecosystem level. Biology deals with organisms and their environment and includes genetic diversity, metabolism, reproduction, behaviour, growth and how organisms react to their environment and adapt to changes in it. Doctoral research in Biology at Karlstad University is focused on ecology, physiology, molecular biology and biology education.

2. Aims and Objectives

The general objectives of licentiate or doctoral studies in terms of knowledge and understanding, competence and skills, and judgement and approach are specified as follows in the *Higher Education Ordinance, Annex 2, SFS* 2006:1053):

Degree of Licentiate

Knowledge and understanding

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

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

- demonstrate the ability to identify and formulate issues with scholarly precision critically, independently 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 skills required to participate independently in research and development work and to work autonomously in some other qualified capacity.

Judgement and approach

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

- *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.*

Degree of Doctor

Knowledge and understanding

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

- *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

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

- *demonstrate the capacity for scholarly analysis and synthesis as well as 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, independently 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

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

- *demonstrate intellectual independence 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.*

Subject-Specific Objectives

Not applicable

3. Admission Requirements

A person who meets the general admission requirements as well as the specific admission requirements and is judged to have the ability otherwise required for pursuing the programme successfully is eligible for admission.

3.1 General eligibility

A person who has earned a master's degree of at least 240 ECTS credits of which at least 60 ECTS credits are studies at master's level, or who in some other way in the country or abroad has acquired largely equivalent knowledge has general eligibility for admission. If there are special reasons for doing so, the faculty board may grant an individual applicant exemption from the general eligibility *(Higher Education Ordinance*, Ch.7, section 39).

3.2 a Special eligibility for admission to doctoral studies in biology

To meet the specific entry requirements for the third-cycle study programme in Biology, the applicant must hold 120 ECTS credits in Biology including a degree project at the master's level (at least 15 ECTS credits), or having in some other way acquired equivalent knowledge, in Sweden or abroad.

3.2 b Special eligibility for admission to doctoral studies in biology education

To meet the specific entry requirements for the third-cycle study programme in Biology with a focus on didactic specialisation, the applicant must hold 90 ECTS credits in natural sciences relevant to the third-cycle study in Biology. There must be a focus on didactic specialisation, including a second-cycle level degree project (15 ECTS credits), for example a Bachelor of Arts in Education in natural sciences, where a degree project (15 ECTS credits) is in included. An applicant can also meet the specific entry requirements by having acquired, to a large degree, the equivalent knowledge, in the country or abroad.

4. Admission Procedure

Applications for admission to doctoral studies are processed in accordance with the procedures prescribed by the Board of Karlstad University.

5. Selection

Candidates will be selected on the basis of their assessed capacity to successfully complete a programme at the doctoral level.

The selection will also be based on the applicant's previous study results with an emphasis on the quality of the written Master's degree project, particularly at a second-cycle level; the applicants language proficiency, both verbally and in writing (most importantly in English and secondarily in Swedish) the applicant's intent with regard to being present and actively contributing to the discipline's research environment; and how well the applicant's research specialisation corresponds to the discipline's existing capacity for supervision and specialisation.

6. Content and Outline

The doctoral programme can lead to a doctoral or licentiate degree. The licentiate degree requires two years of study, the equivalent of 120 ECTS cr. The doctoral degree requires four years of study, the equivalent of 240 ECTS cr. The studies include coursework and an independent project (licentiate thesis or doctoral thesis).

To earn a licentiate degree, the student is required to complete coursework of at least **30 credits** and a thesis of at least **90 credits**.

To earn a doctoral degree, the student is required to complete coursework of at least **60 credits** and a thesis of at least **180 credits**.

6.1 Courses

Courses and other credit-bearing activities shall provide broader insights into the subject in addition to the expertise obtained through the research work. In the subject of Biology, a doctoral degree requires courses or other activities that give credits for a total of 60 ECTS credits, and 30 ECTS credits for a licentiate degree. The exact distribution of courses and other credit-bearing activities must be stated in the individual study plan. Courses or other credit-bearing activities that are included in the programme can be completed both at and outside of Karlstad University. The examiner determines the number of ECTS credits that shall be transferred for courses or other credit-bearing activities, regardless of where they were obtained.

The courses for a doctoral or licentiate degree are divided into a compulsory part, which is the same for all students in the programme, and an elective part. The purpose of the courses is to provide third-cycle students with an understanding of different research methods as well as a broader foundation within their own subject.

Elective courses shall be selected based on the student's needs and be planned by the student in consultation with the principal supervisor, examiner and any assistant supervisor, and be included in the individual study plan. It is recommended that the elective courses include both subject-specific courses, complementary courses, as well as courses that introduce the research student to theoretical and practical methods relevant to research in Biology.

The course part of the degree may include courses with a specialisation in higher education pedagogy. Third-cycle students who intend to participate in teaching at first-cycle level are required to complete relevant courses in higher education pedagogy.

Third-cycle courses at Karlstad University should be chosen first and foremost.

6.1.1 Degree of Licentiate

Mandatory courses for a Degree of Licentiate in Biology:
- Introductory Paper (7.5 ECTS credits)
- Literature Course (4 ECTS credits)
- Research Ethics for Doctoral Students, basic course (3 ECTS credits)

- Philosophy and Theory of Science for Doctoral Students (4.5 ECTS credits)

Students who are enrolled in graduate schools with comparable courses to the courses described above, will receive credit for these after examination of an examiner.

6.1.2 Degree of Doctor

Mandatory courses for a Degree of Doctor: in biology:
- Introductory Paper (7.5 ECTS credits)
- Literature Course (12 ECTS credits)
- Research Ethics for Doctoral Students, basic course (3 ECTS credits)
- Philosophy and Theory of Science for Doctoral Students (4.5 ECTS credits)
- Communicating Science (4.5 ECTS credits)

Students who are enrolled in graduate schools with comparable courses to the courses described above, will receive credit for these after examination of an examiner.

6.1.3 Description of credit-bearing activities

The introductory paper functions as an introduction to the work to be conducted for the doctoral thesis and should be written during the first year of the third-cycle study programme. The student can summarise, analyse and synthesise literature connected to the doctoral thesis, and through this gain an overview of the general state of knowledge in the relevant field of research, as well as training in critical thinking. The essay may be written in Swedish or English. The latter is recommended.

The literature courses are individual and are created in consultation with the examiner and supervisor. For a Degree of Doctor, the norm is to read scientific literature equivalent to three books (for a Degree of Licentiate it is one book), of which one must be about evolution, if the student has not received this knowledge during the first- and second-cycle studies (the requirement regarding evolution does not apply to didactic specialisation). The intent of the literature courses is to broaden the knowledge of the student in adjacent and relevant areas of expertise outside of the main area covered by the student's doctoral thesis.

Research seminars are an essential and continuous part of the student's studies, in which the doctoral students (does not apply to biology didactics), among other things, are expected to present their planned studies related to the doctoral thesis and papers that are ready to be submitted for scientific publication. The doctoral student is expected to participate in all seminars and must perform two (Degree of Licentiate) to four (Degree of Doctor) presentations, as well as participate actively in discussions at the seminars during the third-cycle study programme. Active participation during seminars can yield a maximum of 1.5 ECTS credits per academic year, with a total maximum of 3 ECTS credits for a Degree of Licentiate and 6 ECTS credits for a Degree of Doctor.

Conferences and symposiums give credit when the student is participating actively, which is defined as the student presenting their research in the form of an oral presentation or a poster presentation. The doctoral student can receive at most 1.5 ECTS credits per conference or symposium, with a total maximum of 4.5 ECTS credits for a Degree of Doctor and 3 ECTS credits for a Degree of Licentiate.

Additional credit-bearing activities - ECTS credits can be acquired by participating in activities such as courses, seminars, excursions, etc. Activities are chosen in consultation with the examiner and supervisor in accordance with the needs of the doctoral student.

In all cases where the amount of credits given for a credit-bearing activity has not been established in the course syllabus, the amount is decided by the examiner in consultation with the student and their supervisor.

6.2 Licentiate and Doctoral Theses

Third-cycle students are required to write a thesis for a licentiate or a doctoral degree, which may be a monograph or a compilation thesis. The latter alternative is recommended. The licentiate thesis is to be defended at a licentiate seminar and the doctoral thesis at a public examination. Further information is provided in Gällande regelverk vid Karlstads universitet: Regler för utbildning på forskarnivå. The thesis topic for either degree is chosen in consultation with the advisor and examiner. The thesis summary should be written in English. The included articles should be written in English.

6.3 Supervision

Admitted students are entitled to advisors in accordance with the principles stated in the current policy document at Karlstad University.

6.4 Individual Study Plan

At the start of the studies, the student shall draw up an individual study plan (ISP) in consultation with the advisors. The plan shall include a realistic estimate of time for course work, thesis work and supervision. The plan shall also include a project description and relevant ethical considerations.

The ISP is drawn up according to the form or system devised by the university.

The individual study plan is subject to continual revision (at least once a year) and shall be revised if changes in time or project plan are required.

Follow-up of the individual study plan is carried out by the student and their supervisor, in consultation with the examiner.

Goal attainment in licentiate/doctoral studies shall be monitored on occasions in the course of studies. After one year, an individual qualifications matrix is formulated and attached to the student's individual study plan.

One year before the preliminary date of licentiate degree completion and two years before the preliminary date doctoral degree completion the outcome of the individual qualifications matrix is evaluated when the ISP is followed up. If

the evaluation indicates that the goal attainment is not satisfactory, the study plan is revised to ensure that the national requirements are met at the time of the final examination. The revised qualifications matrix is attached to the individual study plan.

The goals of the curriculum are listed in matrix form and are presented in appendix 1 for Degree of Licentiate and appendix 2 for Degree of Doctor.

6.5 Examination

Licentiate/doctoral students are examined in accordance with the requirements of each individual course syllabus. Doctoral or licentiate theses are examined in accordance with the *Higher Education Ordinance* (Ch.6, sections 32-35) and Karlstad University's current policy document.