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Dnr FS 4.1.1-1313-25

UMEÅ UNIVERSITET

General syllabus for doctoral studies in Molecular Biology

with doctoral degree as goal

Scope: 240 higher education credits (ECTS)
Degree: Doctoral degree
Study level: Third-cycle
Established by: General syllabus established by the Faculty of Science and Technology Board on 2025-09-25
Enters into force: 2025-10-01
Responsible body: Faculty of Science and Technology

This document has been translated from Swedish into English. If the English version differs from the original, the Swedish version takes precedence.

1. Subject description and delimitation

The subject of Molecular Biology is a broad field that encompasses research in cell biology, genetics, molecular evolutionary biology, microbiology, physiology, tumor biology, neurobiology, as well as developmental and structural biology. The subject includes studies of structures and processes at the molecular, cellular, and organismal levels.

2. Objectives of the education

2.1 Description of education at the current level

The education is at third-cycle level. The goals for third-cycle education can be found in Chapter 1 of the Higher Education Ordinance 9 a §.

2.2 National goals for the degree

The national goals for the degree can be found in the Higher Education Ordinance, Appendix 2.

The objectives for the doctoral degree in molecular biology are defined in the Higher Education Ordinance, Chapter 6, Sections 4–5 (see page 5), where the terms *research area* and *limited area of this research field* refer to molecular biology as defined above and the doctoral student's specialization, respectively. The purpose of the research area is to increase knowledge about fundamental molecular and cellular mechanisms, and the education is therefore intended to provide a broad foundation and prepare for future research and work beyond the individual doctoral project. Holders of a doctoral degree in Molecular Biology are expected to have acquired solid overall expertise in the subject as well as in-depth knowledge within their area of specialization. The national objectives are complemented with perspectives on gender equality and equal opportunities, integrated into the program's content and design to provide insight into how traditional structures maintaining inequality can be counteracted.

3. Entry requirements and prerequisites

To be admitted to doctoral education, the applicant must meet both general and specific entry requirements and be deemed to have the overall ability required to benefit from the education (Higher Education Ordinance, Chapter 7, Section 35).

General entry requirements

To fulfil the general entry requirements, the applicant must have qualifications equivalent to either a completed degree at advanced level (second-cycle), or completed course requirements of at least 240 ECTS, including at least 60 ECTS at advanced level, or has otherwise acquired essentially equivalent knowledge within Sweden or abroad. The faculty board may, in the case of a specific applicant, consent to an exemption from the general entry requirements if there are special reasons to do so. (Higher Education Ordinance, Chapter 7, Section 39)

Specific entry requirements

To meet the specific entry requirements for doctoral education in chemistry, the applicant must have completed higher education studies comprising at least 90 credits in the main subject area Molecular Biology, including courses in chemistry, cell- and molecular biology, genetics, and microbiology. In addition, courses corresponding to 30 credits at advanced level (second-cycle) within the molecular biology subject area are required, including an independent project of at least 15 credits. To enable interdisciplinary initiatives and significant specialization in certain areas related to molecular biology, other qualifications than the applicant's subject-specific competence in molecular biology may be considered as fulfilling the specific entry requirements.

The requirements for prior knowledge as described above are also considered to be met by those who have otherwise acquired essentially equivalent knowledge.

4. Selection

Selection among applicants who meet the entry requirements will be made with consideration of their ability to benefit from doctoral education, and is based on the following assessment criteria:

- personal suitability
- previous study results and
- other merits

Applicants must not be given preference over other applicants in the selection process solely based on the assessment that the applicant can receive accreditation for previous education or professional activities. (Higher Education Ordinance, Chapter 7, Section 41)

Decisions regarding admissions to studies at doctoral level concluding in a doctoral degree are made in accordance with Umeå University's delegation of authority.

5. Content and structure

5.1 General

An individual study plan is to be established for each doctoral student, which shall give details of financing, supervision, courses, thesis-related work, etc. For a doctoral degree, the studies shall entail 240 higher education credits (ECTS). A doctoral student can, if desired, pursue a licentiate degree as an intermediate goal.

Doctoral education leading to a doctoral degree corresponds to four years of full-time study and consists of a course component of 29-60 credits and an academic thesis of 180-211 credits.

5.2 Content

The programme consists of coursework and thesis work. The annual review of the doctoral student's individual study plan ensures an appropriate selection of courses and other activities to achieve the national goals for doctoral education. For doctoral students admitted with qualifications other than subject-specific competence in molecular biology, particular emphasis shall be placed on activities that ensure broad knowledge and a systematic understanding of the subject of molecular biology.

The character of the education is highly international. Doctoral students participate in international collaborations and are expected to present their research results in international contexts.

5.2.1 Courses

The coursework consists of mandatory courses common to all doctoral students in the subject and a variable number of individually selected courses based on each student's needs. The mandatory courses develop generic skills, provide insight into the subject and its scientific methodology at large, and address gender-equality and equal-opportunity issues as an integrated component. Depending on the specialization and the doctoral student's prior knowledge, the admission decision shall specify additional compulsory course requirements if this is deemed necessary to ensure that the doctoral student attains a good general understanding of the subject as well as deep knowledge in their area of specialization. The following courses are mandatory for all doctoral students in molecular biology with a doctoral degree as the final goal:

Mandatory courses developing general competence:

- Introduction to Doctoral Studies at the Faculty of Science and Technology, 1 credit
- Writing Science, 5 credits
- Oral Presentation, 1 credit
- Science, Ethics, and Society, 4 credits

Courses providing general competence in molecular biology and its research methodology:

- Frontiers in molecular biology I, 12 credits
- Frontiers in molecular biology II, 6 credits

For doctoral students who use laboratory animals in their research, training in laboratory animal science, 3 credits, is mandatory.

Additional mandatory course requirements for the individual doctoral student may be added if necessary and are specified in the admission decision.

Additional elective courses may be included in the doctoral education to further specialize or broaden the doctoral students competence in molecular biology or provide additional generic skills.

5.2.2 Doctoral thesis

Through the thesis, the doctoral student shall demonstrate that the national learning outcomes for the doctoral degree have been achieved.

The doctoral thesis shall comprise at least 180 credits and either take the form of a coherent, unified scientific work (monograph thesis) or a compilation of scientific papers with an introduction, summary, and discussion of these papers (compilation thesis), which must also include a description of the author's contribution to each individual paper. The thesis must also contain a popular science summary intended for readers outside academia.
The doctoral thesis shall be defended orally at a public disputation and is assessed with one of the grades Pass or Fail. In grading, consideration is given to both the content of the thesis and the oral defense.

6. Examination

A doctoral degree is awarded upon completion of doctoral studies equivalent to 240 higher education credits, provided that the applicant has received the grade *Pass* in all mandatory parts. In particular, this includes the public defense of the doctoral thesis and its approval by the grading committee. Degree certificates are issued following application to Student Services/Examina.

7. Other instructions

The provisions that apply in respect of doctoral studies can be found in:

- The Higher Education Ordinance (HEO): Chapter 5 (employment as a doctoral student), Chapter 6 (the education), and Chapter 7 (admission to education), Appendix 2 (Degree Ordinance).
- Admission regulations for doctoral education at Umeå University.
- Local degree ordinance at Umeå University.
- Rules for doctoral education at Umeå University.
- Handbook for doctoral studies at the Faculty of Science and Technology at Umeå University.

National Goals for the Doctoral Degree

(Higher Education Ordinance, Chapter 6, Sections 4 and 5)

Knowledge and understanding

For the doctoral degree, the doctoral student shall

- demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialized 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 the doctoral degree, the doctoral student shall

- 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 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 in 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 the doctoral degree, the doctoral student shall

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