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UMEÅ UNIVERSITY

General syllabus for doctoral studies in Computing Science

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. Field of Study

Computing Science in the sense of this syllabus is the scientific field that studies the theoretical and practical aspects of computation and how it can be made use of in science, technology, and society. The goal is to strengthen the basis for practical applications on the one hand, and to understand the fundamental limitations of computational devices on the other hand. While the division between Computing Science and related fields, such as Mathematics and Informatics, is not always sharp, research qualifies as Computing Science if it creates new knowledge about computation, its limitations, and possibilities. This separates Computing Science from research that merely uses the computer as a tool, studies its societal impact, or the like.

Holders of a doctoral degree in Computing Science are expected to have acquired good overall expertise of the subject, and deep knowledge in their respective area of specialization. The latter is demonstrated by the ability to conduct research that makes significant contributions to the field as outlined above. To make it possible for the student to reach this depth, admission to doctoral studies is restricted to areas of specialization in which high quality supervision by senior researchers can be provided.

2. Learning outcomes

The learning outcomes for the degree of doctor in Computing Science are those specified by the Higher Education Ordinance, Chapter 6, Sections 4 and 5 (see page 5), where the terms *research field* and *area of specialization* refer to Computing Science (as defined above) and the doctoral student's specialization, respectively. These learning outcomes are complemented by a gender and equal opportunities perspective which is integrated in the content and organization of the program. It provides the student with additional insights into how the sustenance of inequality by traditional structures and perspectives can be counteracted.

3. Entry requirements and prerequisites

To be admitted for studies at doctoral level, the applicant is required to meet the general entry requirements and the specific entry requirements as outlined below, and be deemed as having the ability to benefit from the studies. (Higher Education Ordinance, Chapter 7, Section 35)

General entry requirements

To fulfil the general entry requirements, the applicant must have qualifications equivalent to 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 in some other ways have 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 fulfil the specific entry requirements to be admitted to doctoral studies in Computing Science, the applicant is required to have completed at least 90 ECTS in Computing Science, or in subjects considered to be directly relevant for the specialization in question.

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 process

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 licentiate degree are made by the Faculty Board of the Faculty of Science and Technology.

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 ECTS. A doctoral student can, if desired, pursue a licentiate degree as an intermediate goal.

Studies at doctoral level that are to be concluded with a doctoral degree shall comprise a net study period of four years. They consist of a course component of 50–70 ECTS and an academic thesis of 170–190 ECTS. A mandatory mid-seminar is to be held.

5.2 Content

Studies towards the degree of doctor in Computing Science consist of courses and thesis work. The course part consists of a fixed set of mandatory courses and a variable number of courses individually determined according to the doctoral student's needs. The mandatory courses convey generic skills, provide an overview of the field as such and its scientific methods, and take up gender equality and equal opportunities issues as an integral component. Depending on the specialization and the doctoral students' previous knowledge, the admission decision shall specify additional mandatory course requirements if such is deemed necessary to guarantee that the student achieves a good overall expertise of the subject, and deep knowledge in their respective area of specialization. The annual follow-up of the doctoral student's individual study plan ensures an appropriate choice of courses and other activities in order to achieve the national goals for doctoral education.

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 following courses are mandatory for all doctoral students in Computing Science:

Courses developing general competence:

- *Introduction to Doctoral Studies at the Faculty of Science and Technology*, 1 ECTS
- *Writing Science*, 5 ECTS
- *Oral Presentation*, 1 ECTS
- *Science, Ethics and Society,* 4 ECTS
- *Work, Technology, and Gender*, 5 ECTS

Courses developing competence in Computing Science:

- *Ground Knowledge in Computing Science*, 3 ECTS
- *Computing Science Research Methodology, Peer Reviewing, and Publication*, 6 ECTS
- *Doctoral Student Days in Computing Science – Presentation and Discussion of Research Work in Progress*, 6 ECTS

Additional mandatory courses for the individual doctoral student can be specified in the admission decision.

The remaining course requirements are satisfied via elective courses which broaden or deepen the doctoral student's expertise in the subject (comprising at least 15 ECTS credits) as well as courses that provide additional generic skills.

5.2.2 Doctoral thesis

The doctoral thesis comprises at least 170 ECTS and either takes 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.

Further, the thesis shall contain a popular science description aimed at readers outside of academia.

The doctoral thesis shall be defended orally in public, resulting in an assessment with one of the following grades: G (Pass) or U (Fail). When setting the grade, the grading committee shall pay attention to both the content of the thesis and its 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: Chapter 5 Employment of doctoral students, Chapter 6 Courses and study programmes, and Chapter 7 Admission to courses and study programmes, Annex 2 Qualifications 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.

Appendix A: The national goals for the Doctoral Degree

(HF 6, chapter 4 & 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
- 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
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how this is used.