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UMEÅ UNIVERSITY

General syllabus for doctoral studies in Subject Matter Education

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
Specialization: Mathematics, 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

Subject Matter Education is about learning and teaching in relation to a particular disciplinary content. This includes the knowledge formation and tradition of the specific subject, as well as the knowledge practices, norms, and assessment systems of the teaching subject. Based on the subject-specific conditions for teaching in and about mathematics, science, and/or technology, learning, knowledge formation, teaching methods, learning environments, working conditions for pedagogical professionals, and professional development are studied. Subject Matter Education research provides knowledge to understand the content and conditions of specific subject teaching as well as how the subject content can be organized for a specific group of learners.

The subject is part of the field of Educational Science research and often includes multi- or interdisciplinary perspectives. Holders of a doctoral degree in Subject Matter Education are expected to have acquired broad knowledge in the subject as well as in-depth and up-to-date knowledge within the chosen specialization of the doctoral studies.

2. Objectives of the education

2.1 Description of education on 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 Act 9 a §.

2.2 National goals for the degree

The national goals for the degree can be found in the Higher Education Act, Appendix 2, and can also be found at the end of this document.

The learning outcomes for the doctoral degree in Subject Matter Education are those specified by the Higher Education Ordinance, Chapter 6, Sections 4 and 5 (see Appendix A), where the terms *research field* and *area of specialisation* refer to subject matter education (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. Sustainability perspectives are also integrated into the education through the exploration of science's possibilities and limitations in contributing to sustainable societal development, particularly in relation to the global goals of quality education, health, well-being, and resource and environmental issues.

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 described below, and be deemed to have the necessary ability 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 or outside Sweden. 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 education in Subject Matter Education with a specialization in mathematics, science, or technology, the applicant must meet the general entry requirements and have a minimum of 90 ECTS in the subject of the chosen specialization, and/or in its didactics. The degree must include a degree project.

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 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

However, 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. The requirements for a licentiate degree are described in the corresponding general syllabus.

Doctoral education leading to a doctoral degree corresponds to four years of full-time study and consists of a course component of 75–105 higher education credits and an academic thesis of 135–165 higher education credits.

5.2 Content

The content of the program consists of a course component and the thesis work. The course component consists of compulsory courses that are common to all doctoral students in the subject and a variable number of courses that are determined individually according to each doctoral student's needs. The compulsory courses convey generic skills, provide insight into the subject and its scientific methodology in general, and thematize sustainability, gender equality, and equal opportunities issues as an integral component. Depending on the specialization and the doctoral student's prior knowledge, decisions on admission shall specify additional mandatory course requirements if this is deemed necessary to ensure that the doctoral student achieves a good general understanding of the subject as well as deep knowledge of his or her specialist area. 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

Doctoral education in Subject Matter Education consists of a course component comprising 75-105 higher education credits. The following courses are mandatory for all doctoral students aiming for a doctoral degree in Subject Matter Education:

Mandatory courses developing general competence:

- Introduction for doctoral students at the Faculty of Science and Technology, 1 ECTS
- Writing Science, 5 ECTS
- Oral presentation, 1 ECTS
- Science, ethics and society, 4 ECTS

Mandatory courses developing competence in Subject Matter Education:

- Introductory course in Subject Matter Education, 7.5 ECTS

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

Elective courses for doctoral degrees: Courses are chosen by the doctoral student in consultation with supervisors and should be largely adapted to the doctoral student's study specialization.

The remaining part of the course requirement is met by taking elective broadening and deepening courses in the subject of at least 15 credits as well as courses that provide additional generic skills.

5.2.2 Doctoral thesis

Through the doctoral thesis, the doctoral student shall demonstrate that the national objectives for the doctoral degree have been achieved. The doctoral thesis comprises at least 135 higher education 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. Regardless of whether the thesis is written in English or Swedish, it must include an abstract in the other language. 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. It will be graded as either Pass (G) or Fail (U). In determining the grade, consideration shall be given to both the content of the thesis and the quality of the 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

Learning outcomes 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.