



General syllabus for third-cycle studies in Subject Matter Education

Scope: 240 higher education credits

The Degree: Degree of Doctor

Study level: Third-cycle

Established by: General syllabus established by the Faculty of Science and Technology Board on 28/05/2021

Enters into force: 28 May 2021

Responsible body: Faculty of Science and Technology

Subject focus: mathematics, science, and technology

1. Field of Study

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. Admission to the doctoral program is limited to the areas in which high-quality supervision by senior research leaders can be offered. A Doctor of Subject Matter Education is 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. Learning outcomes

The learning outcomes for the degree of doctor 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 specialization are to be interpreted in accordance with the preceding section. 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 inequality by traditional structures and perspectives can be counteracted.

3. Entry requirements and prior knowledge required

To be admitted for studies at third-cycle level the applicant is required to meet the general entry requirements and the specific entry requirements that the board of the Faculty of Science and Technology Board has prescribed, and shall be considered as otherwise possessing that required to benefit from the studies. (Higher Education Ordinance, Chapter 7, Section 35)



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General entry requirements

To fulfil the general entry requirements, the applicant must have qualifications equivalent to a completed degree at second-cycle level, or completed course requirements of at least 240 ECTS credits including at least 60 ECTS credits at second-cycle level. The board of the Faculty of Science and Technology 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

In order to meet the requirement for special eligibility to be admitted to doctoral education in Subject Matter Education with a focus on mathematics, science and technology, the applicant must have basic qualifications, and a minimum of 90 ECTS credits in the subject of the chosen specialization. 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 acquired essentially equivalent knowledge in another order.

4. Selection process

Selection process

A selection process involving applicants who meet the entry requirements will be conducted with reference to their ability to benefit from third-cycle studies, and is based on the following assessment grounds:

- 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 third-cycle level concluding in a doctoral degree are made in accordance with Umeå University's delegation of authority.

5. Contents and scheduling

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 degree of doctor to be awarded, the studies shall entail 240 ECTS credits. A doctoral student can, if desired, pursue a licentiate degree as an intermediate goal. The requirements for obtaining a licentiate degree are detailed in the relevant general syllabus.

Studies at third-cycle 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 75–105 ECTS credits and an academic thesis of 135–165 ECTS credits.



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5.2 Contents

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 must present their research results in international contexts.

5.2.1 Courses

The following courses are mandatory for all doctoral students in **Subject Matter Education**:

Courses developing general competence:

- *Introduction to Doctoral Studies at the Faculty of Science and Technology, 1 ECTS credit*
- *Writing Science, 5 ECTS credits*
- *Philosophy of Science, 2 ECTS credits*
- *Introduction to Research Ethics, 2 ECTS credits*

*Courses developing competence in **Subject Matter Education**:*

- *Introductory course in Subject Matter Education, 7.5 ECTS credits*

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 student in consultation with supervisors and should be largely adapted to the student's study focus.

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

The doctoral thesis comprises at least 135 ECTS credits. It may either take the form of a single coherent work (a monograph) or a compilation consisting of an introduction, a number of scientific papers, and a summary and discussion of the papers which includes a description of the author's contributions to each paper (compilation thesis). In both cases the number of ECTS credits of the thesis is to be indicated. A thesis can be written in Swedish or in English and must contain an abstract in the other language. Further, the thesis shall contain a popular scientific description aimed at readers outside academia.



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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

The degree of doctor is awarded upon completion of third-cycle studies equivalent to 240 ECTS credits within Subject Matter Education, 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 third-cycle 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 studies at Umeå University.
- Local system of qualifications at Umeå University.
- Regulations for doctoral studies at Umeå University.
- Handbook for postgraduate students at the Faculty of Science and Technology at Umeå University.

Appendix A

Learning outcomes for the degree of doctor

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

Knowledge and understanding

For the degree of Doctor of Philosophy 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 the degree of Doctor of Philosophy the third-cycle 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 degree of Doctor of Philosophy the third-cycle student shall

- demonstrate intellectual autonomy 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 this is used.