

General syllabus for third-cycle studies in applied electronics

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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 17/10/2007; revised on 20/03/2014

Enters into force: 17/10/2007

Responsible body: Faculty of Science and Technology

Specialisations: Control engineering, signal processing or medical engineering

1. Learning outcomes

Learning outcomes for the degree in question

(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.

Local learning outcomes for the degree in question

Knowledge and understanding

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

- demonstrate interdisciplinary understanding of the functioning of sociotechnical systems in a sustainable society.

Competence and skills

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

- demonstrate skills in systems analysis and life cycle assessments.

Judgement and approach

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

- demonstrate insight into the importance of technology for the development of the modern society and its anthropogenic effects on the global environment.
- demonstrate the ability to critically reflect on their role in the development of sustainable sociotechnical systems.

2. Entry requirements and prior knowledge required

General entry requirements

To be admitted for studies at third-cycle level the applicant is required to have completed a second-cycle level degree, or completed course requirements of at least 240 credits, of which at least 60 credits are at second-cycle level, or have an equivalent education from overseas, or equivalent qualifications.

Specific entry requirements

To fulfil the specific entry requirements to be admitted for studies at third-cycle level in applied electronics with specialisation in control engineering, signal processing or medical engineering, the applicant is required to have completed course requirements of at least 120 credits within the field of energy engineering, closely related areas of application or other subject areas considered to be directly relevant for third-cycle studies.

The prior knowledge requirements in respect of the above are also deemed to be fulfilled by applicants who in some other system either within Sweden or abroad have acquired largely equivalent skills.

3. Selection process

Selection process

The selection among those applicants who meet the entry requirements will be conducted with reference to their ability to successfully perform 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.

4. Contents and scheduling

4.1 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 credits. A doctoral student who is admitted for third-cycle studies that are to conclude with a doctoral degree can, if he/she so wishes, study for a licentiate degree as an intermediate goal.

Studies at third-cycle level that are to be concluded with a doctoral degree shall comprise a net study period of four years and consist of a course component of 60-90 credits and a doctoral thesis of 180-150 credits.

4.2 Contents

4.2.1 Courses

Third-cycle studies in applied electronics with specialisation in control engineering, signal processing or medical engineering include a course component equivalent to 60-90 credits.

Mandatory courses for the doctoral degree:

Courses that develop general skills amounting to 10 credits. 8 of these credits are to consist of courses within philosophy of science, ethics and conduct, oral presentation and a written presentation.

Courses are chosen by the student in consultation with their supervisor and the examiner. These courses can be largely adapted to the student's interests and area of specialisation.

Examples of courses for a doctoral degree with specialisation in control engineering are:

System identification

Controlling robot manipulators

Adaptive control

Advanced control methods based on optimization

Control of oscillations in nonlinear systems

Embedded control systems

Artificial intelligence

Image analysis

Methods for robotics applications

Numerical methods for control

Examples of courses for a doctoral degree with specialisation in signal processing are:

Research methods and scientific writing

Media techniques

Advanced signal processing

Media computing

Media communication

Media systems

Examples of courses for a doctoral degree with specialisation in medical engineering are:

Laboratory technology

Medical sensors

Anatomy/Physiology

4.2.2 Doctoral thesis

The doctoral thesis 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 (compilation thesis).

The doctoral thesis shall be defended verbally in public. The thesis is assessed with the following grades: G (Pass) or U (Fail). When setting the grade, attention will be paid to both the content of the thesis and its defence.

5. Examination

The degree of doctor can be awarded following the student's completion of third-cycle studies equivalent to 240 credits within applied electronics with specialisation in control engineering, signal processing or medical engineering, and where the applicant has received the grade of pass for the tests included in the studies in addition to writing and publicly defending a doctoral thesis approved by the Examining Committee. Degree certificates are issued following application to Student Services/Examina.

6. 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 (Ref. no. FS1.1.2-25-14).



- Local system of qualifications at Umeå University (Ref. no. 500-2958-11).
- Regulations for doctoral studies at Umeå University (Ref. no. 500-953-13).
- Handbook for postgraduate students at the Faculty of Science and Technology at Umeå University.