



LUND
UNIVERSITY

Faculty of Engineering/LTH

General syllabus for third-cycle studies in Software Engineering TEETSF01

The syllabus was approved by the Board of the Faculty of Engineering/LTH 24 September 2007 and most recently amended 10 March 2014 (reg. no U 2014/214).

1. Subject description

The PhD programme in Software Engineering at LTH deals with techniques, methods, and processes for the development of complex software systems, with special emphasis on large-scale industrial software development. The programme covers the application of systematic, disciplined, and quantifiable approaches to development, operation, and maintenance of software systems. The scientific research is to produce principles that are applicable to large-scale software development that leads to products with the right quality, delivered at the agreed time, and to the specified cost. The subject areas include requirements management, verification & validation, process improvement, software quality, software architecture, as well as measurements and models for software development. Research in the programme is largely performed using empirical methods such as case studies, surveys and controlled experiments.

2. Objective of third-cycle studies at LTH

The Board of LTH established the following objective for third-cycle studies on 15 February 2007.

The overall objective of third-cycle studies at LTH is to contribute to social development and prosperity by meeting the needs of business and industry, academia and wider society for staff with third-cycle qualifications. LTH shall primarily provide education leading to a PhD or licentiate in the fields of LTH's professional degrees. The programmes are first and foremost intended for the education of engineers and architects. The programmes are designed to encourage personal development and the individual's unique qualities.

Third-cycle graduates from LTH shall demonstrate:

- proficiency in research theories and methods and in a critical, scientific approach
- both breadth and depth of knowledge within the subject of his or her third-cycle studies

The programmes aim to develop:

- creativity and independence with the ability to formulate advanced research issues, solve problems and plan, carry out and evaluate projects within a set time frame
- openness to change
- personal networks, both national and international
- social skills and communication skills
- teaching ability
- innovation skills, leadership and entrepreneurship

In order to enable students to achieve these skills and abilities, LTH provides:

- high-quality supervision and good conditions for study in a creative environment
- a good balance between basic and applied research, with openness to wider society
- a range of advanced third-cycle courses at both departmental and faculty level
- a good balance between courses and thesis work
- opportunities to present research findings at national and international conferences and in internationally recognised journals, or by another equivalent method which leads to wide exposure and circulation
- opportunities to spend time in international research environments for short or extended periods

3. Learning outcomes for third-cycle studies

The learning outcomes for third-cycle studies are given in the Higher Education Ordinance.

3.1 Licentiate

Knowledge and understanding

For a Licentiate the third-cycle student shall:

- demonstrate knowledge and understanding in the field of research including current specialist knowledge in a limited area of this field as well as specialised knowledge of research methodology in general and the methods of the specific field of research in particular.

Competence and skills

For a Licentiate the third-cycle student shall:

- demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake a limited piece of research and other qualified tasks within predetermined time frames in order to contribute to the formation of knowledge as well as to evaluate this work
- demonstrate the ability in both national and international contexts to present and discuss research and research findings in speech and writing and in dialogue with the academic community and society in general, and

- demonstrate the skills required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.

Judgement and approach

For a Licentiate the third-cycle student shall:

- demonstrate the ability to make assessments of ethical aspects of his or her own research
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

3.2 Doctor of Philosophy

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 thesis the ability to make a 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 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 it is used.

4. General and specific admission requirements

A person meets the general admission requirements for third-cycle courses and study programmes if he or she:

1. has been awarded a second-cycle qualification
2. has satisfied the requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second cycle, or
3. has acquired substantially equivalent knowledge in some other way in Sweden or abroad.

The higher education institution may permit an exemption from the general entry requirements for an individual applicant, if there are special grounds. Ordinance (2010:1064).

A person meets the specific admission requirements if he or she has:

1. at least 150 credits in mathematics, engineering or science, including at least 60 credits in computer science and a degree project of at least 30 second-cycle credits of relevance to software engineering, or
2. a MSc in computer science/software engineering or another second-cycle degree of relevance to software engineering, including at least 60 credits in computer science/software engineering.

Finally, the student must be judged to have the potential to complete the programme.

Exemptions from the admission requirements may be granted by the Board of LTH.

5. Selection

Selection for third-cycle studies is based on the student's potential to profit from such studies.

The assessment of potential in accordance with the first paragraph is made primarily on the basis of academic results from the first and second cycle. Special attention is paid to the following:

1. Knowledge and skills relevant to the thesis project and the subject of study. These may be demonstrated through documents appended to the application and at a possible interview.
2. An assessment of ability to work independently and to formulate and tackle research problems. The assessment could be made on the basis of the student's degree project and a discussion of this at a possible interview.
3. Written and oral communication skills
4. Other experience relevant to the third-cycle studies, e.g. professional experience.

6. Degree requirements

Third-cycle studies lead to a PhD or, if the student wishes or if it has been specified in the decision on admission, to a licentiate. The student also has the right to complete a licentiate as a stage in his or her third-cycle studies, but is not obliged to do so.

The requirements for a licentiate are

- passed courses of at least 60 credits, and
- a passed thesis of a scope corresponding to studies of at least 60 credits

The thesis and courses shall comprise at least 120 credits in total.

The requirements for a PhD are

- passed courses of at least 90 credits, and
- a passed thesis of a scope corresponding to studies of at least 150 credits

The thesis and courses shall comprise at least 240 credits in total.

6.1 Degrees awarded

The programme can lead to the following degrees:

Teknologie licentiatexamen/Licentiate in Engineering

Teknologie doktorsexamen/Doctor of Philosophy in Engineering

or:

Filosofie licentiatexamen/Licentiate of Philosophy

Filosofie doktorsexamen/Doctor of Philosophy

7. Course component

The programme is to include courses. For each course, an examiner shall be appointed at the department that delivers the course. The examiner shall draw up a written syllabus which states the course title in Swedish and English, the learning outcomes of the course, the course content and the number of credits.

The individual study plan is to include details of which courses the individual student shall or may include in his or her studies and how many credits for each course may be included in the degree. Courses taken at other faculties or higher education institutions may also be included in the study plan.

7.1 Licentiate

For a degree of licentiate, the course component comprises 30 credits (see below). The compulsory courses will be adapted to the individual student's prior knowledge. The remaining courses are to include elective courses selected in consultation with the principal supervisor (see also section 9). At least 15 credits of the elective courses must be within the following recommended areas.

Compulsory courses:

- Research Methodology, 7.5 credits
- Project in Software Engineering, 7.5 credits
- Software Engineering, 7.5 credits
- A course in an application area, e.g. telecommunications systems, 7.5 credits

The courses listed above are taught regularly at the department. However, equivalent courses (knowledge) acquired elsewhere can replace one or some of these courses.

Recommended areas:

- software systems
- research methodology
- telecommunications systems
- computer science
- software engineering
- mathematical statistics

The aim of the elective courses is to provide variation within the third-cycle programme. The courses can be selected to provide specialisation within the subject or a broadening to include other subjects. The latter type of course may be within the recommended areas listed above or within other subjects at the University.

Specialisation courses offered as part of an MSc in Engineering or another relevant programme may be available for transfer of a maximum of 15 credits, provided that the course is relevant to the student's research studies specialisation. A condition for credit transfer is that the course is not included in the student's previous degree.

7.2 Doctor of Philosophy

For a degree of doctor, the course component is to comprise the 40 credits required for a degree of licentiate and another 30 credits of elective courses. These courses are also to be selected in consultation with the principal supervisor. At least 15 of the credits for elective courses required for a degree of doctor must be within the recommended areas listed in section 7.1.

8. Thesis

The programme shall include a research project documented in a licentiate or doctoral thesis.

The scientific level of the thesis must be the same as that produced within the field at internationally respected universities abroad. The required scientific level is ensured through continual exchange with other universities and through international publication. The thesis is to be written in English.

8.1 Licentiate thesis

The licentiate thesis can be designed either as a monograph or a compilation thesis. It is to be presented at a public seminar. The seminar is also to include a public review of the thesis performed by an invited reviewer who is to address questions to the research student. The thesis is assessed and graded by an examiner.

8.2 PhD thesis

The PhD thesis can be designed either as a monograph or a compilation thesis. It is to be defended publicly. The contents of the thesis are presented by an invited reviewer who is also to address questions to the doctoral student. The thesis is assessed and graded by an examining committee of 3–5 members.

9. Further rules and regulations

One principal supervisor and one or more assistant supervisors are appointed for each research student. An individual study plan is to be drawn up for each research student, describing the structure of the programme. The individual study plan is to be regularly revised (approximately once a year) during the course of the programme. The plan is reviewed in detail when the student has obtained a degree of licentiate.