



LUND
UNIVERSITY

Faculty of Engineering, LTH

General syllabus for third-cycle studies in Systems Safety TEVBRF10

The syllabus was approved by the Board of the Faculty of Engineering/LTH 14 November 2011 and most recently amended 23 February 2015 (reg. no U 2015/80).

1. Subject description

Safety and risk are closely related and encompass the constant work in a sociotechnical system to prevent risks developing into accidents and crises. A key aspect of the subject is analysis and understanding of how and why accidents and crises come about and the actions taken as a result by social agents. However, knowledge about the safety and resilience of a system is not only generated through study of accidents and crises. Another field of study is the daily assessments of operative sociotechnical systems. In order to understand and study Systems Safety you need to be able to analyse, assess and then control and steer an activity in relation to risks and the desired safety. In addition, the subject includes the development of methods aiming to rectify problems identified in the research.

Risk management entails systematic and continuous work to eliminate, reduce and control risks in complex systems. Complex systems are defined as sociotechnical systems based on components that may be complex systems in themselves – systems of the system. Furthermore, no single agent can have full knowledge of all processes in a complex system and no single agent can take responsibility for the entire system. An essential aspect of a sociotechnical system is that it involves several agents, is flexible and can be adapted to dynamic changes, and can solve a certain task or function. Examples of complex systems are a process plant, an infrastructure system or a crisis management system in a community. The third-cycle programme is interdisciplinary and aims to comprise theories, methods and modelling focusing on systems theory, complex adaptive systems, resilience and methods of risk and vulnerability and risk-informed decision support.

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 further training 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
- 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
- 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
- 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
- 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
- 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, or
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. a second-cycle degree project of at least 30 credits within the field, or
2. a BSc in Fire Protection Engineering amounting to 210 credits.

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

The requirements for a PhD are

- passed courses of at least 60 credits, and
- a passed thesis of a scope corresponding to studies of at least 120 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.

The courses are of two types: Recommended general and Elective

Recommended general courses

The recommended general courses are intended to provide students with broad knowledge of research methods and a first broad overview of the whole specialisation. This means that they are not specifically focused on the field of the thesis project. As far as possible, these courses should be completed at the beginning of the programme.

Elective courses

Within the Systems Safety specialisation, course should be selected in the subjects of

- complex systems
- design theory
- decision analysis and decision theory
- resilience
- models for risk analysis and managing uncertainties
- theories of risk management including the impact of human and organisational factors
- risk governance

In addition to the recommended general courses and the thesis, further elective courses are required to meet the requirements for a degree of Doctor or Licentiate. Elective courses can also be selected at other departments at Lund University or at other higher education institutions. The courses may be from any cycle of higher education.

8. Thesis

The programme shall include a research project documented in a licentiate or doctoral thesis. The thesis can be structured either as a number of articles with a summarising introduction (compilation thesis) or as a unified research study (monograph).

8.1 Licentiate thesis

The thesis produced for a degree of licentiate is to correspond to at least 60 credits. The thesis is to be discussed at a public seminar, to which an external reviewer has been specifically invited to review and discuss the thesis.

8.2 PhD thesis

The PhD thesis is to correspond to at least 120 credits. If the student has obtained a degree of licentiate, the licentiate thesis can be included in the PhD thesis.

A thesis written jointly by two or more people may be approved as a PhD thesis for authors whose individual contributions can be discerned. When the thesis is a compilation thesis, papers included with more than one author may only be considered for a degree of Doctor for authors whose individual contributions can be discerned.

Prior to the defence of the thesis and even in cases where the thesis is intended to be a monograph, the doctoral student must have written articles.