

International Office, LTH

General syllabus for third-cycle studies in Industrial Engineering and Management TEMIOF01

The syllabus was approved by the Board of the Faculty of Engineering/LTH 14 June 2016 and most recently amended 8 September 2020 (reg. no U 2020/679).

1. Subject description

The research area of Industrial Engineering and Management deals with design, strategy, planning and control, development, and economic evaluation of industrial operations. The area comprises three main focus areas: Logistics and supply chain management, Production and inventory control, and Technology strategies, innovation and business models. Industrial Engineering and Management is concerned with problem areas in the interface between technology/engineering and economics/business management. It aims at integrating both perspectives, by using methods and principles from one area and modifying and applying it to the other. This is done by applying mathematical methods from the engineering sciences on problems in business and economics, and also by using managerial and economic analysis and principles to study problems of technical nature and assessment of technical alternatives. The area is multidisciplinary by nature and covers issues of strategic as well as operative nature within all types of operations.

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

Midway Review

A midway review, with the aim of reviewing the doctoral student's education in relation to the learning outcomes for the degree in the Higher Education Ordinance, is to be implemented at least once during the doctoral student's programme for all doctoral students whose education is to conclude with a doctoral degree.

4. General and specific admission requirements

4.1 General admission requirements

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

- has been awarded a second-cycle qualification, or

- has satisfied the requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second cycle, or
- 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).

4.2 Specific admission requirements

To be admitted to doctoral studies in Industrial Engineering and Management, the student must have at least 30 credits at the advanced level of relevance to the focal area.

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:

- 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.
- 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.

- Written and oral communication skills
- 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 45 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 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.

It is compulsory to participate in and pass the course Introductory Workshop for Newly Admitted Doctoral Students at LTH (*Introduktionskurs för nyantagna doktorander vid LTH*) GEM056F or the equivalent.

It is also compulsory to attend and earn a Pass grade on the course Research Ethics, GEM090F.

The head of department determines the examiner for each course that is provided by the department.

The course components are guided by following principles.

7.1 Licentiate

The credits that are required for the licentiate degree should include:

- 7.5 credits of courses in research methodology
- 7.5 credits depth studies in areas that are relevant for the licentiate thesis
- 7.5 credits breadth studies

7.2 Doctor of Philosophy

The credits that are required for the doctorate degree should include:

- 15 credits of courses in research methodology
- 15 credits depth studies in areas that are relevant for the licentiate thesis
- 15 credits breadth studies

The detailed planning of courses is done in consultation with the main supervisor, and is documented in the individual study plan.

8. Thesis

The programme shall include a research project documented in a licentiate or doctoral thesis. Before the licentiate degree (or the equivalence of this level) the doctoral student is expected to have participated in two international scientific conferences, and have presented a research work in at least one of these. Before the doctorate degree (or the equivalence of this level) the doctoral student is expected to have participated in at least three international scientific conferences, and have presented a research work in at least two of these. The doctoral student is also expected to regularly present and discuss research work at the seminar series at the department.

8.1 Licentiate thesis

The licentiate thesis can be presented in the form of a monography (a coherent scientific work) or in the form of a collection of papers (a number of scientific works and an introduction to the area). For a thesis of the latter type, the licentiate thesis shall, besides the introduction (kappa), consist of at least two scientific papers that are internationally publishable.

The assessment of the licentiate thesis is performed at a public seminar with an external discussant that is well prepared. The main supervisor decides on the external evaluator. The evaluator shall be very knowledgeable about the thesis area, examine the licentiate thesis in detail, and provide an assessment during the licentiate seminar. The head of department decides on the examiner that evaluates and determines the pass or no pass grade for the licentiate thesis.

8.2 PhD thesis

The doctoral thesis can be presented in the form of a monography or in the form of a collection of papers. For collaboration projects the contribution of the doctoral student should be clarified for a doctoral thesis of the latter type, the thesis shall, besides the introduction (kappa), consist of at least four scientific papers, that are internationally publishable. To the thesis a short abstract is added in English and a popular scientific summary in Swedish, which shall form the basis for a press release.

9. Transitional provisions

This study plan takes effect immediately. PhD students admitted earlier can apply for a transfer to the research subject Industrial Engineering and Management and follow this study plan, but are also entitled to continue with their studies according to their existing study plan and research subject.

For doctoral students with an admission date of 1 January 2019 or later, it is compulsory to participate in and pass the course Introductory Workshop for Newly Admitted Doctoral Students at LTH (*Introduktionskurs för nyantagna doktorander vid LTH*) GEM056F or the equivalent in order to fulfil the requirements for the degree.

For doctoral students admitted on or after 1 January 2021, it is compulsory to attend and earn a Pass grade on the course Research Ethics, GEM090F.

The midway review is compulsory for doctoral students admitted on or after 1 January 2019.