

Reg.no. 2019/2853

Deciding authority: The Faculty Board

Date of decision: 2023-02-02

General syllabus for *Industrial systems* at Mälardalen University

Third-cycle subject Industrial Systems

Research in Industrial Systems concerns the development of sustainable products, production systems, services and associated digital technologies. Industrial Systems research requires interdisciplinary skills and competences, including elements from both computer science and product and production engineering. The research has an engineering perspective and is concerned with investigating opportunities, challenges, and solutions related to the adaptation, integration and implementation of technologies as well as organizational and management issues within industrial systems. The subject includes the development of approaches, methods, models, techniques, and tools related to the industrial systems.

Purpose and objective of the third-cycle studies

The purpose of the third-cycle studies is that the doctoral student will develop knowledge, generic skills and an approach that is needed in order to plan, implement and report scholarly studies in the third-cycle subject area Industrial Systems both orally and in writing.

Third-cycle courses and study programmes can lead to two different qualifications, Degree of Doctor (240 credits equivalent to full-time study of four years) and Degree of Licentiate (120 credits equivalent to full-time study of two years).

Through active participation in courses and work with the thesis, as well as active participation in seminar activities conducted in each third-cycle subject, the following qualitative targets are supported at third-cycle studies level in accordance with the Higher Education Ordinance, Appendix 2 (SFS 1993:100).

Degree of Licentiate

Goals

Knowledge and understanding

For the Degree of Licentiate the doctoral 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 the Degree of Licentiate the doctoral 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 the Degree of Licentiate, the doctoral 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.

Thesis

For a Degree of Licentiate, the doctoral student shall have been awarded a pass grade for a research thesis of at least 60 credits.

Degree of Doctor

Goals

Knowledge and understanding

For the Degree of Doctor, the doctoral 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, the doctoral student shall:

- demonstrate the capacity for scholarly analysis and synthesis as well as 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 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 a Degree of Doctor the doctoral 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

Academic dissertation (doctoral thesis)

For the Degree of Doctor the doctoral student shall have been awarded a pass grade for a research thesis (doctoral thesis) of at least 120 credits.

Structure of third-cycle studies

Individual study plan

For each doctoral student, an individual study plan must be drawn up in accordance with Chapter 6, Section 29 of the Higher Education Ordinance. The individual study plan must clarify the commitments of each party (the University and doctoral student) and the timetable for the education, as well as specific goals for the doctoral student. The individual study plan must define activities that provide prerequisites to reach the national as well as subject-specific qualitative targets.

The individual study plan shall be reviewed regularly and after consultation with the doctoral student and their supervisor may be changed by the University to the required extent.

Courses

An important aspect of third-cycle studies in Industrial Systems is the requirement to take courses. Courses are selected in consultation with the principal supervisor and are documented in the individual study plan and can be taken at the University or at another higher education institution.

For the Degree of Doctor in Industrial Systems a course component of at least 60 higher education credits is included from which the below listed courses of 15 credits are compulsory.

Compulsory courses, 15 higher education credits

- Research method, 7,5 credits
- Research ethics and practice, 2,5 credits
- Industrial Systems, 5 hp

For the Degree of Licentiate in Industrial Systems a course component of at least 30 higher education credits is included.

Credit-bearing components

The doctoral student also has the opportunity within the scope of third-cycle studies at MDU to include credit-bearing components.

Review of ongoing studies

Within the framework of third-cycle studies at MDU, a doctoral student shall present the ongoing studies internally but also at public seminars/reviews to provide the research community and the public insight into the research being conducted at the University. The purpose of the review is to allow the doctoral student to discuss the ongoing work and have it reviewed by internal and external senior researchers. At MDU there are two compulsory review sessions where the doctoral student shall present their results at a:

- Mid-way review/seminar, does not apply to doctoral students who will complete a Degree of Licentiate
- Final review/preview

Doctoral thesis

A doctoral thesis in the Industrial Systems will be designed as a compilation thesis or monograph and must be written in English.

A compilation thesis consists of papers and a compilation part (introductory chapter of a compilation thesis - known as a kappa in Swedish). The papers will meet the quality requirements for publication in international peer reviewed journals. When the thesis is submitted for public defence in Industrial Systems at least 4 of the papers must be in the format of a complete article manuscript.

The compilation part will highlight the different papers, how they are interrelated and what information they generate together. The thesis, regardless of whether it is written in Swedish or English, must include summaries in both Swedish and English.

Licentiate Thesis

A licentiate thesis in Industrial Systems will be designed as a compilation thesis or monograph must be written in English.

A licentiate thesis written as a compilation thesis consists of papers and a compilation part. The papers must meet the quality requirements for publication in international peer reviewed journals. When the licentiate thesis is submitted for public defence in Industrial Systems at least 2 of the papers must be in the format of a complete article manuscript.

The compilation part will highlight the different papers, how they are interrelated and what information they generate together. The licentiate thesis, regardless of whether it is written in Swedish or English, must include summaries in both Swedish and English.

Examination

Third-cycle courses and study programmes are concluded with a doctoral degree or a licentiate degree. The doctoral student who has a doctoral degree as their goal has the right, but no obligation, to graduate with a licentiate degree as a stage in the doctoral studies education.

Degree of Doctor

For a Degree of Doctor, a total of 240 completed higher education credits are required, consisting of:

- approved courses of 60 credits
- of an approved doctoral thesis whose scope corresponds to studies of 180 credits

Public defence

The doctoral student must independently defend their doctoral thesis orally at a public defence.

The thesis is examined by an examining committee, who will decide a grade of Pass or Fail.

Licentiate degree

For a Degree of Licentiate, a total of 120 completed higher education credits are required, consisting of:

- approved courses if 30 credits
- of an approved licentiate thesis whose scope corresponds to studies of 90 credits

Licentiate seminar

The doctoral student must independently defend their licentiate thesis at a seminar where the public can attend.

The licentiate thesis is examined by an examining committee, who will award a grade of Pass or Fail.

Title of degree

For a Degree of Doctor

Science Doctor

For a Degree of Licentiate

Science Licentiate

Additional information

Further information can be found in Mälardalen University's *Rules for third-cycle studies*. Information is also available on the University's website.

Entry requirements

General entry requirements

A person meets the general entry requirements to third-cycle studies, according to the Higher Education Ordinance, Chapter 7, Section 39, if they:

1. have been awarded a qualification at second cycle,
2. have fulfilled course requirements comprising at least 240 higher education credits, of which at least 60 were awarded in the second cycle, or
3. have acquired substantially equivalent knowledge in some other way in or outside Sweden.

The University may grant an exemption from the general entry requirements for an individual applicant if there are particular grounds, according to Chapter 7, Section 39 of the Higher Education Ordinance.

Specific entry requirements

Specific entry requirements to be admitted to Industrial Systems are met if you have:

1. A degree at advanced level in an area/subject relevant for the third-cycle education project in question, or equivalent.

Selection

Selection among applicants who fulfil the entry requirements is made by an assessment of the applicant's ability to be able to benefit from the education.

The selection of eligible applicants who fulfil the entry requirements will be based on the following assessment criteria:

- Relevant prior knowledge for the research project in question
- Ability to cooperate as well as taking lead, and
- good presentation and writing skills.

Coming into effect and interim regulations

The existing syllabus will come into effect on 2023-03-01

This is a translation of the Swedish version. In the event of discrepancies, the Swedish version will take precedence.