



Faculty of Health, Science and Technology

Curriculum for Third-Cycle Education in Industrial engineering management

(Forskarutbildning i Industriell ekonomi)

Curriculum Approval

The curriculum was approved by the Faculty Board of Health, Science and Technology 2023-02-02 and is effective from the date of decision.

General stipulations for third-cycle education are provided in the *Higher Education Act* and in the *Higher Education Ordinance*. The Licentiate/Doctoral programme is offered to the extent permitted by available funding.

1. General Information

Industrial engineering management is an interdisciplinary technical-management subject area. It investigates how organisations are organised as well as how they manage and develop resources, methods, and services. As a subject area for doctoral studies (third-cycle education) the focus is on both theoretical contributions to knowledge, as well as advancement of industrial best practice, as these are pivotal for management of innovation and production in established and developing industries and organisations. Main focus areas are production planning & control, and innovation management.

2. Aims and Objectives

The general objectives of licentiate or doctoral studies in terms of knowledge and understanding, competence and skills, and judgement and approach are specified as follows in the *Higher Education Ordinance, Annex 2, SFS 2006:1053*):

Degree of Licentiate

Knowledge and understanding

For a Degree of 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 Degree of Licentiate the third-cycle student shall

- demonstrate the ability to identify and formulate issues with scholarly precision critically, independently 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 independently in research and development work and to work autonomously in some other qualified capacity.

Judgement and approach

For a **Degree of 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.

Degree of Doctor

Knowledge and understanding

For a **Degree of Doctor** 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 a **Degree of Doctor** the third-cycle 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, independently 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 third-cycle student shall

- demonstrate intellectual independence 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.

3. Admission Requirements

A person who meets the general admission requirements as well as the specific admission requirements and is judged to have the ability otherwise required for pursuing the programme successfully is eligible for admission.

3.1 General eligibility

A person who has earned a master's degree of at least 240 ECTS credits of which at least 60 ECTS credits are studies at master's level, or who in some other way in the country or abroad has acquired largely equivalent knowledge has general eligibility for admission. If there are special reasons for doing so, the faculty board may grant an individual applicant exemption from the general eligibility (*Higher Education Ordinance, Ch.7, section 39*).

3.2 Special eligibility

Special eligibility requirements for admission to doctoral studies in Industrial engineering management meet those who have been awarded a Master of Science or Master in Industrial engineering management or in adjacent subject areas such as Mechanical engineering (in particular with specialisation in Industrial production) and Computer science (in particular with specialisation in Industrial IT), provided that the studies and Thesis work have a direction that is relevant to the envisaged doctoral studies. The Thesis work must be an individual work of at least 15 ECTS on advanced level with relevance to the envisaged doctoral studies.

An applicant who does not meet these specific entry requirements but who has acquired relevant knowledge in some other way may be deemed eligible following a special assessment.

4. Admission Procedure

Applications for admission to doctoral studies are processed in accordance with the procedures prescribed by the Board of Karlstad University.

5. Selection

Candidates will be selected on the basis of their assessed capacity to successfully complete a programme at the doctoral level.

The selection will be based on the applicant's previous study records, with an emphasis on the quality of independently written work of a scholarly and investigatory nature, particularly at Master's level, previous research and investigatory work and work experience of relevance to the doctoral programme, ability to communicate verbally and in writing in English, and the extent to which the applicant is able to be physically present and an active member of the research environment.

6. Content and Outline

The doctoral programme can lead to a doctoral or licentiate degree. The licentiate degree requires two years of study, the equivalent of 120 ECTS cr. The

doctoral degree requires four years of study, the equivalent of 240 ECTS cr. The studies include coursework and an independent project (licentiate thesis or doctoral thesis).

To earn a licentiate degree, the student is required to complete coursework of at least 30 ECTS and a thesis of at least 80 ECTS.

To earn a doctoral degree, the student is required to complete coursework of at least 60 ECTS and a thesis of at least 150 ECTS.

The exact numbers are decided upon when the individual study plan is established, and are based on the need for courses in relation to the envisaged thesis work and the doctoral student's pre-knowledge.

6.1 Courses

Mandatory course content:

- Theory of science including philosophy and ethics (at least 5 ECTS)
- Research methodology (at least 5 ECTS for Licentiate degree, at least 12,5 ECTS for Doctoral degree)
- Academic writing, research communication, information search (at least 5 ECTS)
- Specialisation in a for the doctoral studies (Thesis work) relevant research area (at least 5 ECTS).

Pedagogic education

All doctoral students with teaching duties are offered a basic pedagogic education of at least 3 ECTS. Doctoral students in Industrial engineering management can count in this education as a course within their doctoral studies.

Pedagogic courses that are relevant for future duties and professional roles can after approval by the Examiner be counted as a course within the doctoral studies. The university's pedagogical unit (UPE) offers a number of potentially relevant courses.

Credit transfer

Credit transfer is regulated by the Higher Education Ordinance, Chapter 6, Sections 6-8.

6.2 Licentiate and Doctoral Theses

Third-cycle students are required to write a thesis for a licentiate or a doctoral degree, which may be a monograph or a compilation thesis. The latter alternative is recommended.

The licentiate thesis is to be defended at a licentiate seminar and the doctoral thesis at a public examination. Further information is provided in the document "Gällande regelverk vid Karlstads universitet: Regler för utbildning

på forskarnivå” (unofficial translation ”Regulations for Third-Cycle Studies at Karlstad University”). The thesis topic for either degree is chosen in consultation with the advisor and examiner. The thesis should be written in English, with summaries both in English and in Swedish.

Before a licentiate thesis is published, it has to undergo a review in accordance with the above-mentioned document “Regler för utbildning på forskarnivå”.

In case no licentiate degree is taken, a mandatory “half time seminar” has to be held where the doctoral student demonstrates the state of progress towards a Doctoral degree.

When doctoral thesis work progresses towards completion (about 5-6 months before the planned thesis defence (“PhD Viva”) date), the work shall be presented and defended at a seminar (so-called “90% seminar”). At this seminar, the opponent shall be someone qualified to be main advisor for doctoral students in the subject area (Swedish: “minst docentkompetent”, corresponds to Associate Professor). The opponent shall write a short statement regarding the quality of the thesis work including identification of any required changes/improvements.

Before a doctoral thesis can be published and the thesis defence date set, the thesis draft has to be reviewed according to the rules set out in the above-mentioned document “Regler för utbildning på forskarnivå”.

6.3 Supervision

Admitted students are entitled to advisors in accordance with the principles stated in the current policy document at Karlstad University.

6.4 Individual Study Plan

At the start of the studies, the student shall draw up an individual study plan (ISP) in consultation with the advisors. The plan shall include a realistic estimate of time for course work, thesis work and supervision. The plan shall also include a project description and relevant ethical considerations.

The individual study plan specifies which courses are part of the doctoral studies as well as which of these are mandatory. This list is updated when the individual study plan is revised.

The ISP is drawn up according to the form or system devised by the university.

The individual study plan is subject to continual revision (at least once a year) and shall be revised if changes in time or project plan are required.

Goal attainment in licentiate/doctoral studies shall be monitored on occasions in the course of studies. After one year, an individual qualifications matrix is formulated and attached to the student’s individual study plan.

One year before the preliminary date of licentiate degree completion and two years before the preliminary date doctoral degree completion the outcome of the individual qualifications matrix is evaluated when the ISP is followed up. If the evaluation indicates that the goal attainment is not satisfactory, the study plan is revised to ensure that the national requirements are met at the time of the final examination. The revised qualifications matrix is attached to the individual study plan.

6.5 Examination

Licentiate/doctoral students are examined in accordance with the requirements of each individual course syllabus. Doctoral or licentiate theses are examined in accordance with the *Higher Education Ordinance* (Ch.6, sections 32-35) and Karlstad University's current policy document.