General syllabus for third-cycle studies in the subject Industrial Economics and Management

This governance document was adopted by the Faculty Board of the School of Industrial Engineering and Management (registration number M-2024-0018) with reference to Chapter 6, Sections 26–27 of the Higher Education Ordinance. This governance document is in force as of 9 December 2024. This governance document regulates the main content of the programme, specific entry requirements, and other necessary regulations. The Faculty Board of the School of Industrial Engineering and Management is responsible for reviewing the governance document and answering questions about it.

1 Programme content

1.1 The name of the subject in Swedish and English

Swedish: Industriell ekonomi och organisation
English: Industrial Economics and Management

1.2 Description of the subject

Industrial Economics and Management encompasses the sciences within business and management that form the basis for engineers' understanding, management, and development of technology-based value creation and sustainable growth.

Most of the research is conducted at the organisation and company level, but it also includes studies of inter-organisational relationships, industrial and technological transformation, as well as operational processes and work organisation.

Some examples of key sub-areas are innovation, industrial marketing, technology-based business development, operations management, logistics, supply chain management, project management, organisational theory, entrepreneurship, as well as technological transformation and industrial dynamics.

1.3 Specialisation(s)

This subject has no specialisations

1.4 Organisation of the programme

The programme consists of a course component of 60 credits for the Degree of Doctor and 30 credits for the Degree of Licentiate, as well as a thesis component of 180 credits for the Degree of Doctor and 90 credits for the Degree of Licentiate.

The programme is highly individualised and tailored to the doctoral student's prior knowledge and the focus of the thesis work.

Supervision

The doctoral training is conducted under the supervision of a principal supervisor, together with at least one assistant supervisor, as set out in the individual study plan.

Individual study plan

The studies of the doctoral student are set out in an individual study plan, which is revised at least once per calendar year. In connection with the revision, the doctoral student's progress and plans towards the degree are assessed and documented.

The principal supervisor is responsible for ensuring that the individual study plan is established and revised at appropriate time points (at least once per calendar year). The study plan is then approved by the director of third cycle education-

Course component

The course component has two purposes: to provide a broad bildung in the subject of Industrial Economics and Management, and to provide subject-specific depth in the specialised area of the thesis.

In addition to compulsory courses (30 credits for Degree of Doctor, 18 credits for Degree of Licentiate), there is a high degree of flexibility when choosing the elective courses (30 credits for Degree of Doctor, 12 credits for Degree of Licentiate) included in the programme.

Courses may be taken at KTH or at other universities and research institutions. The courses are to be studied as specified in the individual study plan.

See also sections 1.4.2–1.4.4.

Thesis component

The thesis component aims to enable the doctoral student to develop the ability to make independent contributions to research and the scientific community.

See also section 1.4.5.

Programme seminars

For the Degree of Doctor, the doctoral student must not only participate in internal work seminars, but also present their thesis-oriented research at a minimum of three official Programme Seminars during their doctoral studies:

1. Thesis Proposal (after 6–12 months of study)
2. Midterm/Licentiate Seminar (approximately halfway through)
3. Final Seminar (when there are 6–12 months until the Doctoral Defense).

See also section 1.4.6.

1.4.1 Activities for achieving the intended learning outcomes of the programme according to the Higher Education Ordinance

The activities required for the doctoral student to achieve the intended learning outcomes for the award of third-cycle qualification pursuant to the Higher Education Ordinance and KTH's

objectives are described below. The activities for each individual doctoral student are specified in the individual study plan.

Outcomes: 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.

  This is achieved by the doctoral student (for example):

  1) Completing a compulsory course in orientation to research in industrial economics and management
  2) Presenting and discussing their research
     a. at various seminars.
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  3) Participating in the department's teaching at the first-cycle and second-cycle levels.

- Demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular.

  This is achieved by the doctoral student (for example):

  1) Completing compulsory courses in qualitative and quantitative methods.
  2) Completing a compulsory course in scientific theory.
  3) Completing in-depth elective methodology courses.
  4) Presenting and discussing their research
     a. at various seminars.
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  5) Completing degree assessment through a doctoral thesis and public defence.

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.

  This is achieved by the doctoral student (for example):

  1) Completing a compulsory course in orientation to research in industrial economics and management
  2) Presenting and discussing their research
     a. at various seminars.
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.

3) Participating in the department's teaching at the first-cycle and second-cycle levels.
4) Completing degree assessment through a licentiate thesis and licentiate seminar.

Outcomes: Competence and skills

For the Degree of Doctor, the doctoral student shall:

- Demonstrate the capacity for scientific analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically.

  This is achieved by the doctoral student (for example):

  1) Presenting and discussing their research
     a. at various seminars.
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  2) Critically discussing the research of others at seminars and conferences.
  3) Completing degree assessment through a doctoral thesis and public defence.

- Demonstrate the ability to identify and formulate issues with scientific 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.

  This is achieved by the doctoral student (for example):

  1) Completing compulsory courses in qualitative and quantitative methods.
  2) Completing a compulsory course in scientific theory.
  3) Completing in-depth elective methodology courses.
  4) Presenting and discussing their research
     a. at various seminars.
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  5) Critically discussing the research of others at seminars and conferences.
  6) Publishing in international scientific journals
  7) Completing degree assessment through a doctoral thesis and public defence

- Demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through their own research.

  This is achieved by the doctoral student (for example):

  1) Completing degree assessment through a doctoral thesis and public defence

- 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 scientific community and society in general.

This is achieved by the doctoral student (for example):

1) Completing an elective course in scientific communication
2) Presenting and discussing their research
    a. at various seminars
    b. at scientific conferences.
    c. at the programme's thesis plan, mid-way and final seminars.
3) Critically discussing the research of others at seminars and conferences.
4) Publishing in international scientific journals
5) Completing degree assessment through a doctoral thesis and public defence

- Demonstrate the ability to identify the need for further knowledge.

This is achieved by the doctoral student (for example):

1) Completing an elective course in which the doctoral student seeks and analyses relevant literature in their specialist area.
2) Presenting and discussing their research
    a. at various seminars
    b. at scientific conferences.
    c. at the programme's thesis plan, mid-way and final seminars.
3) Conducting annual follow-ups together with their supervisor and planning new milestones in the individual study plan

- 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.

This is achieved by the doctoral student (for example):

1) Completing an elective course in scientific communication
2) Presenting and discussing their research
    a. at various seminars
    b. at scientific conferences.
    c. at the programme's thesis plan, mid-way and final seminars.
3) Participating in the department's teaching at the first-cycle and second-cycle levels.

For the Degree of Licentiate, the doctoral student shall:

- Demonstrate the ability to identify and formulate issues with scientific 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.

This is achieved by the doctoral student (for example):

1) Completing an introductory course for third-cycle studies
2) Completing a methodology course relevant to the doctoral student or a course in scientific theory
3) Presenting and discussing their research
    a. at various seminars
    b. at scientific conferences.
    c. at the programme's thesis plan, mid-way and final seminars.
4) Conducting annual follow-ups together with their supervisor and documenting achieved milestones in the individual study plan.

- Demonstrate the ability in both national and international contexts to present and discuss research and research findings clearly in speech and writing and in dialogue with the scientific community and society in general.

  This is achieved by the doctoral student (for example):

  1) Completing an elective course in scientific communication
  2) Presenting and discussing their research
      a. at various seminars
      b. at scientific conferences.
      c. at the programme's thesis plan, mid-way and final seminars.
  3) Critically discussing the research of others at seminars and conferences.
  4) Publishing in international scientific journals
  5) Completing degree assessment through a licentiate thesis and licentiate seminar

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

  This is achieved by the doctoral student (for example):

  1) Presenting and discussing their research
      a. at various seminars
      b. at scientific conferences.
      c. at the programme's thesis plan, mid-way and final seminars.
  2) Critically discussing the research of others at seminars and conferences.
  3) Publishing in international scientific journals

Outcomes: Judgement and approach

For the Degree of Doctor, the doctoral student shall:

- Demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics.
  This outcome only applies for the Degree of Doctor.

This is achieved by the doctoral student (for example):

1) Completing a compulsory introductory course for third-cycle studies.
2) Completing specialised third-cycle courses with a clear focus on research ethics.
3) Presenting and discussing their research at the programme's thesis plan, mid-way and final seminars.
4) Completing degree assessment through a doctoral thesis and public defence

- 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.

  This is achieved by the doctoral student (for example):

  1) Completing a compulsory introductory course for third-cycle studies.
  2) Presenting and discussing their research
     a. at various seminars
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  3) Critically discussing the research of others at seminars and conferences.
  4) Publishing in international scientific journals
  5) Completing degree assessment through a doctoral thesis and public defence

For the Degree of Licentiate, the doctoral student shall:

- Demonstrate the ability to make assessments of ethical aspects of their own research.

  This is achieved by the doctoral student (for example):
  1) Completing a compulsory introductory course for third-cycle studies
  2) Completing specialised third-cycle courses with a clear focus on research ethics
  3) Presenting and discussing their research
     a. at various seminars
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  4) Critically discussing the research of others at seminars and conferences.
  5) Completing degree assessment through a licentiate thesis and licentiate seminar

- Demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.

  This is achieved by the doctoral student (for example):

  1) Completing a compulsory introductory course for third-cycle studies
  2) Completing a relevant methodology course
  3) Presenting and discussing their research
     a. at various seminars
     b. at scientific conferences.

c. at the programme's thesis plan, mid-way and final seminars.

4) Critically discussing the research of others at seminars and conferences.

- Demonstrate the ability to identify the personal need for further knowledge and take responsibility for their ongoing learning.

  This is achieved by the doctoral student (for example):

  1) Completing an elective course in which the doctoral student seeks and analyses relevant literature in their specialist area.
  2) Presenting and discussing their research
     a. at various seminars
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.
  3) Conducting annual follow-ups together with their supervisor and planning new milestones in the individual study plan.

KTH's intended learning outcomes in sustainable development

For *both the Degree of Licentiate and the Degree of Doctor*, the doctoral student shall:

- Demonstrate the ability to use knowledge and skills to contribute to sustainable development towards an equal, inclusive and climate-neutral society.

  This is achieved by the doctoral student (for example):

  1) Completing compulsory and/or elective courses that include sustainability subjects as part of their intended learning outcomes
  2) Presenting and discussing their research
     a. at various seminars
     b. at scientific conferences.
     c. at the programme's thesis plan, mid-way and final seminars.

1.4.2 Compulsory courses

The compulsory courses comprise 30 credits for the Degree of Doctor and 18 credits for the Degree of Licentiate.

The courses are preferably taken at the Department of Industrial Economics and Management, but equivalent courses may also be taken at another department at KTH or at another higher education institution (however, this must be approved in advance by the supervisor and the director of the doctoral programme). The exact course syllabus is specified in consultation with the principal supervisor and is specified in the individual study plan.

For the Degree of Doctor, compulsory courses shall include:

1. Introduction to Research Studies, 6 credits
2. Orientation to Research in Industrial Economics and Management, 6 credits
3. Qualitative Research Methods, 6 credits
4. Quantitative Research Methods, 6 credits
5. Theory of Science, 6 credits

For the Degree of Licentiate, compulsory courses shall include:

1. Introduction to Research Studies, 6 credits
2. Orientation to Research in Industrial Economics and Management, 6 credits
3. At least one of the following:
    a. Qualitative Research Methods, 6 credits
    b. Quantitative Research Methods, 6 credits
    c. Theory of Science, 6 credits

Higher education pedagogy requirements

Doctoral students who teach in KTH's first-cycle and/or second-cycle programmes have to fulfill KTH's requirements related to courses in higher education pedagogy.

1.4.3 Recommended courses

In addition to subject-specific courses, doctoral students are encouraged to take more general skills courses, such as:

- Doctoral student and researcher courses in scientific communication.
- Courses covering systematic literature reviews, database searches, open access, etc.

1.4.4 Conditionally elective courses

The programme does not have any conditionally elective courses.

Individualised course syllabus

For each doctoral student, the course requirements shall be planned together with the supervisors and approved in advance by the principal supervisor. The courses shall be documented in the individual study plan.

Credit transfer for courses

After assessment by the principal supervisor, credits from previous studies may be applied to the programme. When transferring credits, the provisions in KTH's System of Qualifications for Third-Cycle Programmes shall be taken into account:

- For the Degree of Doctor, at least 45 credits of the total course component must be at the third-cycle level. For the Degree of Licentiate, at least 18 credits must be at the third-cycle level.

- For first-cycle and second-cycle programmes up to 240 credits, no credit transfer is permitted.

- Credits may not be transferred from courses required to meet specific entry requirements for the third-cycle programme.

In addition, other elements that the principal supervisor considers important for the thesis work may be included in the course component. Such credit-bearing activities may include individual literature courses, qualified contributions to the department's research activities or other qualified scientifically related activities. In order for such activities to be credited, an agreement must be made *in advance* between the principal supervisor and the doctoral student, with credits specified in the individual study plan.

So-called MOOCs (Massive Open Online Courses) must be approved in advance by the principal supervisor in consultation with the programme director of the doctoral programme in order to be credited within the framework of the doctoral and licentiate degrees.

1.4.5 Qualification requirements

Degree of Doctor

The Degree of Doctor comprises 240 credits. The doctoral thesis shall comprise at least 180 credits.

Thesis

Thesis work is a compulsory component of third-cycle education, and aims to enable doctoral students to develop the ability to make independent contributions to research and the scientific community.

Format

The thesis can be written as a monograph or as a compilation of scientific articles. In the latter case, the thesis must include a specially written summary (a so called cover essay).

A monograph shall normally be 150 to 200 pages long.

A compilation thesis shall, in addition to a cover essay of approximately 50 pages, comprise at least four publishable scientific articles (the international standard in the field). The doctoral student shall normally be the responsible first author of at least one article and the sole author of at least one article. At the time of thesis defence, at least two articles should preferably have been accepted for publication in internationally recognised, peer-reviewed scientific journals.

The thesis is assessed as a whole, regardless of its format.

Language

The thesis should normally be written in English or Swedish (special permission from the ITM School is required for Swedish-language theses).

Content and quality level

For the Degree of Doctor, the thesis shall contain new theoretical or empirical research results within the chosen subject area that the doctoral student has developed through theoretical or empirical research. It must also include an overview of previous research in the chosen subject

area, and position the doctoral student's contribution in relation to previous research.

When presented as a monograph or a compilation of scientific articles, the doctoral thesis must be of such quality that it is deemed to correspond to at least four articles published in internationally recognised, peer-reviewed scientific journals.

Courses

The doctoral student must have completed courses totalling at least 60 credits, of which at least 45 credits must be at the third-cycle level and a maximum of 10 credits may be at the first-cycle level.

Degree of Licentiate

The Degree of Licentiate comprises at least 120 credits. The licentiate thesis shall comprise at least 90 credits.

Licentiate thesis

Format

The licentiate thesis can be written as a monograph or as a compilation of scientific articles. In the latter case, the thesis must include a specially written summary.

Language

The thesis should normally be written in English or Swedish (special permission from the ITM School is required for Swedish-language theses).

Content and quality level

A licentiate thesis shall contain an application of existing scientific knowledge in a new area that the student has developed through theoretical or empirical research. It must also include an overview of previous research in the chosen subject area, and position the doctoral student's contribution in relation to previous research.

When presented as a monograph or a compilation of scientific articles, the licentiate thesis must be of such quality that it is deemed to correspond to at least two articles published in internationally recognised, peer-reviewed scientific journals. In the case of a compilation thesis, the doctoral student should be the sole author of at least one article.

After approval by the principal supervisor, the thesis is presented at a public seminar in accordance with KTH's regulations.

Courses

The doctoral student must have completed courses totalling at least 30 credits, of which at least 18 credits must be at the third-cycle level and a maximum of 10 credits may be at the first-cycle level.

1.4.6 Other elements of the programme to promote and ensure goal attainment

Quality assurance

For the Degree of Doctor, the doctoral student must not only participate in internal work seminars, but also present their thesis-oriented research at a minimum of three official programme seminars during their doctoral studies:

- Thesis plan (after 6–12 months of study)
- Interim/licentiate seminar (approximately halfway through)
- Final seminar (when 6–12 months remain until thesis defence).

All doctoral students and researchers associated with the programme are invited to participate in these seminars. At the seminar, the manuscript is reviewed by an expert opponent/external reviewer who is not involved in the doctoral student's work. The seminar is chaired by a faculty member of the department of Industrial Economics and Management, but not the doctoral student's principal supervisor or assistant supervisor.

A written manuscript must be provided to the invited participants no later than one week before the seminar. At the interim/licentiate seminar, the opponent/external reviewer should preferably be qualified for appointment as a docent.

Final Seminar prior to the public defence

Prior to completion of the doctoral thesis, the doctoral student shall present their manuscript at a Final Seminar. The Final Seminar is part of the quality review process within the doctoral programme and aims to ensure that the doctoral thesis is of high scientific quality.

The Final Seminar deals with what is considered to be the penultimate version of the thesis manuscript, which means that the thesis is ready in its entirety.

An external, independent opponent/external reviewer who has not previously been involved in the doctoral student's work is invited to the seminar. The opponent/external reviewer should preferably be qualified for appointment as a docent. The seminar is chaired by a faculty member of the department of Industrial Economics and Management, but not the doctoral student's principal supervisor or assistant supervisor. The final seminar shall be announced to all factulty members and doctoral students in the programme.

2 Admission to third-cycle programmes (entry requirements, etc.)

Admission to third-cycle programmes is regulated in Chapter 7, Section 40 of the Higher Education Ordinance and in KTH's admission regulations. KTH's regulations on specific entry requirements and other abilities needed to benefit from the third-cycle programme in the subject in question are set out below.

2.1 Specific entry requirements

The following requirements must be met to be admitted to a third-cycle programme in Industrial Economics and Management:

- The applicant must have passed at least 60 credits of courses at the second-cycle level in the field of Industrial Economics and Management (or equivalent) or other subjects deemed directly relevant to the research specialisation in question. These requirements are also deemed to be met by those who have acquired equivalent knowledge in other ways.

- The applicant must have English proficiency equivalent to English 6.

2.2 Criteria for assessing the ability to succeed in the programme

Admission of students to the third-cycle programme is decided by the Dean/Head of School. The degree of ability to succeed in the third-cycle programme forms the basis for selection. The selection is primarily based on documented material submitted by the applicant. Other supporting material, such as an interview with the applicant, may also be of significance. Suitability for third-cycle studies is determined based on a combination of grades, previous activities, interest and ability to exercise independent judgement and critical analysis.

When assessing the ability to succeed in the programme, the following assessment criteria are used:

Admission to a third-cycle programme is based on assessed ability to succeed in the programme. The assessment of ability is primarily based on qualifying education. The following are given special consideration:

1. Knowledge and skills relevant to the thesis work and the subject.
   These can be demonstrated through attached documents and an interview, if applicable.
2. Assessed ability to work autonomously
   a. ability to formulate and address scientific problems
   b. written and oral communication skills
   c. maturity, judgement and capacity for independent critical analysis

   The assessment can, for example, be based on the degree project and a discussion of this at a possible interview.
3. Other experience relevant to the third-cycle programme, such as professional experience.

3 Other necessary regulations

3.1 Transitional provisions

Doctoral students who were admitted under a previous syllabus are entitled to follow either the new syllabus or the syllabus under which they were admitted. Requests to follow the previous syllabus are made to the ITM School's director of third cycle education.

Appendix: Qualitative targets and assessment criteria

Intended learning outcomes pursuant to the System of Qualification, Annex 2 to the Higher Education Ordinance, plus requirements specified by KTH, with examples of assessment criteria that can determine whether the doctoral student has achieved the outcome in question. *The assessment criteria in the table are examples and were developed as support and inspiration for activities described in Section 1.4.*

Degree of Doctor

Knowledge and understanding	
Intended learning outcomes	**Assessment criteria with reference to numbering in eISP**
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.	The outcome has been achieved through the doctoral student having **A1.1:** authored original scientific papers in which their own contributions are significant and identifiable. The papers are of such quality that they have been published, or are expected to be published, in peer-reviewed international scientific journals or conferences. **A1.2:** demonstrated both broad and specialised knowledge in the research area by writing a thesis in which the research results were positioned and discussed in a broader perspective, and presented a reference list of other researchers' results that spans the relevant breadth of the research area. **A1.3:** in a seminar, course or a thesis or its public defence, demonstrated a good ability to account for how their own research results relate to the research front within the research area, and justify how their own results advance this. **A1.4:** actively participated in seminar activities in which their own results were presented and discussed, and asked questions and provided feedback on the presentations on other students and researchers.
Demonstrate *familiarity* with research methodology in general and the methods of the specific field of research in particular.	The outcome has been achieved through the doctoral student having **A2.1:** assessed with passing result regarding intended learning outcomes in scientific methodology, which may be a course or equivalent learning element at the third-cycle level. **A2.2:** described basic theories in scientific theory and correctly applied one or more of these in their own research. **A2.3:** practically applied methods appropriate to the research area and developed the ability to independently perform, interpret and critically examine the results in order to clarify whether the method and its execution were appropriate to obtain credible results that answer the scientific question. **A2.4:** justified their choice of method and execution in relation to the research question and to alternative methods. **A2.5:** described the advantages and disadvantages of different

	scientific methods used in their own research area, as well as the methods used in the broader definition of the research area.
Competence and skills	
Intended learning outcomes	**Assessment criteria with reference to numbering in eISP**
Demonstrate the capacity for scientific analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically.	The outcome has been achieved through the doctoral student having **B1.1:** demonstrated the ability to independently formulate and critically analyse both existing and new complex phenomena. **B1.2:** presented concrete examples of scientific questions and problems of a complex nature from their own research, and described how these were tested and how the results were analysed. **B1.3:** described the interpretation of the results and how these were combined with existing knowledge to give rise to a new explanatory model. **B1.4:** where applicable, presented concrete examples of results that have given rise to falsification of a hypothesis and revision of the hypothesis.
Demonstrate the ability to identify and formulate issues with scientific 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.	The outcome has been achieved through the doctoral student having **B2.1:** presented examples of independently performed experiments/simulations/tasks that were preceded by detailed time planning. **B2.2:** where applicable, presented examples of their own hypotheses that have been tested within the framework of their own research project and described the choice of method and outcome. If any results were not as expected, the doctoral student shall have explained the possible sources of error and the measures taken to move the project forward. **B2.3:** presented examples of and described and argued for the choice of methods for individual research tasks. **B2.4:** explained how it was ensured that the training could be completed on time, and whether there were obstacles to staying within the time frame, as well as what measures were taken and their outcome.
Demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through their own research.	The outcome has been achieved through the doctoral student having **B3.1**: authored original scientific papers in which their own contributions are significant and identifiable. The papers are of such quality that they have been published, or are expected to be published, in peer-reviewed international scientific journals or conferences. **B3.2**: authored a thesis, based on the scientific papers, of good scientific and linguistic quality, which has been authoritatively defended and discussed at a public defence, and assessed with a passing grade by an independent examining committee.
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 scientific community and society in general.	The goal has been achieved through the doctoral student having **B4.1:** where applicable, participated in national and international conferences and presented their own research results in speech or poster form, and participated in scientific discussions with other researchers in the research area.

	B4.2: described how experience from conference or seminar presentations contributed to the development of their own ability to communicate and defend scientific results, how the presentations were received by other participants, and whether valuable information could be obtained that helped their own studies progress. **B4.3:** been assessed with a passing grade for the intended learning outcomes in communication or presentation techniques in an appropriate compulsory or elective third-cycle course **B4.4:** described basic concepts, tools and methods in presentation or communication techniques, as well as demonstrated the ability to put knowledge into practice by formulating different types of scientific presentation material of good quality. **B4.5:** presented their own research results in a pedagogical manner to other students and researchers at academic seminars, to a general audience or to another category of audience, where the formulation of presentation material and speech was based on pedagogical knowledge adapted to the audience's knowledge level, and also answered questions at an adequate level for the audience. **B4.6:** participated in outreach activities related to their own research in order to contribute to the dissemination and exchange of knowledge with relevant stakeholder groups, such as other higher education institutions, companies, authorities, schools, etc.
Demonstrate the ability to identify the need for further knowledge.	The outcome has been achieved through the doctoral student having **B5.1:** by means of concrete examples, described how the lack of essential knowledge needed to carry out a task was rectified and how this affected the possibility of carrying out the task. This may involve widely differing tasks and knowledge, with the proviso that the doctoral student him/herself must have realised that knowledge was lacking and handled this with measures relevant to the purpose. **B5.2:** demonstrated insight that the knowledge front in higher education and research is in constant change and development and that definitive answers cannot always be obtained, as well as the ability to determine whether certain knowledge already exists, for example by means of thorough and critical examination of existing scientific literature. **B5.3:** demonstrated the ability to question, evaluate and adapt their perception of their own level of knowledge and ability in relation to the prevailing knowledge front.
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.	The outcome has been achieved through the doctoral student having **B6.1:** presented their own research results in a pedagogical manner to other students and researchers at academic seminars, to a general audience or to another category of audience, where the formulation of presentation material and speech was based on pedagogical knowledge adapted to the audience's knowledge level, and also answered questions at an adequate level for the audience. **B6.2:** participated in outreach activities related to their own research in order to contribute to the dissemination and exchange of knowledge with relevant stakeholder groups, such as other higher education institutions, companies, authorities, schools, etc.

	B6.3: actively supervised other students in theoretical and/or practical projects. Doctoral students should, with examples, account for and reflect on various aspects of their own input, e.g. how the supervision was structured, whether pedagogical methodology was applied, how it was ensured that the person who was supervised understood the instructions, etc. The doctoral student should also reflect on different roles of teachers and students, and how personal dynamics and supervision techniques can affect the outcome of learning and interaction. **B6.4:** been assessed with a passing grade for the intended learning outcomes in higher education pedagogy in a suitable compulsory or elective course at the third-cycle level. The doctoral student is thus assumed to be able to describe basic concepts, materials and methods, as well as conditions for teaching and learning in higher education, and to be able to analyse, evaluate and develop teaching and learning. The doctoral student is thus also assumed to be able to demonstrate the ability to evaluate and analyse different methods and approaches in higher education, and to demonstrate the ability to take into account a student perspective. **B6.5:** demonstrated the ability to collaborate and communicate in writing and speech, undertaken tasks and assignments that were planned and completed on time, and demonstrated the ability to comply with applicable rules and directives and thereby acquired general knowledge and skills required in different societal functions.
Judgement and approach	
Intended learning outcomes	**Assessment criteria with reference to numbering in eISP**
Demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics.	The outcome has been achieved through the doctoral student having **C1.1:** demonstrated intellectual integrity in the sense that their own choices and positions have been justified and defended based on independent critical thinking in relation to proven experience and scientific basis. **C1.2:** described how they ensured that their own scientific procedure in theory and practice was carried out in an honest and ethical manner. **C1.3:** reflected on possible existing or hypothetical ethical dilemmas related to their own research area or to scientific research in general, and reported on their own ethically independent stance in the existing or hypothetical situation. **C1.4:** been assessed with a passing grade for the intended learning outcomes in ethics in a suitable compulsory or elective third-cycle course. The doctoral student is thus expected to be able to account for fundamental theories in research ethics and relate these to their own approach and research work.
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, and demonstrate the ability to contribute to sustainable societal development with knowledge and skills.	The outcome has been achieved through the doctoral student having **C2.1:** presented concrete examples of how their own research results, and the research area in general, can contribute new knowledge to the research front in the area and justify its societal relevance.

	C2.2: critically reflected on limitations of their own research results, and the research area in general, in order to contribute to solving societally relevant problems, as well as identify possible situations in which their own research results can be used in both a positive and a negative way. **C2.3:** demonstrated a good ability to reflect on how their own research results can contribute to sustainable societal development and can, where relevant, also link these to the prioritised global sustainable development goals. **C2.4:** described how their own actions and approach take the concept of sustainability into account. **C2.5:** been assessed with a passing grade for the intended learning outcomes in sustainable development in an appropriate compulsory or elective third-cycle course. The doctoral student is thus expected to be able to account for fundamental theories in sustainability and relate these to their own approach and research work.

Degree of Licentiate

Knowledge and understanding	
Intended learning outcomes	**Assessment criteria with reference to numbering in eISP**
Demonstrate *knowledge and understanding* in the field of research, including *current* specialist knowledge in a limited area of this field. *Main difference compared to the Degree of Doctor: For the Degree of Licentiate, it is sufficient to demonstrate "knowledge and understanding", as opposed to "broad knowledge and systematic understanding". In addition, "advanced and up-to-date specialised knowledge" is replaced with "current specialist knowledge".*	The outcome has been achieved through the doctoral student having **A1.1:** authored original scientific papers in which their own contributions are significant and identifiable. The papers are of such quality that they have been published, or are expected to be published, in peer-reviewed international scientific journals or conferences. **A1.2:** demonstrated both broad and specialised knowledge in the research area by writing a licentiate thesis in which the research results were positioned and discussed in a broader perspective, and presented a reference list of other researchers' results that spans the relevant breadth of the research area. **A1.3:** in a seminar, course or a licentiate thesis and its public defence, demonstrated a good ability to account for how their own research results relate to the research front within the research area, and justify how their own results advance this. **A1.4:** actively participated in seminar activities in which their own results were presented and discussed, and asked questions and provided feedback on the presentations on other students and researchers.
Competence and skills	
Intended learning outcomes	**Assessment criteria with reference to numbering in eISP**
Demonstrate the ability to identify and formulate issues with scientific 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. *Main difference compared to the Degree of Doctor: For the Degree of Licentiate, there is emphasis that the student is to undertake a "limited piece of research" that is to contribute to the formulation of knowledge, as opposed to the Degree of Doctor, which specifies that the student is to demonstrate the ability to "undertake research".*	The outcome has been achieved through the doctoral student having **B1.1:** demonstrated the ability to independently formulate and critically analyse both existing and new complex phenomena. **B1.2:** presented examples of their own questions that have been tested within the context of their own research project, and presented their choice of method and the outcome. If any results were not as expected, the doctoral student shall have explained the possible sources of error and the measures taken to move the project forward. **B1.3:** presented examples of independently conducted experiments/simulations/tasks preceded by detailed time planning. **B1.4:** presented examples of, and explained and argued for, the choice of methods for individual experiments. **B1.5:** explained how it was ensured that the training could be completed on time, and whether there were obstacles to staying within the time frame, as well as what measures were taken and their outcome.
Demonstrate the ability in both national and international contexts to present and discuss	The goal has been achieved through the doctoral student having

research and research findings *clearly* in speech and writing and in dialogue with the scientific community and society in general. *Main difference compared to the Degree of Doctor: For the Degree of Licentiate, the requirement is for the student to communicate their research "clearly", as opposed to communicating "authoritatively".*	**B2.1:** where applicable, participated in national and international conferences and presented their own research results in speech or poster form, and participated in scientific discussions with other researchers in the research area. **B2.2:** described how experience from conference or seminar presentations contributed to the development of their own ability to communicate and defend scientific results, how the presentations were received by other participants, and whether valuable information could be obtained that helped their own studies progress. **B2.3:** been assessed with a passing grade for the intended learning outcomes in communication or presentation techniques in an appropriate compulsory or elective third-cycle course **B2.4:** described basic concepts, tools and methods in presentation or communication techniques, as well as demonstrated the ability to put knowledge into practice by formulating different types of scientific presentation material of good quality. **B2.5:** presented their own research results in a pedagogical manner to other students and researchers at academic seminars, to a general audience or to another category of audience, where the formulation of presentation material and speech was based on pedagogical knowledge adapted to the audience's knowledge level, and also answered questions at an adequate level for the audience. **B2.6:** participated in outreach activities related to their own research in order to contribute to the dissemination and exchange of knowledge with relevant stakeholder groups, such as other higher education institutions, companies, authorities, schools, etc.
Demonstrate the skills required to participate autonomously in research and development work and to work autonomously in some other qualified capacity. *Main difference compared to the Degree of Doctor: The doctoral student's future contribution to society through research and education is downplayed, and the focus is placed on the doctoral student's ability to work in areas that require research skills but not a doctoral degree.*	The outcome has been achieved through the doctoral student having **B3.1**: authored original scientific papers in which their own contributions are significant and identifiable. The papers are of such quality that they have been published, or are expected to be published, in peer-reviewed international scientific journals or conferences. **B3.2**: authored a licentiate thesis based on their own studies of good scientific and linguistic quality, which has been defended and discussed at a licentiate seminar, and assessed with a passing grade by an independent examiner.

Judgement and approach

Intended learning outcomes	Assessment criteria with reference to numbering in eISP
Demonstrate the ability to make assessments of ethical aspects *of their own research.* *Main difference compared to the Degree of Doctor: The ability to make assessments of research ethics is limited to the student's own research and not in general.*	The outcome has been achieved through the doctoral student having **C1.1:** demonstrated intellectual integrity in the sense that their own choices and positions have been justified and defended based on independent critical thinking in relation to proven experience and scientific basis. **C1.2:** described how they ensured that their own scientific procedure in theory and practice was carried out in an honest and ethical manner. **C1.3:** reflected on possible existing or hypothetical ethical dilemmas related to their own research area or to scientific research in general,

	and reported on their own ethically independent stance in the existing or hypothetical situation. **C1.4:** been assessed with a passing grade for the intended learning outcomes in ethics in a suitable compulsory or elective third-cycle course. The doctoral student is thus expected to be able to account for fundamental theories in research ethics and relate these to their own approach and research work.
Demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used. *Main difference compared to the Degree of Doctor: For the Degree of Licentiate, only "insight" is required, as opposed to "specialised insight for the doctoral degree.*	The outcome has been achieved through the doctoral student having **C2.1:** presented concrete examples of how their own research results, and the research area in general, can contribute new knowledge to the research front in the area and justify its societal relevance. **C2.2:** critically reflected on limitations of their own research results, and the research area in general, in order to contribute to solving societally relevant problems, as well as identify possible situations in which their own research results can be used in both a positive and a negative way. **C2.3:** demonstrated a good ability to reflect on how their own research results can contribute to sustainable societal development and can, where relevant, also link these to the prioritised global sustainable development goals. **C2.4:** described how their own actions and approach take the concept of sustainability into account.
Demonstrate the ability to identify the personal need for further knowledge and take responsibility for their ongoing learning. *Main difference compared to the Degree of Doctor: Same requirement to be able to identify the need for further knowledge, with the addition of being able to take responsibility for one's own knowledge development, which is considered implicit in a doctoral degree.*	**C3.1:** by means of concrete examples, described how the lack of essential knowledge needed to carry out a task was rectified and how this affected the possibility of carrying out the task. This may involve widely differing tasks and knowledge, with the proviso that the doctoral student him/herself must have realised that knowledge was lacking and handled this with measures relevant to the purpose. **C3.2:** demonstrated insight that the knowledge front in higher education and research is in constant change and development and that definitive answers cannot always be obtained, as well as the ability to determine whether certain knowledge already exists, for example by means of thorough and critical examination of existing scientific literature. **C3.3:** demonstrated the ability to question, evaluate and adapt their perception of their own level of knowledge and ability in relation to the prevailing knowledge front.