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General syllabus for third-cycle programmes in the subject area Technology and Learning

This regulatory document has been established by decision of the President (ref. no. V-2023-0469) pursuant to Sections 26 and 27 of Chapter 6 the Swedish Higher Education Ordinance (SFS 1993:100). The document is valid from 8 March 2019 until further notice and was last revised on 19 September 2023 (ref. no. V-2023-0469). The document regulates the main content of programmes, specific entry requirements and any other necessary provisions. The School of Industrial Engineering and Management is responsible for reviewing and revising the document and answering any questions about its content.

1 Content of the programme

1.1 The name of the subject area in Swedish and English

Teknik och lärande/Technology and Learning

1.2 Subject description

As a subject, Technology and Learning is interdisciplinary, practice-based and policy-based in nature. Research methods, theories and empirical approaches are based on traditions and perspectives drawn from the humanities, social sciences, technological sciences and natural sciences. The subject covers the preconditions for learning and communication, processes of learning, education and communication, as well as the results and effects of learning and communication within technological sciences. Important research areas include: technology didactics; the content of and types of instruction in engineering courses and programmes; learning design and technology; policy, management and change processes; and the significance of technology to society.

1.3 Specialisations

There are no specialisations in this subject area.

1.4 Organisation of the programme

The programme consists of course requirements and a licentiate/doctoral thesis. Course components may consist of lectures, literature reviews and problem-solving, as well as active participation in seminars and conferences. Courses may be studied at KTH or at other Swedish or foreign research institutions. The programme includes active participation in research seminars within the subject area, including regularly making presentations. The doctoral student shall also participate in national and international conferences and researcher networks within the research domain.

The programme will be undertaken under the supervision of a principal supervisor and at least one assistant supervisor in accordance with an individual study plan. Courses requirements are to be agreed between the doctoral student and the principal supervisor and documented in the individual study plan. The individual study plan shall be adapted to the doctoral student's prior knowledge and to the specialisation of their licentiate/doctoral thesis. The doctoral student's progress shall be assessed at least once each calendar year in conjunction with the revision of

the individual study plan by the doctoral student and principal supervisor. The principal supervisor is responsible for ensuring that an individual study plan is drawn up and revised on an annual basis. The individual study plan is established by the director of third-cycle studies.

1.4.1 Activities for achieving intended learning outcomes pursuant to the Higher Education Ordinance

Described below are the activities required for the doctoral student to achieve the outcomes for the award of a third-cycle qualification pursuant to the System of Qualifications, Annex 2 to the Higher Education Ordinance, and KTH's qualitative targets. The individual study plan specifies the activities for each doctoral student.

Outcomes: Knowledge and understanding

For the Degree of Doctor the doctoral student shall:

- Demonstrate broad knowledge and a systematic understanding of the research field as well as advanced and up-to-date specialist knowledge in a limited area of this field.

This outcome can be achieved by, for example, conducting your own research within the research field, reading scientific papers, completing courses and actively participating in and presenting research at seminars and conferences.

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

This outcome can be achieved by, for example, identifying and formulating relevant research questions and discussing research methods to answer them, discussing and reflecting on the chosen research methods and approaches, completing theory courses and actively participating in seminars and conferences at which methods are discussed.

For a 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 in particular.

This outcome can be achieved by, for example, discussing and formulating relevant research questions and planning and implementing data collection and analysis to answer them, writing scientific papers based on the results of your own research, actively participating in seminars with a specific focus on research methodology, reading scientific literature in the field and discussing selected approaches and methods, and conducting studies with reliable results and conclusions.

Outcomes: 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.

This outcome can be achieved by, for example, formulating relevant research questions, reviewing, discussing and offering constructive feedback on other doctoral student's papers and critically reviewing scientific papers.

- 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.

This outcome can be achieved by, for example, planning and conducting studies in a reliable manner, conducting literature reviews in order to formulate relevant research questions, planning empirical studies, actively participating in research seminars at which studies are discussed and taking courses on research methodology. The outcome can also be achieved by documenting and following up subgoals in the individual study plan.

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

This outcome can be achieved through, for example, supervision meetings at which research is planned and discussed, presenting research at seminars and conferences and holding a planning seminar, half-time seminar and final seminar.

- 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.

This outcome can be achieved by, for example, authoring scientific papers, actively participating in research seminars and conferences, presenting research results in various contexts and taking courses on scientific communication.

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

This outcome can be achieved by, for example, writing scientific papers, searching for and reading scientific literature related to your own research, remaining updated on current research of relevance to your degree project and identifying and formulating research questions that can contribute new 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.

This outcome can be achieved by, for example, developing your teaching expertise, such as by taking courses in teaching and learning in higher education, teaching and supervising students, presenting and disseminating information about research, including your own, to the surrounding community in various contexts and taking courses on scientific communication.

For a 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.

This outcome can be achieved by, for example, planning new studies, formulating research questions and choosing suitable research methods, autonomously and critically analysing and evaluating scientific studies, critically analysing and interpreting complex results, identifying

possible new knowledge and actively participating in research seminars in which studies are discussed. The outcome can also be achieved by taking courses on methodology.

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

This outcome can be achieved by, for example, writing scientific papers, actively participating in research seminars and scientific conferences and presenting your own research results. The outcome can also be achieved by taking courses on scientific communication.

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

This outcome can be achieved by, for example, conducting scientific studies and participating in activities that involve contact with organisations outside academia.

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 can be achieved by, for example, discussing the ethical aspects of your own research and taking courses and participating in seminars on 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.

This outcome can be achieved by, for example, reflecting on and discussing the possibilities and limitations of research, both in general and with regard to your own research.

For a Degree of Licentiate, the doctoral student shall:

- Demonstrate the ability to make assessments of ethical aspects of his or her own research.

This outcome can be achieved by, for example, discussing the ethical aspects of your own research and taking courses and participating in seminars on research ethics.

- 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 outcome can be achieved by, for example, reflecting on and discussing the possibilities and limitations of research, both in general and with regard to your own research.

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

This outcome can be achieved by, for example, remaining updated on current research of relevance to your degree project and identifying and formulating research questions that may help you to investigate and identify your need for further knowledge.

KTH's qualitative target for sustainable development

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

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

1.4.2 Compulsory courses

- Introduction to Research Studies at the ITM School
- Introduction to Research Methods in Technology and Learning (for a Degree of Doctor)

1.4.3 Recommended courses

- Interview as Qualitative Research Method
- Writing Scientific Articles
- Communicating Research Beyond the Academy
- Visualize Your Science
- Basic Communication and Teaching
- Introduction to Research Ethics
- Theory, Methods and History of Technology and Engineering Sciences
- Theoretical Perspectives on Learning
- Literature Course: Education and Communication in Technology Sciences A
- Literature Course: Education and Communication in Technology Sciences B
- Literature Course: Education and Communication in Technology Sciences I

1.4.4 Conditional elective courses

1.4.5 Qualification requirements

Degree of Doctor

A Degree of Doctor is awarded after the doctoral student has completed a study programme of 240 credits, of which at least 120 credits must be awarded for a doctoral thesis.

Thesis

Quality requirements and any other requirements for the doctoral thesis.

The completion of a thesis is a compulsory element of all third-cycle programmes. The purpose of this part of the programme is to ensure that the doctoral student develops the ability to make an autonomous contribution to research and the ability to conduct research in collaboration, within and outside their own subject area. A doctoral thesis must contain new research results

developed by the doctoral student themselves or in collaboration with others. The main research results must fulfil the quality requirements for publication in internationally recognised, peer-reviewed journals (or equivalent). It must be possible to distinguish the doctoral student's contribution to articles with multiple authors.

Under normal circumstances the doctoral thesis must be written in English. It should be designed as a compilation thesis with a separate introductory chapter. A doctoral thesis should usually contain four articles suitable for publication in internationally recognised, peer-reviewed journals, at least two of which should have already been published. A doctoral thesis may build on a previous licentiate thesis. In the event that the thesis deviates from the quality requirements, it shall be reviewed by the college of supervisors for the third-cycle subject area in question.

A Degree of Licentiate may be awarded after a doctoral student has completed one part comprising at least 120 credits of a study programme intended to conclude with the award of a Degree of Doctor, if the doctoral student so requests and the higher education institution is amenable. Courses and degree projects included in a Degree of Licentiate may also be credited to a Degree of Doctor.

Courses

The doctoral student shall have completed courses for at least 60 credits, of which 45 credits must be at third-cycle level and no more than 10 credits at first-cycle level.

Degree of Licentiate

A Degree of Licentiate is awarded after a third-cycle student has completed a study programme of at least 120 credits, of which at least 60 credits must be awarded for a licentiate thesis.

Thesis

Quality requirements and any other requirements for the licentiate thesis.

The completion of a thesis is a compulsory element of all third-cycle programmes. The purpose of this part of the programme is to ensure that the doctoral student develops the ability to make an autonomous contribution to research and the ability to conduct research in collaboration, within and outside their own subject area. The thesis must contain new research results developed by the doctoral student themselves or in collaboration with others. The main research results must fulfil the quality requirements for publication in internationally recognised, peer-reviewed journals (or equivalent). It must be possible to distinguish the doctoral student's contribution to articles with multiple authors.

Under normal circumstances the licentiate thesis must be written in English. It should be designed as a compilation thesis with a separate introductory chapter. A licentiate thesis should usually contain two articles suitable for publication in internationally recognised, peer-reviewed journals, at least one of which should normally have already been published. In the event that a licentiate thesis deviates from the quality requirements, it shall be reviewed by the college of supervisors for the third-cycle subject area in question.

Courses

The doctoral student shall have completed courses for at least 30 credits, of which 15 credits must be at third-cycle level and no more than 10 credits at first-cycle level.

1.4.6 Other elements in the education to promote and ensure goal attainment

Doctoral students are expected to participate actively in seminars at their department.

For the award of a Degree of Doctor, it is compulsory for the doctoral student to hold a planning seminar, half-time seminar and final seminar of their thesis. The planning seminar is held when between 20 and 30 percent of the work has been completed. When a draft of half of the doctoral thesis is available, a half-time seminar must be held at which the manuscript is reviewed by an external expert who at least holds a PhD. When at least 80 per cent of the doctoral thesis has been written, a final seminar must be held at which the manuscript is reviewed by an external expert who is at least qualified for appointment as a docent.

For the award of a Degree of Licentiate, when half of the licentiate thesis is completed a half-time seminar must be held at which the manuscript is reviewed by an internal or external expert who at least holds a PhD.

2 Admission to education at third-cycle level (qualification etc.)

Admission to third-cycle courses and programmes, including general entry requirements, is regulated in Sections 34–40 of Chapter 7 of the Higher Education Ordinance and in KTH's Admission Regulations. KTH's regulations concerning specific entry requirements and the ability otherwise required to assimilate the course or study programme are set out below.

2.1 Specific entry requirements

The third-cycle subject area is interdisciplinary by nature and successful applicants may come from various backgrounds. To be admitted to a programme in the subject area Technology and Learning, the applicant must have been awarded at least 60 credits at second-cycle level or above that are deemed to be relevant to the specialisation of their degree project. This requirement may be considered to be fulfilled by someone who has acquired substantially equivalent knowledge in some other way.

The doctoral student is also expected to be able to read and write scientific English and to be able to speak English unhindered.

2.2 The basis for assessing the ability to assimilate the education

The following criteria apply to assessing the ability otherwise required to assimilate the course or study programme:

Selection for third-cycle courses and programmes is based on assessing the applicant's ability to assimilate the course or programme, primarily based on having passed prerequisite courses. Particular consideration is given to the following:

1. Knowledge and skills of relevance to the degree project and subject area.
These can be demonstrated by attaching documentation and possibly at an interview
2. Assessed ability to work autonomously
 - a. ability to formulate and tackle scientific problems
 - b. ability to communicate well in speech and writing
 - c. maturity, judgement and ability to analyse critically and autonomously

The assessment may, for example, be based on degree projects and discussion of these at a possible interview.

3. Other experience of relevance to third-cycle studies, such as professional experience. This can be demonstrated by attaching documentation and possibly at an interview.

3 Other necessary provisions

3.1 Transitional provisions

Doctoral students admitted to an earlier general syllabus for third-cycle programmes are entitled to follow either the new general syllabus or the general syllabus to which they were admitted. Transferring to the new general syllabus is however dependent on being able to achieve the qualitative target of the new syllabus within the programme length. Requests to transfer to the new general syllabus should be addressed to the director of third-cycle studies.

Appendix: Qualitative target 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 developed as a 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.	<p>The outcome has been achieved through the doctoral student having</p> <p>A1.1: authored original scientific works where their own contributions are significant and identifiable. The works are of such quality that they have been published, or are expected to be published, in international scientific journals or conferences that apply peer review.</p> <p>A1.2: demonstrated both broad and specialised knowledge in the research area by writing a thesis in which the research results were placed and discussed in a broader perspective, and presented a reference list of others' research results that spans the relevant breadth of the research area.</p> <p>A1.3: demonstrated, at a seminar, a course or in the thesis or its public defence, 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.</p> <p>A1.4: actively participated in seminar activities where their own results were presented and discussed, as well as asked questions and provided feedback on other students' and researchers' presentations.</p>
Demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular.	<p>The outcome has been achieved through the doctoral student having</p> <p>A2.1: been examined with an approved result regarding intended learning outcomes in scientific methodology, which may be a course or equivalent learning element at third-cycle level.</p> <p>A2.2: described basic theories in scientific theory and correctly applied one or more of these in their own research.</p> <p>A2.3: practically applied to the research area appropriate methods 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.</p> <p>A2.4: justified their choice of method and execution in relation to the issue and to alternative methods.</p> <p>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</p>

Competence and skills	
Intended learning outcomes	Assessment criteria with reference to numbering in eISP
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.	<p>The outcome has been achieved through the doctoral student having</p> <p>B1.1: demonstrated the ability to independently formulate and critically analyse both existing and new complex phenomena.</p> <p>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.</p> <p>B1.3: described the interpretation of the results and how these were combined with existing knowledge to give rise to a new explanatory model.</p> <p>B1.4: in cases where it is applicable, presented concrete examples of results that have given rise to falsification of a hypothesis and revision of the hypothesis.</p>
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.	<p>The goal has been achieved through the doctoral student having</p> <p>B2.1: presented examples of independently performed experiments / simulations / tasks that were preceded by detailed time planning.</p> <p>B2.2: in cases where it is 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. In cases where the result did not turn out as expected, the research student shall have reported on possible sources of error and what measures were taken to move forward in the project.</p> <p>B2.3: presented examples of and described and argued for the choice of methods for individual research tasks.</p> <p>B2.4: described how it was ensured that the education 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.</p>
Demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research.	<p>The goal has been achieved through the doctoral student having</p> <p>B3.1: authored original scientific works where their own contributions are significant and identifiable. The works are of such quality that they have been published, or are expected to be published, in international scientific journals or conferences that apply peer review.</p> <p>B3.2: authored a thesis, based on the scientific work, of good scientific and linguistic quality that was authoritatively defended and discussed in a public defence of the doctoral thesis and been examined with a pass grade by an independent examining committee.</p>
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.	<p>The goal has been achieved through the doctoral student having</p> <p>B4.1: in cases where it is applicable, participated in national and international conferences and presented their own research results in poster form or verbally, as well as participated in scientific discussions with other researchers in the research field.</p> <p>B4.2: described how experience from conference or seminar presentations contributed to developing their own ability to</p>

	<p>communicate and defend scientific results, as well as how the presentations were received by other participants and whether valuable information could be obtained that helped their own studies progress.</p> <p>B4.3: been examined with a pass grade for intended learning outcomes in communication or presentation technology in a suitable compulsory or optional course at third-cycle level.</p> <p>B4.4: described basic concepts, tools and methods in presentation or communication technology, as well as demonstrated the ability to put the knowledge into practice by formulating different types of scientific presentation material of good quality.</p> <p>B4.5: presented their research results in a pedagogical way for other students and researchers at academic seminars, for a general audience or for another category of recipients, 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.</p> <p>B4.6: participated in outreach activities related to their own research in order to contribute to the dissemination of knowledge and exchange of knowledge with relevant stakeholder groups such as other universities, companies, authorities, schools etc.</p>
<p>Demonstrate the ability to identify the need for further knowledge.</p>	<p>The outcome has been achieved through the doctoral student having</p> <p>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 third-cycle students themselves must have realised that knowledge was lacking and handled this with measures relevant to the purpose.</p> <p>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.</p> <p>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.</p>
<p>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.</p>	<p>The outcome has been achieved through the doctoral student having</p> <p>B6.1: presented their research results in a pedagogical way for other students and researchers at academic seminars, for a general audience or for another category of recipients, 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.</p> <p>B6.2: participated in outreach activities related to their own research in order to contribute to the dissemination of knowledge and exchange of knowledge with relevant stakeholder groups such as other universities, companies, authorities, schools etc.</p> <p>B6.3: actively supervised other students in theoretical and / or practical projects. Third-cycle students should, with examples,</p>

	<p>account for and reflect on various aspects of their own input, for example how the supervision was structured, whether pedagogical methodology was applied, how it was ensured that the person who was supervised understood the instructions etc. Third-cycle students 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.</p> <p>B6.4: been examined with a pass grade for intended learning outcomes in teaching and learning in higher education in a suitable compulsory or optional course at third-cycle level. The third-cycle 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, as well as to analyse, evaluate and develop teaching and learning. Third-cycle student is thus also assumed to be able to show the ability to evaluate and analyse different methods and approaches in higher education and to show the ability to take a student perspective into account.</p> <p>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.</p>
Judgement and approach	
Intended learning outcomes	Assessment criteria with reference to numbering in eISP
<p>Demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics.</p>	<p>The outcome has been achieved through the doctoral student having</p> <p>C1.1: demonstrated intellectual integrity in the sense that their own choices and positions have been justified and defended on the basis of independent critical thinking in relation to proven experience and scientific basis.</p> <p>C1.2: described how they ensured that their own scientific procedure in theory and practice was carried out in an honest and ethical manner.</p> <p>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.</p> <p>C1.4: been examined with a pass grade for intended learning outcomes in ethics in a suitable compulsory or optional course at third-cycle level. The research student is thus assumed to be able to describe basic theories in research ethics and relate these to their own approach and research work.</p>
<p>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</p>	<p>The outcome has been achieved through the doctoral student having</p> <p>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.</p> <p>C2.2: critically reflected on limitations of their own research results, and the research area in general, in order to contribute to solving</p>

	<p>societally relevant problems, as well as identify possible situations where their own research results can be used in both a positive and negative way.</p> <p>C2.3: demonstrated 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.</p> <p>C2.4: described how their own actions and approach take into account the concept of sustainability.</p> <p>C2.5: been examined with a pass grade for intended learning outcomes in sustainable development in a suitable compulsory or optional course at third-cycle level. The research student is thus assumed to be able to describe basic theories in sustainability and relate these to their own approach and research work.</p>
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Degree of Licentiate

Knowledge and understanding	
Intended learning outcomes	Assessment criteria with reference to numbering in eISP
<p>Demonstrate knowledge and understanding in the field of research including current specialist knowledge in his or her artistic field as well as specialised knowledge of research methodology in general and the methods of the specific field of research in particular.</p> <p><i>Main differences in relation to the doctoral degree: For the licentiate degree, it is enough to be able to show “knowledge and understanding”, as opposed to “broad and systematic understanding”. Also, “deep up-to-date specialist knowledge” is replaced by “up-to-date specialist knowledge”.</i></p>	<p>The outcome has been achieved through the doctoral student having</p> <p>A1.1: authored original scientific works where their own contributions are significant and identifiable. The works are of such quality that they have been published, or are expected to be published, in international scientific journals or conferences that apply peer review.</p> <p>A1.2: demonstrated both broad and specialised knowledge in the research area by writing a licentiate thesis in which the research results were placed and discussed in a broader perspective, and presented a reference list of others’ research results that spans the relevant breadth of the research area.</p> <p>A1.3: demonstrated, at a seminar, a course or in the licentiate thesis and its public defence, 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.</p> <p>A1.4: actively participated in seminar activities where their own results were presented and discussed, as well as asked questions and provided feedback on other students’ and researchers’ presentations.</p>
Competence and skills	
Intended learning outcomes	Assessment criteria with reference to numbering in eISP
<p>Demonstrate the ability to identify and formulate issues with scholarly precision</p>	<p>The goal has been achieved through the doctoral student having</p>

<p>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</p> <p><i>Main differences in relation to the doctoral degree: For the licentiate degree, it is emphasized that this is “limited research work” that will contribute to the development of knowledge, in contrast to the doctoral degree where one must be able to show the ability to “conduct research”.</i></p>	<p>B1.1: demonstrated the ability to independently formulate and critically analyse both existing and new complex phenomena.</p> <p>B1.2: presented examples of their own questions that were tested within the framework of their own research project, as well as described the choice of method and outcome. In cases where the result did not turn out as expected, the research student shall have reported on possible sources of error and what measures were taken to move forward in the project.</p> <p>B1.3: presented examples of independently performed experiments / simulations / tasks that were preceded by detailed time planning.</p> <p>B1.4: presented examples of and described and argued for the choice of methods for individual experiments.</p> <p>B1.5: described how it was ensured that the education 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.</p>
<p>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.</p> <p><i>Main differences in relation to the doctoral degree: The licentiate degree requires the student to communicate their research “clearly”, as opposed to communicating “with authority”.</i></p>	<p>The goal has been achieved through the doctoral student having</p> <p>B2.1: in cases where it is applicable, participated in national and international conferences and presented their own research results in poster form or verbally, as well as participated in scientific discussions with other researchers in the research field.</p> <p>B2.2: described how experience from conference or seminar presentations contributed to developing their own ability to communicate and defend scientific results, as well as how the presentations were received by other participants and whether valuable information could be obtained that helped their own studies progress.</p> <p>B2.3: been examined with a pass grade for intended learning outcomes in communication or presentation technology in a suitable compulsory or optional course at third-cycle level.</p> <p>B2.4: described basic concepts, tools and methods in presentation or communication technology, as well as demonstrated the ability to put the knowledge into practice by formulating different types of scientific presentation material of good quality.</p> <p>B2.5: presented their research results in a pedagogical way for other students and researchers at academic seminars, for a general audience or for another category of recipients, 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.</p> <p>B2.6: participated in outreach activities related to their own research in order to contribute to the dissemination of knowledge and exchange of knowledge with relevant stakeholder groups such as other universities, companies, authorities, schools etc.</p>
<p>Demonstrate the skills required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.</p> <p><i>Main differences in relation to the doctoral degree: The doctoral student's future contribution to society through research and</i></p>	<p>The goal has been achieved through the doctoral student having</p> <p>B3.1: authored original scientific works where their own contributions are significant and identifiable. The works are of such quality that they have been published, or are expected to be published, in international scientific journals or conferences that apply peer review.</p> <p>B3.2: authored a licentiate thesis based on their own studies of good</p>

<p>education is toned down and the focus is on the doctoral student being able to work on activities that require skills in research work but not a doctoral degree.</p>	<p>scientific and linguistic quality that have been defended and discussed at a licentiate seminar and examined and given a pass grade by an independent examiner.</p>
<p>Judgement and approach</p>	
<p>Intended learning outcomes</p>	<p>Assessment criteria with reference to numbering in eISP</p>
<p>Demonstrate the ability to make assessments of ethical aspects of his or her own research.</p> <p><i>Main differences in relation to the doctoral degree: The ability to make ethical research assessments is limited to their own research and not in general.</i></p>	<p>The goal has been achieved through the doctoral student having</p> <p>C1.1: demonstrated intellectual integrity in the sense that their own choices and positions have been justified and defended on the basis of independent critical thinking in relation to proven experience and scientific basis.</p> <p>C1.2: described how they ensured that their own scientific procedure in theory and practice was carried out in an honest and ethical manner.</p> <p>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.</p> <p>C1.4: been examined with a pass grade for intended learning outcomes in ethics in a suitable compulsory or optional course at third-cycle level. The research student is thus assumed to be able to describe basic theories in research ethics and relate these to their own approach and research work.</p>
<p>Demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.</p> <p><i>Main differences in relation to the doctoral degree: For the licentiate degree, only “insight” is required, as opposed to “in-depth insight” for the doctoral degree.</i></p>	<p>The goal has been achieved through the doctoral student having</p> <p>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.</p> <p>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 where their own research results can be used in both a positive and negative way.</p> <p>C2.3: demonstrated 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.</p> <p>C2.4: described how their own actions and approach take into account the concept of sustainability.</p>
<p>Demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.</p> <p><i>Main differences in relation to the doctoral degree: The same requirement to be able to identify the need for additional knowledge with the addition of being able to take responsibility for their own knowledge</i></p>	<p>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 third-cycle students themselves must have realised that knowledge was lacking and handled this with measures relevant to the purpose.</p> <p>C3.2: demonstrated insight that the knowledge front in higher education and research is in constant change and development and</p>

development, which may be considered to be implied for a doctoral degree.

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.