HÖGSKOLAN
I SKÖVDE

Please note: This is a translation of the Swedish version (Allmän studieplan för utbildning på forskarnivå i informationsteknologi, Dnr HS 2011/26-62). In the event of any discrepancy, the Swedish version of this document has preferential interpretation.

The faculty board of Technology and Science   CURRICULUM

May 6, 2013   Dnr[1] HS 2011/26-62

General curriculum for education at doctoral level in Information Technology

1   Description of subject

Information Technology is the subject which deals with how information is represented, studied, and communicated in artificial and natural systems and also how information technology systems are used and developed with the purpose of achieving useful system solutions for individuals, organizations or society.

Education within this subject is carried on in specialized fields.

The faculty board decides which fields the school can offer. One condition in order to be able to offer a certain field within the subject is that the faculty includes at least three formally qualified primary doctoral advisors (full professors or associate professors) for the field of study, of whom at least one doctoral advisor must be a full professor.

2   Purpose of the program

The purpose of the program is that Ph.D. students, after completing their basic training, within the subject should be able to work individually or in a group with research, development work or other forms of problem solution such as education and administration.

3   Objectives of the program

3.1   General objectives

The general objectives of the program at doctoral level, in regards to knowledge and comprehension, skills and abilities, are as stated in Högskoleförordningen[2] (SFS 2006:1053, bilaga[3] 2).

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[1] Registration number
[2] The regulation of higher education (university/college level)

Objectives of the Ph.D. degree program

Knowledge and comprehension

For a Ph.D. degree, the student shall

- demonstrate broad knowledge in and systematic comprehension of the field of research as well as deep and updated specialist knowledge within a limited part of the field of research, and

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

Skills and abilities

For a Ph.D. degree, the student shall

- demonstrate an ability of scientific analysis and synthesis as well as of independent critical examination and evaluation of new and complex phenomena, issues, and situations,

- demonstrate an ability to critically, independently, creatively and with scientific precision identify and express questions at issue as well as to plan and with adequate methods carry on research and other qualified tasks within given periods of time and to examine and evaluate such work,

- in a dissertation demonstrate the ability to make considerable contributions to the development of knowledge through the student's own research,

- demonstrate an ability to orally and in written form, in national as well as international contexts, with authority present and discuss research and research results in dialog with the scientific community and society at large,

- demonstrate an ability to identify the need for further knowledge, and

- demonstrate skills to contribute to the development of society and to support the learning of others in research and education as well as in other qualified professional contexts.

Ability to make assessments and attitude

For a Ph.D. degree, the student shall

- demonstrate intellectual independence and scientific honesty as well as an ability to make assessments based on research ethics, and

- demonstrate a deepened insight into the possibilities and the limitations of science, its role in society and people's responsibilities for how it is used.

Objectives of the licentiate[4]-degree program

Knowledge and comprehension

For a licentiate degree, the student shall

- demonstrate knowledge and comprehension of the field of research, including updated specialist knowledge within a limited part thereof, as well as deepened knowledge of scientific methodology in general and with the methods in the specific field of research in particular.

Skills and abilities

For a licentiate degree, the student shall

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[3] Appendix
[4] Generally equal to a half Ph.D.

- demonstrate an ability to critically, independently, creatively and with scientific precision identify and express questions at issue, to plan and with adequate methods carry on limited research work and other qualified tasks within given periods of time and thereby make contributions to the development of knowledge as well as to assess this work,

- demonstrate an ability to orally and in written form, in national as well as international contexts, clearly present and discuss research and research results in dialog with the scientific community and society at large,

- demonstrate the skills required for independently taking part in research and development work and for independently working in other qualified activities, and

- demonstrate skills to contribute to the development of society and to support the learning of others in research and education as well as in other qualified professional contexts.

Ability to make assessments and attitude

For a licentiate degree, the student shall

- demonstrate an ability to make assessments based on research ethics in the student's own research,

- demonstrate an insight into the possibilities and the limitations of science, its role in society and people's responsibilities for how it is used, and

- demonstrate intellectual independence and scientific honesty as well as the ability to make assessments based on research ethics, and

- demonstrate an ability to identify her/his own need for further knowledge and take responsibility for her/his own development of knowledge.

3.2   Specific objectives for the subject Information Technology

For a degree at doctoral level in the subject Information Technology, the student shall specifically

- demonstrate knowledge and an understanding of the theoretical and methodological plurality within the subject as well as how one's own questions at issue are related to this,

- demonstrate an insight into the role of information-technology research for individuals, organization, and society, and

- demonstrate an insight into how information-technology systems can be used and developed with the purpose of bringing about useful system solutions.

4   Admission requirements

The prerequisites for being admitted to studies at doctoral level are basic eligibility[5] and special entry requirements which may have been dictated by the faculty board as well as being judged as having the capability further needed for benefitting from this education (HF 7 kap, 35 §[6]).

The admission is made either to the program for a Ph.D. degree or a licentiate degree. See also *Antagningsordning vid Högskolan i Skövde – föreskrifter för antagning till utbildning på forskarnivå*[7].

4.1   Basic eligibility

Basic eligibility for studies a doctoral level includes (HF 7 kap, 39 §):

- having earned a degree at an advanced level,

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[5] Having completed a B.A. or an M.A.
[6] The regulation of higher education, Chapter 7, Paragraph 35
[7] *Admittance regulations at the University of Skövde – directions for admittance to education at doctoral level*

- having completed academic courses of at least 240 credits of which at least 60 credits are at advanced level, or

- in any other way, in Sweden or abroad, having acquired principally the equivalent knowledge.

The faculty board may for an individual applicant admit an exception to the requirement of basic eligibility if there are certain grounds for this.

A person who before July 2, 2007, fulfills the requirement of basic eligibility for admission to doctoral studies shall also thereafter be regarded as having basic eligibility to studies at doctoral level, however no longer than to the end of June 2015.

4.2   *Special entry requirements*

In order to fulfill the special entry requirement for being admitted to an education program at doctoral level in Information Technology, the applicant must have completed academic courses of at least 120 credits, including independent thesis writing of at least 15 credits at advanced level, within the field Information Technology, applicable areas of a similar kind or other fields which are judged as directly relevant for the program.

Furthermore, a passing grade in the high-school course English B or the equivalent is required. Similar knowledge is usually proved through an internationally acknowledged language test such as IELTS, TOEFL or other equivalent tests.

5   Selection

A selection among those applicants who fulfill the requirements shall be made with regards to their ability to benefit from the education program and is based on the following assessment criteria:

- if the applicant is personally suitable,

- the applicant's ability to communicate in English, orally and in written form,

- previous study records (with special focus on the quality of the thesis at advanced level), and

- other qualifications which are of importance for the studies.

The circumstances alone that an applicant can be considered to have previous education or professional experience counted in for this program must however not give the applicant priority over other applicants in the selection process. (HF 7 kap. 41 §)

6   The setup and content of the program

6.1   *The setup of the program*

There are two programs at doctoral level – one which is completed with a Ph.D. degree (240 credits) and one which is completed with a licentiate degree (120 credits). The programs consist mainly of courses with examinations and of work on dissertations as well as essays.

The university offers programs at doctoral level within Information Technology with specialization in computer science, socio-technological systems, and industrial informatics:

- The specialization in computer science deals with forms of representation for data as well as algorithms for working with data.

- The specialization in socio-technological systems deals with how individuals, groups, and organizations create and handle information; how they use, influence and are affected by

information-technological systems as well as which consequences this will have for the development of such systems.

- The specialization in industrial informatics deals with how modern IT-based engineer tools are integrated with each other and with current business systems as well as how they are connected to physical equipment and the demands on these tools and the systems based on, among other things, distributed production, distributed development projects, and the user.

Taking part in scientific activities at the faculty is one part of this program. The student shall actively take part in research seminars and other agreed-upon activities all through the time of studying. The student shall furthermore take advantage of the opportunities which will be offered to attend guest lectures et cetera at the university as well as opportunities to attend and take an active part in national as well international conferences.

The setup of the studies will be decided in an individual study plan. The model to be used for the study plan is approved by the faculty board. The study plan will be followed up in accordance with the guidelines of the faculty board.

6.2   *The content of the program*

A Ph.D. degree in Information Technology

The program leading to a Ph.D. in Information Technology comprises 240 credits of which one course is of at least 60 credits and there is a dissertation part of at least 150 credits. The student selects the courses in consultation with the primary doctoral advisor.

Three mandatory parts must be included in the courses of the program:

- scientific theory within Information Technology, 7.5 credits,
- scientific seminar in Information Technology I, 5 credits, and scientific seminar in Information Technology II, 5 credits,
- scientific method and communication within Information Technology, 7.5 credits.

Specialization in computer science also requires:

- specializing courses in computer science comprising at least 25 credits.

Specialization in socio-technological systems also requires:

- specializing courses in socio-technological systems comprising at least 25 credits.

Specialization in industrial informatics also requires:

- specializing courses in industrial informatics comprising at least 25 credits.

Doctoral students who teach are recommended to take a course in university pedagogy.

In the beginning of this program, the intended aim and direction of research should be reported in a research proposal which will be presented in an open seminar. After approximately half the time of studying, a thesis proposal should be reported which will be presented in an open seminar. The forms for the seminars are regulated in *Föreskrifter för examination inom utbildning på forskarnivå vid Högskolan i Skövde[8]*. If a licentiate dissertation is written as steps toward a Ph.D. degree, the licentiate dissertation replaces the thesis proposal. At least three months before the planned public defense of the doctoral dissertation, a preliminary version of the dissertation should be pre-reviewed. This will be done with the dissertation being presented at an end seminar and also with the dissertation

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[8] *Directions for examination in programs at doctoral level at the University of Skövde*

being reviewed by at least one external person holding a Ph.D. degree who, in connection with the seminar, should assess whether the work is of such quality that a public defense of the thesis can be carried out as planned (see also *Föreskrifter för examination inom utbildning på forskarnivå vid Högskolan i Skövde*).

Licentiate degree in Information Technology

The program leading to a licentiate degree in Information Technology comprises one course of at least 45 credits and a dissertation part of at least 75 credits. The student selects the courses in consultation with the primary doctoral advisor. These courses can to a great extent be adjusted to the student's interest and aims for her/his studies.

Three mandatory parts must be included in the courses of the program:

- scientific theory within Information Technology, 7.5 credits,
- scientific seminar in Information Technology I, 5 credits,
- scientific method and communication within Information Technology, 7.5 credits.

Specialization in computer science also requires:

- specializing courses in computer science comprising at least 15 credits.

Specialization in socio-technological systems also requires:

- specializing courses in socio-technological systems comprising at least 15 credits.

Specialization in industrial informatics also requires:

- specializing courses in industrial informatics comprising at least 15 credits.

Doctoral students who teach are recommended to take a course in university pedagogy.

In the beginning of this program, the intended aim and direction of research should be reported in a research proposal which will be presented in a seminar (see also *Föreskrifter för examination inom utbildning på forskarnivå vid Högskolan i Skövde*).

6.3   The Ph.D. dissertation

The Ph.D. dissertation should be based on independent research work and be of importance for the research within the chosen field. The requirement of independent work does not exclude the fact that the dissertation work with advantage can be a part of a major research project. The dissertation can either be formed as a coherent scientific work (monograph dissertation) or as a compilation of scientific works (compilation dissertation).

A compilation dissertation should include several scientific essays as well as a compilation part (introductory chapter of a compilation dissertation). The majority of the essays should have been peer-reviewed and accepted for publication in international scientific forums of high quality. The compilation part should, besides a summary, include a discussion of the theoretical basis of the work, the uncertainties of its scientific contribution, and clearly show the connection of the work in question with previous research. A deeper discussion about the connection between the essays in relation to the overall question at issue should also be included in the compilation part. In the case of any of the essays being co-authored with other persons, the work of the author of the dissertation should be stated in the preface.

For a monograph dissertation, equivalent requirements for quality and length apply.

The Ph.D. should normally be written in English with a summary in Swedish and in English.

6.4 The licentiate dissertation

For the licentiate dissertation, the student shall write a scientific dissertation which can make up one part of a Ph.D. dissertation. The dissertation should be based on independent research work and be of good scientific quality. The requirement of independent work does not exclude the fact that the dissertation work with advantage can be a part of a major research project. The dissertation can either be formed as a coherent scientific work (monograph dissertation) or as a compilation of scientific works (compilation dissertation).

A compilation dissertation for a licentiate degree should include several scientific essays as well as a compilation part (introductory chapter of a compilation dissertation). The majority of the essays should have been peer-reviewed and accepted for publication in international scientific forums of high quality. The compilation part should, besides a summary, include a discussion of the theoretical basis of the work, the uncertainties of its scientific contribution, and clearly show the connection of the work in question with previous research. A deeper discussion about the connection between the essays in relation to the overall question at issue should also be included in the compilation part. In the case of any of the essays being co-authored with other persons, the work of the author of the dissertation should be stated in the preface.

For a monograph dissertation, equivalent requirements for quality and length apply.

The Ph.D. should normally be written in English with a summary in Swedish and in English.

6.5 Time plan

The education program for a Ph.D. usually requires four years of full-time studies, provided that the student has the necessary pre-knowledge, fully devotes her/his time to the studies and makes efficient use of the teaching. The study period can be extended only if there are certain reasons for this, such as leave due to ill health, serving in the military or the elected office of labor unions or student bodies, or for parental leave. In case of other financing than employment as a doctoral student, the study time can in accordance with Chapter 7, § 36 in Högskoleförordningen not exceed eight years.

A doctoral student who is employed as such can to a limited extent (not exceeding 20 percent) work with education and administration. These activities are not included in the study time.

6.6 Supervision and follow-up

A person who has been admitted to an education program at doctoral level has the right to guided supervision in accordance with Högskoleförordningen (SFS 1993:100, 6 kap 28 §, 30-31 §§[9]), *Antagningsordning vid Högskolan i Skövde – föreskrifter för antagning till utbildning på forskarnivå* samt *Riktlinjer för handledning och studieuppföljning inom utbildning på forskarnivå vid Högskolan i Skövde[10]*.

Education at doctoral level is carried on under the guidance of a primary doctoral advisor, possibly together with a supervisor and one or two assistant supervisors, in accordance with

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[9] Chapter 6, §§ 28, 30-31
[10] *Guiding principles for supervision and study follow-up in education at doctoral level at the University of Skövde*

the individual study plan which the doctoral advisor and the doctoral student together draw up for the first time no later than three months after the student's admission to the doctoral program and which thereafter is revised at least once a year. Doctoral students, the supervision group, and the vice principal[11] for education at doctoral level must meet at least once a year for a follow-up of the work carried out and for planning the subsequent work.

7   Examination

A Ph.D. degree is awarded when the doctoral student has completed her/his education at doctoral level comprising 240 credits within her/his field and thereby been awarded the grade Pass at the examination which is part of the education as well as having written and at a public hearing defended her/his dissertation, which was passed by a grading board. See also *Föreskrifter för examination inom utbildning på forskarnivå vid Högskolan i Skövde*.

A licentiate degree is awarded when the doctoral student has completed her/his education at doctoral level comprising 120 credits within her/his field and thereby been awarded the grade Pass at the examination which is part of the education as well as having written and at a public seminar defended her/his licentiate dissertation. The grade for the licentiate dissertation is decided by the examiner, who cannot be a supervisor of the doctoral student in question. See also *Föreskrifter för examination inom utbildning på forskarnivå vid Högskolan i Skövde*.

A doctoral student who has been admitted to an education program for a licentiate degree may, after having been awarded her/his degree, apply for being admitted to an education program for a Ph.D. degree. A doctoral student who has been admitted to an education program for a Ph.D. degree may be given the opportunity to complete her/his education with a licentiate degree.

The title of the degree after completing the education with a passing grade is, in accordance with this curriculum, Technology Licentiate/Doctor of Information Technology. A doctoral student who wishes to use the suffix[12] Philosophy can apply for this with the faculty board at the time of the application for submission of the dissertation. The English title of the Ph.D. degree, both technology and philosophy, is Doctor of Philosophy in Informatics. Technology and philosophy licentiate degrees are in both cases translated into Licentiate of Philosophy in Informatics.

8   Taking effect

Ratified by the faculty board for Technology and Science on May 6, 2015, taking effect on the same day. Replaces the version ratified on November 23, 2011.

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[11] Alternative titles: rector or chancellor
[12] A prefix in the title in Swedish