The Committee for the PhD Programme in Informatics

SYLLABUS

June 13, 2016   Dnr[1] HS 2016/655

General Syllabus for the PhD Programme in Informatics[2]

1 Description of subject

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

Education within this subject is chiefly carried out within the framework of three comprehensive fields of research:

- Computer science, comprising research on forms of representation of data as well as algorithms for processing of data.
- Socio-technical systems, comprising research on how individuals, groups, and organizations create and deal with information; how they use, influence, and are affected by informatics systems as well as what consequences this will have on the development of such systems.
- Industrial informatics, comprising research on how modern IT-based engineering tools are integrated with each other and existing business systems as well as how they are connected to physical equipment; what is required of these tools and systems as seen from, among others, distributed production, distributed development projects, and the user.

2 Purpose of the programme

The purpose of the programme is that PhD 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.

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[1] Registration number

[2] This is a translation of the Swedish version (Allmän studieplan för utbildning på forskarnivå i informationsteknologi, Dnr HS 2016/655). In the event of any discrepancy, the Swedish version of this document has preferential interpretation.

3   Outcomes of the programme

3.1   General outcomes

The general outcomes of the programme at PhD level, in regards to knowledge and understanding, competence and skills, judgement and approach, are as stated in Högskoleförordningen[3] (SFS 2006:1053, bilaga[4] 2).

Outcomes of the PhD degree programme

Knowledge and understanding

For a PhD degree, the student shall

- demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field, and
- demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular.

Competence and skills

For a PhD degree, the student shall

- demonstrate the capacity for scholarly analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically
- demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work
- demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research
- demonstrate the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general
- demonstrate the ability to identify the need for further knowledge and
- demonstrate the capacity to contribute to social development and support the learning of others both through research and education and in some other qualified professional capacity.

Judgement and approach

For a PhD degree, the student shall

- demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics, and
- demonstrate specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used.

Outcomes of the licentiate[5]-degree program

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[3] The regulation of higher education (university/college level)
[4] Appendix
[5] Generally equal to a half PhD

Knowledge and understanding

For a licentiate degree, the student shall

- demonstrate knowledge and understanding in the field of research including current specialist knowledge in a limited area of this field as well as specialised knowledge of research methodology in general and the methods of the specific field of research in particular.

Competence and skills

For a licentiate degree, the student shall

- demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake a limited piece of research and other qualified tasks within predetermined time frames in order to contribute to the formation of knowledge as well as to evaluate this work
- demonstrate the ability in both national and international contexts to present and discuss research and research findings in speech and writing and in dialogue with the academic community and society in general, and
- demonstrate the skills required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.

Judgements and approach

For a licentiate degree, the student shall

- demonstrate the ability to make assessments of ethical aspects of his or her own research
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

4   Admission requirements

The requirements for being admitted to studies at PhD level are general[6] and specific entry requirements which may have been laid down by the faculty board, and that the applicant is considered in other respects to have the ability required to benefit from the course or study programme. (HF 7 kap, 35 §[7]).

The admission to the programme is made either to a PhD degree or a licentiate degree. See also *Antagningsordning vid Högskolan i Skövde – föreskrifter för antagning till utbildning på forskarnivå[8]*.

4.1   General entry requirements

General entry requirements for studies a PhD level includes (HF 7 kap, 39 §):

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

- having earned a degree at an advanced 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 general entry requirements if there are certain grounds for this.

4.2 Specific entry requirements

In order to fulfil the specific entry requirements for being admitted to the PhD programme in Informatics, the applicant must have completed academic courses of at least 60 credits, including independent thesis writing of at least 15 credits at advanced level, within the field Informatics, applicable areas of a similar kind or other fields which are judged as directly relevant for the licentiate or PhD thesis.

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

In selecting between applicants who meet the entry requirements their ability to benefit from the PhD programme shall be taken into account and shall be 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.

However, the fact that an applicant is considered able to transfer credits from prior courses and study programmes or for professional or vocational experience may not alone give the applicant priority over other applicants. (HF 7 kap. 41 §)

6 The setup and content of the program

6.1 The setup of the program

There are two programmes at PhD level – one which is completed with a PhD degree (240 credits) and one which is completed with a licentiate degree (120 credits). The programmes consist mainly of courses with examinations and of work with licentiate or PhD thesis and articles.

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

PhD degree in Informatics

The programme leading to a PhD degree in Informatics consists of 240 credits of which one part comprises courses of at least 60 credits and the other part a thesis of at least 150 credits. The student selects the courses in consultation with the main supervisor. The selection of courses is adjusted to the student's research specialisation.

Three mandatory courses must be included in the programme:

- Scientific Theories in Informatics, 7.5 credits,
- Scientific Seminar in Informatics I, 5 credits and
- Scientific Seminar in Informatics II, 5 credits,
- Scientific Methodology and Communication in Informatics, 7.5 credits.

The remaining credits must be completed by courses taken within Informatics comprising at least 25 credits.

PhD students who teach are recommended to take a course in teaching and learning in higher education.

In the beginning of this programme, the intended aim and direction of research should be reported in a research proposal which will be presented in a public seminar. After approximately half the time of studying, a thesis proposal should be reported which will be presented in a public seminar. The forms for the seminars are regulated in *Riktlinjer för examination inom utbildning på forskarnivå vid Högskolan i Skövde[9]*. If a licentiate thesis is written as a step toward a PhD degree, the licentiate thesis replaces the thesis proposal. At least three months before the planned public defence of the PhD thesis, a preliminary version of the thesis should be pre-reviewed. This will be done with the PhD thesis being presented at a final seminar and also with the thesis being reviewed by at least one external person holding a PhD degree who, in connection with the seminar, should assess whether the work is of such quality that a public defence can be carried out as planned (see also *Riktlinjer för examination inom utbildning på forskarnivå vid Högskolan i Skövde*).

Licentiate degree in Informatics

The programme leading to a licentiate degree in Informatics consists of 120 credits of which one part comprises courses of at least 45 credits and the other part a thesis of at least 75 credits. The student selects the courses in consultation with the main supervisor. These courses can to a great extent be adjusted to the student's research specialisation.

Three mandatory courses must be included in the programme:

- Scientific Theory in Informatics, 7.5 credits,

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[9] *Examination regulations for PhD programmes at the University of Skövde*

- Scientific Seminar in Informatics I, 5 credits,
- Scientific Method and Communication in Informatics, 7.5 credits.

The remaining credits must be completed by courses taken within Informatics comprising at least 15 credits.

PhD students who teach are recommended to take a course in teaching and learning in higher education.

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

6.3   The PhD thesis

The PhD thesis 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 thesis work with advantage can be a part of a major research project. The thesis can either be formed as a coherent scientific work (monograph thesis) or as a compilation of scientific works (compilation thesis).

A compilation thesis should include several scientific articles as well as a compilation part (introductory chapter of a compilation dissertation). The majority of the articles 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 articles in relation to the overall question at issue should also be included in the compilation part. In the case of any of the articles being co-authored with other persons, the PhD student's contribution should be stated in the preface.

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

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

6.4   The licentiate thesis

For a licentiate degree, the student shall write a scientific thesis which can make up one part of a PhD thesis. The thesis 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 thesis work with advantage can be a part of a major research project. The thesis can either be formed as a coherent scientific work (monograph thesis) or as a compilation of scientific works (compilation thesis).

A compilation thesis for a licentiate degree should include several scientific articles as well as a compilation part (introductory chapter of a compilation thesis). The majority of the articles 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 articles in relation to the overall question at issue should also be included in the compilation part. In the case of any of the articles being co-authored with other persons, the student's contribution should be stated in the preface.

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

The licentiate thesis should normally be written in English with a summary in Swedish and in English.

6.5   Time plan

The PhD programme usually requires four years of full-time studies, provided that the student has the necessary prior 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 labour unions or student bodies, or for parental leave. In case of other financing than employment as a PhD student, the study time can in accordance with Chapter 7, § 36 in Högskoleförordningen not exceed eight years.

A PhD 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 a PhD programme has the right to guided supervision in accordance with Högskoleförordningen (SFS 1993:100, 6 kap 28 §, 30-31 §§[10]), *Antagningsordning vid Högskolan i Skövde – föreskrifter för antagning till utbildning på forskarnivå* and *Riktlinjer för handledning och studieuppföljning inom utbildning på forskarnivå vid Högskolan i Skövde[11]*.

Education at PhD level is carried on under the guidance of a main supervisor, possibly together with a primary supervisor and one or two assistant supervisors, in accordance with the individual study plan which the supervisor and the PhD student together draw up for the first time no later than three months after the student's admission to the PhD programme and which thereafter is revised at least once a year. PhD students, the supervision group, and the director[12] of PhD studies 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 PhD degree is awarded when the PhD student has completed her/his education comprising 240 credits within her/his field and thereby been awarded the grade Pass at the examinations which are part of the education as well as having written and at a public hearing defended her/his thesis, which was passed by an examining committee. See also *Riktlinjer för examination inom utbildning på forskarnivå vid Högskolan i Skövde*.

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

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[10] Chapter 6, §§ 28, 30-31
[11] *Guidelines for PhD supervision and study follow-up at the University of Skövde*
[12] Swedish: studierektor för forskarutbildning

A PhD student who has been admitted to a study programme for a licentiate degree may, after having been awarded her/his degree, apply for being admitted to a study programme for a PhD degree. A PhD student who has been admitted to a study programme for a PhD degree may be given the opportunity to complete her/his education with a licentiate degree.

The Swedish title of the degree after completing the education with a passing grade is, in accordance with this syllabus, *teknologie licentiat/doktor i informationsteknologi*. A PhD student who wishes to use the suffix[13] *filosofie* can apply for this to the faculty board when submitting the application for the licentiate seminar or public defence. The English title of the PhD degree, both *teknologie* and *filosofie*, is Doctor of Philosophy in Informatics. *Teknologie* and *filosofie licentiat* are in both cases translated into Licentiate of Philosophy in Informatics.

8 Taking effect

Ratified by the Committee for the PhD Programme in Informatics on June 13, 2016, taking effect on the same day. Replaces the version ratified on May 6, 2013.

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[13] A prefix in the title in Swedish