FIL3606 The Art of Doctoral Research 7.5 credits

Konsten att forska som doktorand

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FIL3606 valid from Autumn 2016

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

All accepted ICT doctoral program students are eligible for this course. Accepted doctoral students from other KTH schools are also eligible for this course. It is recommended to take the course in the beginning of the doctoral program.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The aim of this course is to prepare doctoral students for their professional career. After completing the course, the student shall demonstrate the knowledge and skills required to work autonomously as a doctoral researcher according to the KTH goals for third cycle education. These include:

1. Knowledge and understanding
The student shall:
1.1 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.
1.2 Demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular.

2. Competence and skills
The student shall:
2.1 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.
2.2 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.
2.3 Demonstrate the ability to make a contribution to the formation of knowledge through his or her own research.
2.4 Demonstrate the ability to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community.
2.5 Demonstrate the ability to identify the need for further research in the field.

3. Judgement and approach
The student shall:
3.1 Demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make ethical judgments.
3.2 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.

Course contents

The course covers a variety of topics necessary to provide a doctoral student with the knowledge and skills required to work autonomously as researcher. The content is partitioned into three modules as follows:

M1) Starting out in research
Module M1 consists of a general introduction and general research methodology. The introductory part covers major phases of a doctoral study: Background study, Literature studies, Detailed problem formulation, Execution, Publishing (conferences, journals, books). It also covers general research methodology as well as specific aspects of doctoral studies, including relationship between student and supervisor and guidelines for filling an individual study plan. This part of the course contributes to the goals 1.1, 1.2.

M2) Writing and presentation skills for doctoral students
Module M2 has three parts. Its first part provides general guidelines and specific suggestions to the art of writing scientific papers. Major sections of a paper will be studied including: Introduction, Problem statement/Claims, Related work, Research presentation, Experimental results, Conclusion and Future work. Different categories will be covered, e.g. concept

paper, paper presenting experimental results, theoretical work, methodology, etc. Sources of information about major conferences and journals will be considered and their expectations and standards will be discussed. The submission of supplementary information to journal papers, in order to alleviate replication of scientific results, will be exemplified. This part also provides general guidelines and specific suggestions on writing reviews of scientific papers. This part of the course contributes to the goals 2.1, 2.2, 2.3, 2.4.
The second part of this module covers the art of giving technical presentations. Common ways to format the slides and to convey the information to the audience will be reviewed. Typical ways to organize a conference talk will be discussed including: Title, Problem description, Motivation, Roadmap, Background, Previous Work, Innovation and contribution, Experimental results, Conclusion and Future Work. This part of the course contributes to the goal 2.4.
The third part of this module provides information about sources of external funding and guidelines in writing project applications. Instructions in developing comprehensive funding applications and presenting them to the outside world in a format that is recognized and accepted will be offered. This part also provides general guidelines and specific suggestions on writing reviews of funding applications. This part of the course contributes to the goals 2.2, 2.5.

M3) Research ethics
This module covers the main aspects of research ethics, including the design and implementation of research involving human and animal experimentation, various aspects of scientific misconduct (such as fraud, fabrication of data and plagiarism), as well as codes of ethics and professional conduct. This part of the course contributes to the goals 3.1, 3.2.

Disposition

The course consists of three modules:
1) Starting out in research (3 credits)
2) Writing and presentation skills for doctoral students (3 credits)
3) Research ethics (1.5 credits)

The theoretical part of the course will be complemented by practical training. Each student is expected to apply the techniques learned in M1-M3 to write several reports related to research methodology and research ethics, as well as to write a conference or journal paper in his/her area of research, to present this paper in the class, to write a review of a research paper, to write an application for funding, and to review an application for funding. The activities are partitioned among the three modules as follows:

M1) The student shall apply the techniques learned in M1 to provide written reports to these 3 assignments which examine the student's familiarity with research methodology in general and the methods of the specific field of research in particular, as well as capacity of the student for scholarly analysis and synthesis and his/her ability to review and assess new and complex phenomena autonomously and critically.

M2) The student shall apply the techniques learned in M2 to:
• Write a scientific conference or journal paper in his/her area of research and submit it to the course's examiner for evaluation.
• Write a review for a conference or journal paper written by another student taking the course and submit it to the course's examiner for evaluation.
• Present the paper presented for the evaluation (bullet 1) in the class (20 min talk).
• Attend at least two oral presentations sessions

• Write an application for funding, e.g. a travel grant supporting a conference trip, a research visit, or a project application, and submit it to the course's examiner for evaluation.
• Write a review for an application for funding written by another student taking the course and submit it to the course's examiner for evaluation.

M3) The student shall apply the techniques learned in M3 to provide a written report to an assignment which examines student's ability to make ethical judgments.

Course literature

The material will be provided in class.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

In the examination part, the following is included:
- three written reports related to M1
- written scientific paper
- review of another student's scientific paper
- oral presentation
- active attendance of at least two oral presentations sessions
- written application for funding
- review of another student's application for funding
- one written report related to M3

Other requirements for final grade

To pass, all points listed in the examination should be completed.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.