Learning Outcomes
in
The Scool of Computer Science at Reykjavik University

Ph.D. in Computer Science

2009

HÁSKÓLINN Í REYKJAVÍK
REYKJAVÍK UNIVERSITY

Learning Outcomes for Ph.D. in Computer Science (level 5)

The Ph.D. program in Computer Science at Reykjavík University is a three to four year course of study covering 180-240 ECTS (60 ECTS per year). The goal of the program is to prepare students for leading careers in academia and industry. Applicants should at least have completed an M.Sc. degree in Computer Science, or a related area, before entering the program. In the M.Sc. program, the applicant must have demonstrated strong potential for further graduate studies. Students are supervised by a recognized expert in the intended area of thesis work. A thesis committee, which includes the supervisor, guides the student towards the completion of the research. Each student is generally required to spend at least three months, but no more than one year, at another university or research laboratory. Students from areas other than Computer Science may be required to complete preparatory courses from the undergraduate and/or graduate program at Reykjavík University, before joining the Ph.D. program or during the program.

Students entering the Ph.D. program are expected to have a wide background in computer science from their M.Sc. program. On the completion of Doctorate degree, the following criteria shall be fulfilled, in addition to the criteria fulfilled at previous levels:

Knowledge and understanding

- Demonstrate a systematic understanding of the field of computer science.

- Demonstrate wide knowledge in the three major areas of computer science: systems, applications and theory.

- Demonstrate mastery of the skills and methods of research in computer science.

- Demonstrate the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity.

- Demonstrate the ability to make a contribution to their specific field of study through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits international refereed publication.

- Demonstrate capacity for critical analysis, evaluation and synthesis of new and complex ideas.

- Demonstrate capacity to participate actively in their academic community and to communicate with peers, the larger scholarly community and with society in general about their areas of expertise.

Type of knowledge

Upon completion of the Ph.D. degree course, students will

- Be among the recognized experts in the area of research to which their doctoral thesis contributes;

- Have shown the ability to carry out a substantial body of research on an individual basis;

- Be able to contribute to a long-term collaborative research effort that aims at pushing the boundary of knowledge in a given field of study;

- Be able to set their own research agenda for the future, and to undertake a future career as an independent researcher in academia and industry.

Practical Skills

- Make creative and expert use of a range of existing theories, techniques and tools relevant to their field of research.

- Refine existing techniques or define novel ones, as necessary, in the process of solving a complex research problem.

- Organize and carry out complex research tasks.

- Search for new research projects within their field of interest.

- Be able to place critically the results of their research work in the context of the research literature on the subject.

- Be aware of the publication process in peer-reviewed international outlets.

- Be able to select the appropriate publication outlets for articles reporting on their research work.

- Be able to create a small network of trusted research collaborators.

Theoretical skills

- Be able to carry out research that advances scientific knowledge in their field of expertise.

- Be able to find new research problems whose solution is within the reach of their abilities.

- Analyze a complex research problem, consider a range of possible approaches to its solution, and determine the most promising approaches.

- Be able to organize and write a doctoral dissertation reporting on a substantial amount of new technical work.

- Understand fully the specific characteristics of scientific research, its progress, milestones and ethical values that make it a source of reliable knowledge.

- Evaluate critically a solution to a complex research level problem, and propose possible improvements.

- Abstract the essential core of a complex research problem, and realize the commonalities between seemingly different tasks to be accomplished, and techniques and results from different research areas in computer science.

- Reason at a level of abstraction that is appropriate while pursuing the solution to a complex research problem.

- Be familiar with research methods, techniques, and problem solving approaches from the field of research in which they are specializing.

- Be able to infer new and complex results from the collected data and body of knowledge.

Communication skills and information literacy

- Communicate effectively and professionally both in writing and by means of presentations using appropriate technical language.

- Be able to report on their work, and that of others, both to a specialist and a general audience.

- Be aware of the benefits and pitfalls of science communication via the media.

- Be able to analyze statistical data, and communicate their findings using, e.g., charts and statistical software.

- Be well informed of issues related to ethical conduct in science, and be able to engage in discussions on this topic both with their peers and the general public in an informed and reasoned fashion.

- Be able to make an expert and novel use of software tools embodying the most recent theoretical advances in their area of research.

- Be able to engage other scientists in their work, and publicize it within their research community.

- Be able to work with researchers located at different institutions, making effective use of available information technology tools.

- Be experts at finding information that is relevant to their research work.

Learning Skills

- Solve complex research problems independently.

- Possess state-of-the-art knowledge of their main area of specialization, and related fields of study.

- Be able to shape the research agenda in their fields of specialization by asking new questions based on the available information and knowledge.

- Make very creative use of known information, methods, concepts and theories in new situations.

- Generalize from a collection of specific instances.

- Identify the key components in the solution to a complex research level problem.

- Draw conclusions and predict possible outcomes.

- Discover patterns in the available information.

- Interpret facts by comparing them and contrasting them with one another.

- Verify the value of the available evidence.

- Recognize and evaluate subjective opinions.

- Infer possible causes from the available data.

- Make choices based on reasoned arguments, and evaluate the outcomes of those choices by comparing them with alternative solutions.

- Be able to discuss the results of research work carried out by themselves or others with their peers.

- Develop a critical assessment of the present state of knowledge in their field of research.