

Visualisation and Media Technology

/Visualisering och medieteknik/

SCB-code: 10204, 10202, 10209

General description of the research area

Modern visualization and media technology encompasses a large number of areas with a strong information and computer technology character. The subject deals with the entire chain from data collection, processing, synthesis and communication using image, sound, and other senses as well as methods and tools for such activities. The PhD program aims to provide the student with in-depth knowledge of the theoretical issues that form the basis for research in the field. Furthermore, the student is given experience of leading hardware and software and their integration into advanced systems for applications.

The education takes place in the interplay between basic research and application and is conducted in an interdisciplinary environment in close collaboration with other academic groups and companies. During the PhD studies, the student will develop skills in leading algorithms for data management and processing as well as rendering and interaction. Within the education, it is possible to develop applications for specific applications. Education is intended to prepare the student for a career both in business and in the university world.

The postgraduate subject Visualization and Media Technology focuses on:

- Visualization and interaction with a focus on computer graphics, visualization and interaction as well as information systems, and
- Media technology, which focuses on graphic technology, image processing, and image reproduction.

Examples of areas covered are:

- Computer graphics
- Image processing
- Visualisation
- Graphic technology
- Sound technology
- Colour science

The subject has close points and partly overlaps with other research areas. Some examples are electronics, computer science, software engineering and signal processing. In addition to the area's purely technical aspects, consideration is also given to non-technical aspects such as humanities and behavioral science issues.

Eligibility requirements and selection

The basic eligibility requirements as well as the general principles for selection are specified in the faculty's *Study Handbook for PhD Studies*.

Specific eligibility requirements

Admission to PhD Studies in the research area of Visualisation and Media Technology requires that the candidate has been awarded a degree of Master of Science in Engineering in a program related to the research area or fulfills the requirements for another master's degree in a field with comparable breadth and depth in the technical sciences.

Degree

PhD studies in Visualisation and Media Technology leads to a Degree of Doctor or a Degree of Licentiate. The latter degree can also serve as a stage in the PhD studies. The Degree of Licentiate comprises 120 ECTS, of which courses correspond to 45 ECTS and the licentiate thesis corresponds to at least 75 ECTS. The Degree of Doctor comprises 240 ECTS, of which courses correspond to 60 ECTS and the doctoral thesis corresponds to 180 ECTS.

Goals and implementation of the PhD studies

The general goals and objectives of PhD studies are specified in the introduction to the faculty's *Study Handbook for PhD Studies*, as well as in the Higher Education Ordinance (reprinted in the *Study Handbook's* appendix A).

PhD studies in Visualisation and Media Technology will equip the PhD student with the knowledge and skills to fulfill all the degree outcomes. The studies consist of research and thesis work, courses, participation in seminars, attendance at national and international conferences, and networking with industry as well as the local community.

The PhD studies will endow the PhD student with a broad knowledge and understanding of the research area of Visualisation and Media Technology through participation in subject-related courses and helping to teach undergraduate courses. Subject-related courses should give breadth within the student's own area of research focus but even adjacent disciplines. They should also give depth in the fields that are relevant for the student's thesis. Courses with a focus on teaching and learning in higher education can be part of the studies and are required if the PhD student plans to teach at the undergraduate level during his/her period of study. Courses can be offered at the student's own department, at other departments at Linköping University and at other universities and summer schools.

The PhD student will acquire a deep knowledge and understanding of Visualisation and Media Technology, and in particular within his/her research specialisation, by actively participating in in-depth courses, carrying out independent work in one or several research projects, participating in discussions at seminars and conferences, etc.

The PhD student will develop familiarity with scientific methodology through his/her own research as well as by completing mandatory courses in research methodology.

PhD students in Visualisation and Media Technology acquire skills and competencies:

- By independently planning and carrying out both theoretical and experimental research
- By annually participating in national conferences, for example SIGRAD
- By participating in seminar series in the division for Media and Information Technology at the Department of Science and Technology (MIT/ITN)

- By participating/presenting in the department's annual conference for PhD students (ITN PhD Conference)
- By participating in international conferences and presenting his/her own research where the student practises his/her ability to make presentations in front of colleagues from different fields of research, and to critically review both his/her own research and the other participants' research work
- By reviewing and evaluating research articles for international journals and conferences, and by participating in the so-called peer-review process

The PhD student in Visualisation and Media Technology will develop judgement and approach through completing courses in research ethics and participating in seminars/seminar series in the research area. PhD students in Visualisation and Media Technology will demonstrate their intellectual autonomy by writing a monograph or compilation thesis.

Thesis

The overall rules regarding the format, submission and grading of a thesis can be found in the faculty's *Study Handbook for PhD Studies*.

Together with his/her supervisor the PhD student will decide if he/she will write a monograph or compilation thesis.

A monograph thesis should consist of free-standing and cohesive text that describes the PhD student's research results and places them in the context of other research in the area. The monograph should be based on published scientific work.

A compilation thesis normally consists of five to ten publications, of which at least two are published in internationally recognised journals in the research area. A licentiate thesis normally consists of three to six publications, of which one is published in an internationally recognised journal or an analogous publication. Deviations from these norms should be documented and justified in the individual study plan.

Individual study plan

An individual study plan will be formulated for each PhD student. The detailed planning of courses and other components will be conducted in consultation with the supervisor and documented in the individual study plan (see *Study Handbook for PhD Studies*, section 5.3). The study plan should be established within one month after admission to PhD studies, and it should be revised at least once a year.

Supervision

All PhD students will have at least two supervisors. One of the supervisors will be appointed as the main supervisor (see *Study Handbook for PhD Studies*, section 4.1).

The supervisors should assist the student in the planning of his/her studies and in the selection of research projects, and in general guide the student during the period of study. The role of the co-supervisor is to complement for interdisciplinary aspects and/or to step in if the main supervisor has temporary hindrances that prevent him/her from supervising.

The PhD student and the supervisors should have regular meetings to discuss and consult on the progress of the research work. The PhD student should regularly keep the supervisors informed of the progress of his/her work. It is also encouraged to appoint a mentor to the PhD student.

Courses

Faculty course requirements

Scientific theory, methodology and ethics

All PhD students admitted as of 1 January 2010 should complete mandatory courses as decided by the faculty in methodology and ethics, or be deemed to have equivalent competencies, in order to receive a degree.

Pedagogic studies

All PhD students who teach should complete a basic course in pedagogy. At least 3 ECTS from this course should be included in the PhD studies, and any remaining credits should be counted as departmental duties (see *Study Handbook for PhD Studies*, section 5.5).

Other course requirements

The following courses are common recommended courses that the PhD student should have completed during the first two years of studies:

- Mathematical methods for advanced Media Technology/ Matematiska metoder för avancerad medieteknik/
- Scientific research methodology in Media Technology/ Vetenskapsmetodik i medieteknik/
- State-of-the-art (within the student's field): literature review and report/ State-of-the-art (inom studentens område): litteraturstudie och rapport/
- Software engineering/ Mjukvaruutveckling/

Seminars

MIT conducts recurrent seminars where PhD students and guest researchers present current research. Current technical progress and advancement can also be presented.

Transitional provisions

Changes to the general study syllabus do not apply to those who have already been admitted to PhD studies in the research area. A change to the new general study syllabus may however be approved if both the main supervisor and the PhD student agree. In such a case, this should be documented in the individual study plan.