L

GENERAL CURRICULUM FOR EDUCATION AT POST-GRADUATE LEVEL IN

SCIENTIFIC COMPUTING

TFN Chair, 2007-06-21

1 Subject area

Scientific Computing comprises the use of algorithms and numerical methods to solve and analyse challenging computational problems. One important area is the use of high performance computing.

2 Programme curriculum

Education at post-graduate level in Scientific Computing that concludes with a licentiate degree comprises a total of two years' full time study (120 higher education credits) and consists of a study programme that gives 30-60 higher education credits and a licentiate thesis that gives 60-90 higher education credits.

Education at post-graduate level in Scientific Computing that concludes with a doctorate comprises a total of four years' full time study (240 higher education credits) and consists of a study programme that gives 60-120 higher education credits and a doctoral thesis that gives 120-180 higher education credits.

The education is so planned as to allow the student to acquire advanced knowledge of scientific computing. This is achieved by means of well-adapted courses and an advanced scientific project. The student is given the opportunity to develop knowledge of planning and conducting research projects and publishing and presenting research findings. This is done through giving the student the opportunity to present research findings at international conferences and gradually taking increasing responsibility for writing his/her own articles for publication and participating in the work of drawing up research applications. The student is also given the opportunity for practice in critical review and evaluation of existing research findings. The student's environment shall be such that it stimulates the student's desire to learn. This may, for example, be achieved through the student being placed in a group of researchers consisting of students at different stages of their education and several senior researchers/supervisors. Part of the course can profitably be studied at other universities, to advantage also outside Sweden, to create networks and prepare the student for an international labour market.

After completion of the programme, the student shall be able to participate in world-class research projects, disseminate research findings and be able to interact with actors both in industry and at other universities both in Sweden and in other countries.

An individual study programme is drawn up for every postgraduate student (according to a fixed model) where the study programme is specified in detail. The individual study programme is followed up at least once a year by the post-graduate student and his/her supervisor and is then approved by the head of department, as delegated by the faculty board.

3 Eligibility and selection

3.1 General eligibility requirements
As specified in Section 39 of Chapter 7 of the Higher Education Ordinance and the local guidelines laid down in the Admission Rules for Post-graduate Education at Luleå University of Technology.

3.2 Specific eligibility requirements
Main subject/main area Mathematics, Scientific Computing or related subjects, 60 credits/ 90 higher education credits at basic level. Scientific Computing or related subjects, 10 credits/ 15 higher education credits at advanced level. For applicants who achieved basic eligibility before 1 July 2007: no examination requirements.

Good skills in oral and written communication in English.

3.3 Selection
As specified in Section 41 of Chapter 7 of the Higher Education Ordinance and the local guidelines laid down in the Admission Rules for Post-graduate Education at Luleå University of Technology.

When basic and special eligibility requirements have been met, selection will be based on:
- Knowledge relevant to the project in question
- The quality of the applicant's degree project
- Personal qualities relevant to education at post-graduate level

4 Examinations included in the education
The education consists of courses and an academic thesis. Examinations included in post-graduate programmes are graded Pass or Fail. Course and licentiate thesis grades are decided by specially appointed teachers (examiners). Doctoral thesis grades are decided by a specially appointed grading committee.

4.1 Courses
Compulsory course: Teaching and Learning in Higher Education
Other courses included in the education are specified in the individual study programme.

Goal attainment is tested by means of the form of examination specified in the syllabus.

4.1.1 Recognition of prior studies
As specified in the local guidelines laid down in the Admission Rules for Post-graduate Education at Luleå University of Technology.

4.2 Academic thesis
An academic project in the form of a dissertation/thesis in Scientific Computing shall be presented as a homogenous, cohesive academic work (monograph) or a brief summary – comprehensive summary – of academic essays (composite thesis) that the post-graduate student has written alone or together with another person or persons.

Thesis manuscripts shall be presented at one or more research seminars or be subjected to equivalent review through the agency of the department.

The licentiate thesis is defended orally at a public licentiate seminar and is graded Pass or Fail. When the thesis is graded both the content of the thesis and the defence of the thesis are taken into consideration. The grade of a licentiate thesis is decided by an examiner appointed by the head of department.

The doctoral thesis is defended orally at a public disputation and is graded Pass or Fail. When the thesis is graded both the content of the thesis and the defence of the thesis are taken into consideration. The grade of a doctoral thesis is decided by a grading committee that is appointed for each thesis.

5 Degree

In Scientific Computing, a post-graduate student who has been admitted to a doctorate has the possibility to take a licentiate degree after completing a portion giving at least 120 higher education credits of the education that will be concluded with a doctorate.

5.1 Degree objectives

As specified in the degree description (Higher Education Ordinance, Appendix 2 – Degree Ordinance. See also the appendix below.

5.2 Degree title

A post-graduate student who takes a licentiate degree in Scientific Computing receives the degree title of Licentiate in Technology.

A post-graduate student who takes a doctorate in Scientific Computing normally receives the degree title of Doctor of Technology.

Requests for another degree title are made according to established guidelines.

6 Entry into effect and interim regulations

The previous general curriculum will cease to apply for post-graduate students who are admitted to education at post-graduate level after 1 July 2007. Post-graduate students admitted before this date may choose to either follow the previous curriculum or transfer to the present curriculum.

Qualifications ordinance (Higher Education Ordinance, Annex 2) Contents
the qualifications that may be awarded in the third cycles, and
the requirements to be fulfilled for the award of each qualification (qualification descriptors).

THIRD-CYCLE QUALIFICATIONS
General qualifications

Degree of Licentiate [Licentiatexamen]
Scope

A Degree of Licentiate is awarded
either after a third-cycle student has completed a study programme of at least 120 credits in a subject in
which third-cycle teaching is offered,
or after a third-cycle student has completed one part comprising at least 120 credits of a study
programme intended to conclude with the award of a PhD, if a higher education institution decides
that a licentiate of this kind may be awarded at the institution.

Outcomes

Knowledge and understanding
For a Degree of Licentiate the third-cycle 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 Degree of Licentiate the third-cycle student shall have:
•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.

Judgement and approach
For a Degree of Licentiate the third-cycle 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.

Thesis
For a Degree of Licentiate the third-cycle student shall have been awarded a pass grade for a research
thesis of at least 60 credits.

Miscellaneous

Specific requirements determined by each higher education institution itself within the parameters of the requirements laid down in this qualification descriptor shall also apply for a Degree of Licentiate with a defined specialisation.

Degree of Doctor

Scope
A Degree of Doctor is awarded after the third-cycle student has completed a study programme of at least 240 credits in a subject in which third-cycle teaching is offered.

Outcomes

Knowledge and understanding
For the Degree of Doctor the third-cycle 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.
•demonstrate the capacity for scholarly analysis and synthesis as well 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 the Degree of Doctor the third-cycle 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.

Research thesis (doctoral thesis)
For the Degree of Doctor the third-cycle student shall have been awarded a pass grade for a research thesis (doctoral thesis) of at least 120 credits.

Miscellaneous
Specific requirements determined by each higher education institution itself within the parameters of the requirements laid down in this qualification descriptor shall also apply for a Degree of Doctor with a defined specialisation. Ordinance (2008:132)