GENERAL CURRICULUM FOR EDUCATION AT POST-GRADUATE LEVEL IN PHYSICAL CHEMISTRY

TFN Chair, 2008-04-08

Admission to postgraduate studies in Physical Chemistry has ceased 2012-09-18 (dnr 1044-12)

1 Subject area

The Physical Chemistry subject area is principally characterised by the areas of thermodynamics, quantum chemistry and the chemical bond and spectroscopy, chemical kinetics, reaction mechanisms and molecular dynamics, and colloid chemistry. The subject shall give basic theories, principles and knowledge about different spectroscopic methods that are often used to explain experimental observations in other areas of chemistry and their application in studies of inorganic and organic molecules and biomolecules. The Physical Chemistry research subject chiefly comprises the development and use of spectroscopic methods for the analysis of structures in different organic, inorganic and composite materials at molecular level.

Research is focused on studies of metal ions' coordination chemistry, adsorption processes of ions and molecules on metal sulphide materials, iron oxide and silicate materials. Part of the research is related to peptide synthesis and the manufacture of gold nanoparticles activated with organic molecules and peptides. Nuclear Magnetic Resistance (NMR) in solid and liquid phase. FT-IR, ATR-IR and FT-Raman are the spectrographic methods used in studies of molecules and their structure.

The majority of the research projects are conducted in co-operation with industrial stakeholders, other universities in Sweden and abroad and with other departments at the university. The knowledge acquired shall constitute a solid foundation for a continued academic career in the national or the international arenas.

2 Programme curriculum

Education at post-graduate level in Physical Chemistry 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 higher education credits and a licentiate thesis that gives 90 higher education credits.

Education at post-graduate level in Physical Chemistry 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 higher education credits and a doctoral thesis that gives 180 higher education credits.

The education normally comprises 80% full-time study and 20% departmental duties that usually involve teaching at basic level. The education consists of research work for the academic thesis, courses oriented towards the specific area of specialisation of the thesis, pedagogical education or other education that is required to carry out the departmental duties. The research work is communicated to the scientific community and the rest of society through scientific articles, participation in conferences and participation in national and

international collaborative projects. During the period of study the student's progress and development in the scientific research project are communicated to the student's appointed supervisor and assistant supervisor. The research work is also communicated internally within the department at different internal workshops and seminars for researchers and post-graduate students.

An individual study programme is drawn up for every post-graduate 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 area Chemistry/ Chemical Engineering; 90 higher education credits/60 credits, basic level.

For applicants who achieved basic eligibility before 1 July 2007:
Master of Science degree in with specialisation in Chemical Engineering/ Bachelor's Degree with the same specialisation.

Good skills in oral and written communication in Swedish and 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.

Where basic and special eligibility requirements have been made selection will be made on the basis of:

- Knowledge relevant to the project in question
- The quality of the applicant's degree project
- Grades obtained in relevant courses.

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
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 Physical Chemistry 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. In normal cases 5-6 research articles assessed by peer review in research journals are to be appended of which at least 4 are in print (accepted or in press) and 1-2 are manuscripts. The post-graduate student must the main author for most of the publications, or his/her contribution to the published articles must be made clear in the summary.

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 Physical Chemistry, 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 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 Physical Chemistry receives the degree title of Licentiate in Technology.

A post-graduate student who takes a doctorate in Physical Chemistry 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)