

Assessment report for PhD programs in Chemistry at Uppsala University

Short summary with list of recommendations

(April 19, 2021)

Overall summary

In summary, the assessment committee is overall very positive about the PhD education in chemistry at Uppsala University. Indeed, the department offers a vivid, international and scientifically strong environment for students to pursue doctoral studies – both in regard to research at the highest level and in regard to course work. Our recommendations mainly relate to implementing a few changes for homogenizing the structure of the PhD programs; yet, without compromising too much the flexible and non-bureaucratic programs that all seem to work very successfully. In this regard, we would in particular recommend to implement licentiate in all programs and to work out program-common procedures for the thesis pre-assessment before its submission. In addition, we think it is important that the department takes initiatives to remedy the gender imbalance between both students and teaching/supervision staff.

Summary

Education at the postgraduate level in Chemistry is of a high quality. The environment for the PhD education is excellent, characterized by a strong, often interdisciplinary collaboration of a number of research groups, within the department, nationally and internationally. It is of a sufficient overall volume and supervision/training capacity in the short and long term. Small program units may be somewhat vulnerable to fluctuations in the resources. The postgraduate education delivers the expected learning outcomes.

Easily accessible, excellent instrumental facilities at the Ångström Laboratory represent a particularly strong aspects of the educational environment. As demonstrated through high-impact publications and international research grants, the research of a majority of supervisors is of internationally recognized quality. Their didactic competence is ensured by taking specific training course in PhD supervision. Several research projects include collaboration with the industry, involving industrial partners in the supervision of students. The panel thus concludes that the evaluated postgraduate education has a clear scientific foundation and proven experience.

Yearly revisions of the ISPs provide both the quality control of the education, as well as allow monitoring the progress of student's studies. Through their active involvement in the revisions, students have an influence in the planning of their education. It would be helpful to include a project-independent participant in the revision in order to impartially assess a reasonable pace of studies and accomplished progress. In-between the revisions, an

excellent culture for presentations and feedback from fellow students, supervisors and others in the research environment is established, ensuring peer feedback, suggestions etc. The follow-up and development of education is also facilitated by regular yearly meetings of FUAPs, supervisors, where quality matters, problems and experiences are discussed.

The reported spectrum of activities and approaches which are to ensure the progression in the education is diverse and highly relevant, and appears to be adequate for reaching the examination goals. A variety of checkpoints at different stages of the student's doctoral studies serves for identifying potential problems in the PhD education and for monitoring the progress. These include, for example, half-time oral assessments and, in some cases, licentiate thesis. This is highly commendable. Also, students are continuously provided with feedbacks on their performance in research and teaching activities. On the other hand, possibilities for students to give a feedback on taken courses (course evaluations) can be improved. Yearly revisions of ISPs are used as an effective tool for monitoring the progress towards examination goals, in particular by describing when and in what way the qualitative goals have been completed.

The internationalization at Chemistry-Ångström is strong. It permeates the education in multiple aspects, from internationally co-authored publications, through international research projects and mobility, to employment of large portions of non-Swedish PhD students and supervisors. One challenge arising from the internationalization is how to manage the teaching work load of Swedish-speaking students on the fundamental courses which have Swedish as the teaching language.

The sustainability perspective in the PhD education is well promoted through participation in a number of research projects addressing societal needs, mainly within renewable energy, human health and new materials. Students have opportunities to engage in discussions during seminars and research meetings dedicated to the sustainability topics. Sustainable lab work routines have been implemented, which creates an awareness on sustainability in the daily environment.

Generally, there is a good awareness on career planning but most students wish a stronger planning and guidance. The way and degree of addressing this topic differ between programs. Various actions - e.g. yearly meeting with alumni and companies, industrial internships and job fairs - are organized to support the career development but there is a further need, as well as a potential, to enlarge the scope of activities. The course 'Exit from postgraduate studies' is much appreciated in this context. During the studies, yearly revisions of ISPs represent an effective tool and a convenient opportunity to discuss career planning. A closer collaboration with the Uppsala Innovation Centre, using to a greater extent alumni resources, and introduction of mentorship programs represent another not yet fully utilized means of tackling this task. Many PhD projects also involve interactions with industry, both start-ups as well as established industries. This increases the career-relevant aspects of the studies.

The evaluated programs work actively with the gender-related and equal opportunities questions as illustrated by examples of improved routines and gender-dedicated events. A range of adopted departmental policies and program measures make the gender equality perspective increasingly integrated into the education. This is an ongoing process,

representing a development area. The PhD programs support equality in recruitment process and promote gender diversity. Despite the efforts, the imbalanced gender distribution remains an important task to deal with. The overall male to female ratio of 2:1 has not changed during the last five years.

PhD students are members of boards and councils what provides them with ample possibilities to influence the education. The faculty PhD council (TNDR), having English as a working language, is inclusive for all students. However, boards at the central level operate in Swedish, leaving a significant part of the doctoral students unable to contribute in decision-making process over their education.

List of recommendations

- Increase and broaden efforts to remedy the gender imbalance between both students and teaching/supervision staff. Continue working together with the Center for Gender Research (CGR) with the aim of analysis and improvement of routines, which bear upon gender equality issues. Identify gender-related improving actions that go beyond the scope of chemistry education and bring these to the attention of FUN in order to consider introducing faculty-wide measures/recommendations. Be prepared to take stronger and more comprehensive measures if the gender imbalance does not improve. Female PhD student ambassadors may be helpful in encouraging and inspiring female undergraduate students to pursue doctoral studies in chemistry.
- Motivate students to attend seminars, also in fields not directly related to their own research topics.
- Implement licentiate in all programs as an important milestone and quality check for the first half of the PhD education.
- Define procedures common for the whole department for the thesis pre-assessment before its submission, similar to the procedures already implemented for some subjects. This includes scrutiny by a committee of a few senior researchers, including the FUAP, after the student and the supervisor have done their revisions, and taking place in good time before the thesis submission. The committee gives a recommendation if the thesis is ready for submission.
- Increase compliance to following the formalized procedures for recruitments of new PhD students.
- If some programs experience a decrease in senior staff or economy, the Panel would recommend merging such programs to maintain a critical mass.
- The panel recommends raising the ambition level for increasing cross-disciplinary interactions of students between the individual programs.
- Improve visibility and advertisement of scholarships/grants for research stays and international conference participation.
- Encourage supervisors and PhD students to scientific visits to large scale facilities or other research environments (when relevant in relation to the PhD project)
- Introduce digital ISPs (to be conveyed to faculty). Emphasize to students the importance of ISP as a progress tool, starting during the compulsory introduction course. Involve a project-independent participant in the revision of ISP.

- Note down the amount of received supervision hours in the ISP during the yearly revision.
- Establish an online tool for course feedback that offers anonymity and possibility to follow up.
- Involve Doktorandombud in conflict solving process as well as in supervisor change.
- Ensure that policy documents and important information and guidelines are spread in both Swedish and in English to the doctoral students. For board meetings, even though official documents are in Swedish the operating language can still be English.
- Put a greater weight on discussing career opportunities when revising the ISP, especially during the last year(s) of PhD education.
- Introduce a mentorship programme, where PhD students get mentors assigned and have annual meetings in order to look into the career planning.
- Offer courses on entrepreneurship (own courses or given via Uppsala Innovation Centre), which provide students with know-how on starting and running small companies and start-ups. Establish and utilize the company networks to introduce the employment and career opportunities. Use to a greater extent alumni resources.
- Increase awareness on career planning.

Composition of the assessment group

Alex Cravcenca, Doctoral student representative, Gothenburg University

Poul Erik Jensen, Professor, University of Copenhagen

Minna Kellomäki, Professor, Tampere University

Peter Lazor, Professor, Uppsala University, Chairman

Mogens Brøndsted Nielsen, Professor, University of Copenhagen

Reine Wallenberg, Professor, Lund University

About the assessment group

Alex Cravcenca is a doctoral student in organic chemistry at Department of Chemistry and Molecular Biology at University of Gothenburg. Alex is chairing Doctoral committee at GU and also working with the evaluation of doctoral program in organic chemistry at the national level in Sweden.

Poul Erik Jensen is since September 2019 professor in plant based food biochemistry at Department of Food Science at University of Copenhagen. From 2009-19 he was professor of molecular biology of plant photosynthesis at Univ. of Copenhagen. He has acted as opponent/examiner at several PhD defences in Denmark, Sweden, Finland, Czech Republic and the UK. He has completed supervision of 16 PhD students and is currently supervising 4 students.

Minna Kellomäki is professor in biomaterials science and tissue engineering. She has supervised 14 PhD students. She has been an opponent for PhD students in Finland, Sweden, Norway, Germany and Portugal. She is head of Degree Programme in Biotechnology and Biomedical Engineering (engineering), member of PhD graduate school steering group of Medicine and Health Technology Faculty and member of faculty steering group. She is one of the chairpersons of Professors' Council and member of Science Council at Tampere University.

Peter Lazor is professor in physical geochemistry. He has supervised nine PhD students. He is professor responsible for PhD education at the Program of Mineralogy, Petrology and Tectonics, Department of Earth Sciences. Earlier, he was Director of PhD studies at the same department, and member of the faculty board for PhD education.

Mogens Brøndsted Nielsen is professor in organic chemistry at Department of Chemistry at University of Copenhagen. He has supervised 19 graduated PhD students; he is yearly opponent at several PhD defences in Denmark and regularly in Sweden.

Reine Wallenberg is professor of solid-state chemistry and has supervised 8 graduate students. He has been acting as opponent in Sweden, Denmark, Norway, the Netherlands and Spain. He is head of the graduate education group at Centre for analysis and synthesis at the Chemistry Institution at Lund University.