General syllabus for the doctoral programme in the subject of:

CHEMISTRY

Valid from 1 July 2016

Department(s) to which the syllabus applies	Subject code:
MOLECULAR SCIENCES	NJKEMI01

The intended outcomes and the design of programmes can vary between faculties (see point 3. Miscellaneous).

Chemistry ("kemi") is a subject that concerns the composition, structure and properties of different substances, the reactions that transfer one substance to another and various changes in energy that accompany these reactions. At SLU, focus is on the structure and properties of inorganic compounds in soil and water as well as on biomolecules, metabolism and biotechnology.

Regulations for third-cycle (doctoral) education at SLU

Third-cycle (doctoral) education is regulated by the Higher Education Ordinance (SFS 1993:100) and the Ordinance for the Swedish University of Agricultural Sciences (SFS 1993:221).

In addition, SLU has regulations for the following:

- recruitment and admission, in Admission regulations for third-cycle (doctoral) education (SLUID: SLU.ua.2018.1.1.1-930)
- joint programmes leading to a double or joint degree
- supervision
- scope and content of programmes
- planning and follow-up of programmes
- procedure when a course or programme is unsatisfactory
- examination
- degrees.

These can be found in Guidelines for third-cycle (doctoral) education (SLUID: SLU.ua.2018.1.1.1-4677).

A general syllabus must indicate the following: the main content of the programme, specific entry requirements and any other regulations required. All general syllabuses must be approved by the faculty board.

The programme is organised in a way that allows doctoral students to meet the third-cycle studies' qualitative targets specified in the *Higher Education Ordinance's Annex 2 – Qualifications Ordinance*:

Qualitative targets according to the Qualifications Ordinance: Degree of Doctor

Outcomes
For the Degree of Doctor the third-cycle student shall

Knowledge and understanding

- *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.*

Competence and skills

- *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

- *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.*

Outcomes
For a Degree of Licentiate the third-cycle student shall

Knowledge and understanding

- *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

- *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 proficiency required to participate autonomously in research and development work and to work autonomously in some other qualified capacity.*

Judgement and approach

- *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.*

1. Programme content and scope

The programme contains two main elements: research and coursework.

Research

On this programme, the student will conduct independent research work which is presented in a doctoral thesis corresponding to 195 higher education credits (HEC). The thesis may be submitted as a compilation thesis or, exceptionally, as a monograph. The thesis must be written in English.

For a licentiate degree, scientific work corresponding to 100 HEC is normally required. At least 2 papers should normally be included in the thesis. These papers

must be of such quality that they are eligible for publication. The thesis must be written in English.

Courses

The student is required to undertake coursework which corresponds to 45–60 HEC for a Degree of Doctor, or 22,5–30 HEC for a Degree of Licentiate. This must include suitable general courses as well as elective subject courses. Participation in courses linked to a graduate school or similar network is encouraged.

Subject courses should include an advanced general subject course (advanced inorganic chemistry or advanced organic chemistry, respectively) corresponding to at least 15 HEC. At least 10 HEC should consist of research methodology courses (e.g. EXAFS spectroscopy, practical X-ray crystallography, NMR, mass spectrometry, chromatography).

According to the current guidelines for doctoral education (SLU ua 2018.1.1.1-4677), all doctoral and licentiate degrees at SLU must include credit awarding courses of philosophy of science and research ethics at PhD-level. These courses should also cover rules on cheating and plagiarism.

2. Specific entry requirements

Those admitted must meet the following specific entry requirements.

Normally, the specific entry requirement for chemistry is knowledge corresponding to at least 60 HEC in chemistry at first-cycle level (general, analytical, inorganic and physical chemistry as well as biochemistry and organic chemistry) and subject-specific studies at second-cycle level comprising at least 30 HEC.

3. Miscellaneous

Each faculty offering the third-cycle subject can choose to specify specialisations or requirements in addition to the general syllabus. These requirements must be documented in an appendix.