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General syllabus for doctoral (third-cycle) studies in Waste Science and Technology at Luleå University of Technology

Decided by the Chair of the Board of Faculty of Science and Technology on 22 March 2022.

1. Subject description

Swedish name: Avfallsteknik

English name: Waste Science and Technology

Waste Science and Technology incorporates all stages of society's waste management – generation, collection, treatment and disposal of waste, including reuse and recycling. The research is aimed at the development of tools and processes that facilitate sustainable waste management.

2. Programme aim and intended learning outcome

The aim of the doctoral (third-cycle) studies in Waste Science and Technology at the University is to give the doctoral student specialised knowledge in Waste Science and Technology, in-depth knowledge of different research methods and a good understanding of the challenges related to research and its practical application. The overall objective of the programme is that the doctoral student develops into a critical and autonomous researcher in Waste Science and Technology, able to plan and carry out research projects. The doctoral student shall fulfil all the qualitative targets specified in the Higher Education Ordinance as well as in the locally decided qualitative targets, if any (see attached Annex A).

3. Admission requirements and selection

3.1 General entry requirements

An applicant meets the general entry requirements for doctoral (third-cycle) studies if he or she has been awarded a Master's (second-cycle) qualification, has satisfied the requirements for courses comprising at least 240 credits, of which at least 60 second-cycle credits, or has acquired substantially equivalent knowledge in another way, in Sweden or elsewhere (Higher Education Ordinance (2010:1064) Chapter 7 Section 39).

3.2 Specific entry requirements

None.

3.3 Selection

In selecting among applicants who meet the requirements, their ability to benefit from the course or the study programme shall be taken into account. However, the fact that an applicant may be credited for previous courses and study programmes or for professional or vocational experience

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may not alone give the applicant priority over other applicants (Higher Education Ordinance (2010:1064) Chapter 7 Section 41). The University's local guidelines in the Admissions procedure for doctoral (third-cycle) studies must also be applied.

The following criteria will be used in the selection of applicants for doctoral (third-cycle) studies in Waste Science and Technology.

- Study background and prior knowledge: which education / which courses the applicant has completed and with which result
- Knowledge relevant to the current project
- Assessment of the applicant's prerequisites for acquiring postgraduate education in the subject according to criteria regarding methodological rigor, theoretical awareness, ability for critical and analytical thinking, independence, originality, and communicative skills.
- Good command of oral and written communication in English.

4. The degree

The doctoral (third-cycle) studies lead to a Degree of Doctor. Within Waste Science and Technology, a student admitted to doctoral studies has the right to be awarded a licentiate degree after having completed at least 120 credits of the programme leading to a Degree of Doctor.

4.1 Degree requirements

For a Degree of Doctor, the doctoral student shall

- have been awarded a pass grade for courses of at least 60 credits
- have been awarded a pass grade for a research thesis (doctoral thesis) of at least 180 credits.

The thesis and the courses shall together amount to 240 credits for a Degree of Doctor.

For a Degree of Licentiate, the doctoral student shall

- have been awarded a pass grade for courses of at least 30 credits.
- have been awarded a pass grade for a licentiate thesis of at least 90 credits.

The thesis and the courses shall together amount to 120 credits for a Degree of Licentiate.

4.2 Titles of degree

- After the completion of the Degree of Doctor in Waste Science and Technology the doctoral student is awarded the title Doctor of Philosophy in Science.
- [After the completion of the Degree of Licentiate in Waste Science and Technology, the doctoral student is awarded the title Degree of Licentiate of Science.

A request of a title of degree other than the stipulated may be submitted in accordance with laid down guidelines.

5. Programme structure and implementation

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5.1 Programme scope and structure

The doctoral (third-cycle) programme includes two blocs; courses and thesis work. The programme comprises four years (two years for the licentiate degree). In case the doctoral student has a doctoral studentship and carries out departmental duties to a certain extent (no more than 20% of the whole programme), a corresponding prolonged period may be approved.

Up to the licentiate degree, the education primarily focuses on knowledge of methods and subject competence in the thematic area of which the academic work is a part. Scientific communication, analysis and a critical approach are other aspects that are emphasised. The latter part of the education focuses primarily on the theme of the academic work and the development of related research questions and theory. Other themes that are emphasised in the latter part of the education are pedagogical training, leadership and network building.

5.2 Individual study plan and supervision

An individual study plan outlining the implementation of the studies is drawn up for each doctoral student. The plan is established in consultation with the supervisor is decided by the Head of Department by delegation of the Vice-Chancellor. The plan is reviewed and revised at least once a year.

The Head of Department shall appoint at least two supervisors, one of whom is appointed principal supervisor, for each doctoral student. The person appointed principal supervisor shall have at least qualifications required for appointment as a docent and be employed by the University. A principal supervisor who no longer meets the job requirements may continue as supervisor until the doctoral student completes his or her studies, by an individual agreement with the relevant department. The doctoral student is entitled to supervision during the studies, unless the Vice-Chancellor has decided otherwise in accordance with the Higher Education Ordinance (2010:1064) Chapter 6 Section 30. A doctoral student who so requests may have another supervisor (Higher Education Ordinance (2010:1064) Chapter 6 Section 28). The request does not need a justification.

5.3 Courses

The individual study plan shall specify the courses to be included in the doctoral student's education. The goal attainment is examined according to the examination procedure specified in the course syllabus. Credits may be transferred in accordance with the local guidelines in the Admissions procedure for doctoral (third-cycle) studies.

Courses shall predominantly consist of courses within the subject area's core area. For the licentiate degree, courses must provide knowledge and understanding in Waste Technology, contribute to in-depth knowledge of scientific methods in general and the methods of the specific research area in particular, and develop the research student's abilities and approaches. For the doctoral degree, courses within the subject's core areas must provide expanded knowledge within and a systematic understanding of waste technology as well as deep and current specialist knowledge within a limited part of the area. At doctoral level, the remaining part of the courses shall contribute to familiarity with scientific methodology in general and with

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the methods of the specific research area in particular, as well as develop the research student's skills, abilities and attitudes.

Examples of courses:

- General research courses, e.g. the Introductory School for new PhD students, research methodology, science or knowledge theory, information search, research ethics and pedagogy, gender and gender equality.
- Specialized courses, e.g. experimental methods and design of experiments, instrumental analysis.
- Courses in related areas, e.g. modelling and simulation, life cycle analysis or sustainable development.

5.4 Thesis

The thesis may take the form of either a single coherent work (a monographic thesis) or a compilation comprising a number of scientific articles interrelated by an introductory summary chapter (a compilation thesis). Quality and scope requirements for the research activities do not differ between the two alternatives. The scientific articles or, as appropriate, the monograph must be of such quality that they meet reasonable requirements for publication in a peer-reviewed scientific forum.

The number of articles can vary depending on the student's own contribution to each work and the scope of the articles and scientific contributions. Usually, a doctoral thesis consists of 4-5 articles presented in the form of scientific publications in peer-reviewed journals relevant to the subject. At least two of the articles shall be accepted for publication in scientific journals, and 2-3 articles should meet the standard for scientific publication. The dissertation itself contains an overall analysis and summary discussion of the articles.

A licentiate thesis normally consists of two articles of which at least one is accepted for publication in a scientific journal and the other one meets the standard for scientific publication. The licentiate thesis contains an overall analysis and summary discussion of the articles and, where applicable, suggestions for specialization within the framework of the future dissertation work.

The introductory summary chapter of a compilation thesis shall include a separate section describing the doctoral student's contribution to the articles.

The doctoral thesis shall be defended at a public defence seminar. The grades for the thesis are either 'pass' or 'failed'. When grading the thesis, the content and the defence of thesis shall be taken into account. The grade of a doctoral thesis is decided by an examining committee, appointed anew for each thesis.

A doctoral student wanting to be awarded a Degree of Licentiate shall, after consultation with his or her supervisor, request approval from the responsible Head of Department. The doctoral student defends his or her licentiate thesis at a licentiate seminar after which the thesis is graded 'pass' or 'failed'. When grading the thesis, the content and the defence of the thesis is taken into account. An examiner, appointed by the Head of Department, grades the licentiate thesis.

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6. Entry into effect and interim regulations

The previous general syllabus will cease to apply for third-cycle students who are admitted to studies at third-cycle level after 2022-04-01.

If agreed between the third-cycle student and the supervisors, the new general syllabus, dnr 991-2022, may be used as a steering document for a previously admitted third-cycle student.

It must be documented in the third-cycle student's individual study plan which general syllabus that applies.

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