

General Syllabus for Third-cycle Programme in Resource Recovery (RR)

The syllabus was established by the Research and Education Board on December 2, 2010.

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1. Subject field

Resource Recovery as a research field focuses on developing technical methods for recovering resources, energy, and materials from waste and residual products from industrial processes and developing materials for improving recoverability.

In addition to technical methods, the field also includes research into social aspects linked to social solutions for recycling resources.

The research programme in Resource Recovery aims at promoting the development of a sustainable society.

1.1 Organisation

The Research and Education Board has set up a research and education committee for the Resource Recovery field with the authority of delegation. The committee is made up of a chairperson, two or three members who are professors or who are qualified for appointment to a readership ("docent"), and two doctoral students elected by the student body. The Director of Studies for the Research Programme and relevant heads of department are co-opted members. The committee can co-opt additional members to a particular meeting if required.

The Chairperson must be qualified for appointment to a readership ("docent") at minimum, be an active researcher and have overall responsibility for the Research Programme and its development. The Director of Studies must be academically qualified and be responsible for the range of courses offered and the follow-up of individual study plans (see below).

For a more detailed description of the organisation of committees, see Organisation and Decision Process for Research Programme Committees.

2. Intended learning outcomes

The programme's objective is to develop the requisite knowledge and skills to conduct independent research into Resource Recovery and to contribute to a knowledge bank on the subject through a scientific dissertation.

The Third-cycle Programme in Resource Recovery shall develop the doctoral students' communicative and pedagogical skills with regard to expressing themselves verbally and in writing for the academic community, private sector and society in general. The doctoral student will also acquire knowledge of planning, management and the implementation of research projects.

In addition, the course will open the door to international contacts by, for example, taking part in research congresses and by staying at seats of learning in other countries.

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.

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 the Degree of Doctor the third-cycle student shall

- demonstrate the capacity for scholarly analysis and synthesis as well as 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.

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

- 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 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.

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.

3. The course structure

The Third-cycle Programme in Resource Recovery leads to a doctoral degree (240 higher education credits) or to a licentiate (120 higher education credits). The licentiate could be an intermediate goal towards a doctoral degree.

The Third-cycle Programme comprises partly of courses with intermittent examinations and partly of own research that shall lead to a scientific dissertation. For the doctorate degree, courses shall comprise of 60 higher education credits and the dissertation 180 higher education credits. The doctoral thesis shall be defended at a public disputation. For the licentiate, courses shall comprise of 30 higher education credits and the dissertation 90 higher education credits. The licentiate dissertation shall be presented at a public seminar.

3.1 Supervision

For each doctoral student, the Research and Education Board, or the committee set up by the Board, will, on proposals from the Director of Studies, appoint a principal supervisor, a second supervisor and an examiner. The Principal Supervisor will have the qualifications required for appointment to a readership ("docent") and will have undergone supervisor training. The Second Supervisor will possess a doctoral degree. Both supervisors will be well-acquainted with the dissertation subject area. The Examiner should be a professor in the Resource Recovery subject area and be employed at the University of Borås. The Examiner should have several years of experience of research in the area of Resource Recovery or adjacent research areas. The Examiner should have a good knowledge of the field, its focus and its boundaries. The Examiners in Resource Recovery have joint responsibility for developing the research area.

The Principal Supervisor will have main responsibility for guidance and advice within the framework of the research programme. The Principal Supervisor is also responsible for ensuring that the research student receives sufficient supervision. The Second Supervisor takes part in the supervision of the research student.

The Examiner will have overall responsibility for the doctoral student's research programme and ensure that it fulfils the quality requirements of the research task and other elements. The Examiner will approve the individual study plan and play a part in the study follow-up. The Examiner will also preview the licentiate essay and the doctoral dissertation. The Examiner approves the licentiate essay and its presentation.

The Principal Supervisor and the Examiner cannot be one and the same person. If needed at a licentiate degree, the Research and Education Board, or the committee set up by the board, can appoint an external expert who will give a written report concerning the licentiate essay.

3.2 Individual study plan

Each doctoral student will receive an individual study plan on admission. The individual study plan will contain dissertation subjects, the names of the supervisors and examiner, a schedule for the research programme, a financial plan for the research programme, departmental duties and teaching, a project plan for the dissertation and planned courses.

An annual follow-up meeting will be held with doctoral student, Director of Studies, Examiner, Principal Supervisor and Second Supervisor. The meeting will take up the progress of the doctoral student, on the courses as well as in the research and dissertation work, and the individual study plan will be updated. In the event of greater deviations from the study plan, an extra follow-up meeting will be held, the study plan will be updated.

The Director of Studies is responsible for drawing up, updating and following up the individual study plan. The individual study plan is signed by the doctoral student, the Supervisors, the Examiner and the Director of Studies. The individual study plan with updates is established by the Research and Education Board or the committee appointed by the Board.

3.3 Midway seminar

An important part of postgraduate studies is that students are given the opportunity to practice their skills in compiling, analysing, presenting and discussing the results of their research with other researchers. This is best done throughout their studies, but on one occasion prior to the public defence of their doctoral theses, must be conducted under more formalised forms in what is called a midway seminar. This applies when the student does not plan to obtain licentiate degree on the way to obtaining the PhD degree.

The seminar is scheduled in the doctoral student's study plan and conducted when the supervisor and examiner assess that the student has done half of the work required for the PhD degree. The doctoral student must have written at least two articles, of which at least one must have been published or accepted for publication in a scientific journal.

The midway seminar is an occasion for the postgraduate student to present and discuss his or her results. It is also an occasion to discuss planned projects with a group of researchers and postgraduate students with knowledge and interest of the subject area.

The Principal Supervisor is responsible for the midway seminar.

3.4 Dissertation

The dissertation can be composed of either a uniformly cohesive, scientific work (monograph dissertation) or as a compilation of scientific articles with a summarizing chapter (compilation dissertation). The scientific articles can be written by the doctoral student herself/himself or by the doctoral student together with other people. The majority of the scientific articles will have been published or accepted for publication in scientific journals and the doctoral student's contribution should be distinguishable and independent.

3.5 Courses

The course part consists of 30 higher education credits for licentiate thesis and 60 higher education credits for the doctoral thesis. Courses that form a part of the licentiate thesis may be included in these 60 higher education credits. Each course has a course examiner.

Relevant courses from the undergraduate programme can be credited towards the Research Programme. A maximum of 30 higher education credits in the Research Programme may be obtained before research studies are begun within the framework of completed undergraduate studies. This applies to research students who have been accepted with a minimum of 270 higher education credits from their undergraduate studies. Research students who are accepted with 240 higher education credits from their first degree may not count any higher education credits from undergraduate studies, and there is a gradual transition for credit levels of between 240 and 270. However, it is the Examiner who decides how many and which undergraduate study credits may be counted within these guidelines.

The following courses are mandatory for the Resource Recovery doctoral degree (exceptions may be made by the Examiner on special request and on consultation with the Principal Supervisor):

- Introduction to Resource Recovery*, minimum of 5 higher education credits.
- Relevant methodology courses covering a minimum of 7.5 higher education credits.
- Course in theory of science, minimum of 5 higher education credits.
- Course in research ethics, minimum of 2.5 higher education credits.
- Courses within the areas of information retrieval, verbal and written presentation and teaching and learning in higher education, minimum total 5 higher education credits.

* This course comprises a course moment of at least 3 higher education credits that covers sustainable development.

The following courses are mandatory for the Resource Recovery licentiate (exceptions may be made by the Examiner on special request and on consultation with the Principal Supervisor):

- Introduction to Resource Recovery*, minimum of 5 higher education credits.
- Relevant methodology courses covering a minimum of 7.5 higher education credits.
- Course in research ethics, minimum of 2.5 higher education credits.
- Courses within the areas of information retrieval, verbal and written presentation and teaching and learning in higher education, minimum total 2.5 higher education credits.

* This course comprises a course moment of at least 3 higher education credits that covers sustainable development.

Other courses are determined by the Examiner in consultation with the doctoral student and supervisors, and are noted in the doctoral student's study plan. Courses at the University of Borås and courses at other universities could both come into question.

4. Entry requirements, selection and admission

4.1 General entry requirements

According to Chapter 7, Section 39 of the Higher Education Ordinance, to meet the general entry requirements an applicant shall:

1. possess a degree at advanced level.
2. have completed course requirements of a minimum 240 higher education credits, of which a minimum of 60 are at advanced level, or
3. in any other way, in the country or elsewhere, have acquired corresponding knowledge.

4.2 Specific entry requirements

Admission to the Third-cycle Programme in Resource Recovery requires a degree at advanced level or equivalent, with sufficient links to the Resource Recovery research field. The student must also have knowledge of English equivalent to Swedish upper secondary level. For detailed information refer to the Admissions office at the University. The proposed Examiner and proposed Principal Supervisor assess as to whether the applicant has the requisite skills to complete the research programme.

4.3 Selection and admission

The number of doctoral students admitted to the Research Programme is restricted so that students can be offered acceptable conditions in terms of supervision and study conditions in general. Financing for each doctoral student must guarantee four years' full-time or equivalent research studies. Only students who intend to pursue their research studies at a minimum of 50 percent study activity will, in accordance with the

Swedish Higher Education Ordinance, be accepted onto the Research Programme.

Admission to the Research Programme takes place in conjunction with the announcement of a doctoral position at the University of Borås, or agreement on other study financing.

The Research and Education Board, or the committee set up by the Board, appoints a ranking group that prepares matters and establishes ranking procedures. These procedures should contain selection criteria, as well as an assessment of how well each applicant satisfies these criteria.

Selection is made based on the ability to complete the programme.

The Research and Education Board, or the committee set up by the Board, decides on admissions to the Third-cycle Programme based on proposals from the Principal Supervisor and Examiner.

For further details about admissions and appointments, see the University's admission regulations and appointments procedures.

5. Examination

The Third-cycle Programme in Resource Recovery offers two different degrees at doctor's level with two different prefixes:

- Teknologie doktorexamen i resursåtervinning, 240 högskolepoäng
- Filosofie doktorexamen i resursåtervinning, 240 högskolepoäng

These two degrees have the same translation into English:

- Doctor of Philosophy in Resource Recovery, 240 higher education credits

The Third-cycle Programme in Resource Recovery offers two different degrees at licentiate's level with two different prefixes:

- Teknologie licentiatexamen i resursåtervinning, 120 högskolepoäng
- Filosofie licentiatexamen i resursåtervinning, 120 högskolepoäng

These two degrees have the same translation into English:

- Licentiate of Philosophy in Resource Recovery, 120 higher education credits

Decisions regarding prefixes in Swedish (teknologie or filosofie) are made in conjunction with the drawing up of the individual study plan. The following assessment principles apply in the choice of prefix:

- the doctoral student's degree at undergraduate/postgraduate level
- the supervisor's area of expertise
- the subject of the licentiate dissertation/doctoral thesis

A doctoral degree requires:

- Courses comprising of 60 higher education credits.
- Dissertation comprising of 180 higher education credits in the shape of a monograph dissertation, or a compilation dissertation defended at a public disputation.

A monograph dissertation must have been examined by two individuals qualified to supervisor level before being presented for disputation. These individuals may not be the doctoral student's examiner or supervisor.

The scientific articles in a compilation dissertation will be of a quality worthy of publication in scientific journals and the doctoral student's contribution should be distinguishable and independent. Normally a minimum of four articles makes up the dissertation. Of these, at least half will have been published or accepted for publication in scientific journals at the time of disputation. If this is not the case, the dissertation must have been examined by two individuals qualified to supervisor level before being presented for disputation. These individuals may not be the doctoral student's examiner or supervisor.

A final seminar, at which the dissertation is examined and discussed in its entirety, must be held in good time prior to the planned date for disputation. The Principal Supervisor is responsible for the final seminar.

An opponent qualified to supervisor level appointed by the Research and Education Board, or the committee set up by the Board, will participate in the disputation. The opponent should not be a member of staff at the University of Borås.

The doctoral dissertation is awarded either a pass (godkänd, G) or fail (underkänd, U). The grade is awarded by a grading committee. The grading committee is appointed by the Research and Education Board, or the committee set up by the Board, and shall comprise three or five members. The members of the grading committee cannot be members of staff at University of Borås unless there are special circumstances. However, a substitute can be a member of staff at University of Borås. The members of the grading committee should have at least the qualifications required for appointment to a readership ("docent"). However, one (1) member can be appointed with only a Doctor's degree. This can be done if that person is not a member of staff at any university.

More detailed regulations regarding the composition of the grading committee can be found in the university's guidelines for disputation.

A licentiate degree requires:

- Courses comprising of 30 higher education credits.
- Dissertation comprising of 90 higher education credits in the shape of a monograph dissertation, or a compilation dissertation defended at a public disputation.

A monograph dissertation must have been examined by an individual qualified to supervisor level before it is presented at the seminar. This person may not be the doctoral student's examiner or supervisor.

The scientific articles in a compilation dissertation will be of a quality worthy of publication in scientific journals and the doctoral student's contribution should be distinguishable and independent. Normally a minimum of two articles makes up the dissertation. Of these, at least half will have been published or accepted for publication in scientific journals at the time of the seminar. If this is not the case, the dissertation must have been examined by an individual qualified to supervisor level before being presented at the seminar. This person may not be the doctoral student's examiner or supervisor.

A discussion leader qualified to supervisor level appointed by the Research and Education Board, or the committee set up by the Board, will participate in the licentiate seminar.

The licentiate dissertation is awarded either a pass (godkänd, G) or fail (underkänd, U). The grade is awarded by the Examiner.

For further details of examinations see the University's local system of qualifications.