General Syllabus for Research Studies in

MECHANICAL ENGINEERING

*Maskinteknik*

The syllabus was approved by the Faculty Board of Natural Sciences and Technology on 20 June 2007 (reg. no. CF 62-269/2007). It was last amended on 19 October 2010.

1  Subject description

The mechanical engineering subject at Örebro University deals with the foundations and applications of mechanical engineering. The research study programme is offered with specialisations towards machine design and production technology respectively.

Within machine design, research is carried out for the development of computer-aided design and its links with product development on the one hand and manufacturing technology on the other. In this research environment, an overarching philosophy is developing concerning computer-integrated product development and production, based on modern modelling and simulation.

The production technological research is focused on wire technology and powder metallurgy, and is in parts conducted in collaboration with other universities. Here, a modern, integrated take on the process is applied, as opposed to an older formalistic outlook.

2  Aims and objectives

The aims and objectives of the programme, i.e. the targets for the award of the degree, are evident from appendix 1 to this syllabus.

3  Admission to the programme – eligibility and selection etc.

Eligibility requirements and the basis of assessment for the selection of students are evident from appendix 2 to this syllabus. For admission information in other respects, see Admission Regulations for Örebro University.

---

1 The syllabus is approved by virtue of the Higher Education Ordinance, Chapter 6, Sections 26 and 27 (1993:100).
4 General information on the programme organisation

There are two types of research study programmes – one concluding with the degree of doctor (240 higher education credits) and one concluding with a licentiate degree (120 higher education credits). The programmes mainly consist of courses followed by exams as well as of the writing of a doctoral or licentiate thesis respectively. The research student is expected to take an active part in research seminars and other assigned activities during the period of study. The student is further recommended to take advantage of the opportunities offered to attend guest lectures etc. at the university, and to attend and contribute to national and international conferences. For each research student, a minimum of two supervisors will be appointed, one of which is appointed the principal supervisor. The detailed organisation of the programme is determined in the individual study plan.

Credit overview

<table>
<thead>
<tr>
<th>Overview of programme organisation and qualification requirements</th>
<th>Courses/exams, he credits</th>
<th>Thesis, he credits</th>
<th>Total no. of he credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>Compulsory: 0, Elective: 60-90</td>
<td>150-180</td>
<td>240</td>
</tr>
<tr>
<td>Licentiate degree</td>
<td>Compulsory: 0, Elective: 45</td>
<td>75</td>
<td>120</td>
</tr>
</tbody>
</table>

5 Qualification requirements for the degree of doctor

The programme for the degree of doctor comprises 240 higher education credits, corresponding to four years of full-time study.

For the degree of doctor, research students must
- have received a passing grade in the exams of 60-90 higher education credits in accordance with the syllabuses for the courses included on the programme;
- have received a passing grade on a scholarly dissertation (doctoral dissertation) corresponding to 150-180 higher education credits. The thesis is to be defended orally at a public defence event.

Together these modules shall correspond to 240 higher education credits.

---

3 Under the new higher education system, study programmes at the research/doctoral level are referred to as third-level or third-cycle programmes in accordance with the Bologna terminology. In this document, the terms used are variants of research studies and third-level programmes and they should thus be considered as synonymous [translator’s comment].

4 The Higher Education Ordinance requirement of a minimum of two supervisors does not apply to research students who started the programme before 1 July 2007. Instead, the older provision of at least one supervisor applies (point 18, transitional provisions of SFS 2006:1053).

5 Higher Education Ordinance, Chapter 6, Sections 4, 5, 28, and 29.

6 One credit point according to the previous credit system corresponds to one and a half higher education credit under the new system.

7 Higher Education Ordinance, Chapter 6, Section 5.

8 “Courses” also refers to other programme modules that in addition to the thesis generate credits.

9 Higher Education Ordinance, Chapter 6, Sections 5 and 33.
6 Qualification requirements for the licentiate degree

The programme for the licentiate degree comprises 120 higher education credits, corresponding to two years of full-time study\(^{10}\).

For a degree of licentiate, research students must
- have received a passing grade in the exams of 45 higher education credits in accordance with the syllabuses for the courses included on the programme;
- have received a passing grade on a scholarly essay corresponding to 75 higher education credits\(^{11}\).

7 Other provisions

7.1 Required reading

7.2 Course selection

The research student plans, in consultation with the supervisor, which courses should be part of his/her programme. The selection is subsequently laid down in the individual study plan.

7.3 Half-way licentiate degree

Students admitted to the programme concluding with the degree of doctor may conclude part of their studies with a licentiate degree, if their studies comprise at least 120 higher education credits\(^{12}\). To obtain such a half-way degree, the same criteria apply as to programmes that are to be concluded with a licentiate degree. See above.

8 Further information

Further information about provisions for the programme can be found on the university homepage, under the section on research studies. Documents there include the Admission Regulations for Örebro University and other information about national and local regulations.

Entry-into-force and transitional provisions

This general syllabus shall be in effect from 1 July 2007.

*Research students who have started the programme before 1 July 2007*

Research students who have begun their studies on the programme before 1 July 2007 shall continue their studies in accordance with the new provisions for research studies. The research students will generally be awarded their qualification in accordance with the new study programme\(^{13}\).

These research students have however the option to complete their studies and obtain their qualification under the old provisions, though until no later than the end of June 2015 (point 5, transitional provisions of SFS 2006:1053).

\(^{10}\) Higher Education Ordinance, Chapter 6, Sections 2, 4, and 5.

\(^{11}\) Higher Education Ordinance, Chapter 6, Section 5.

\(^{12}\) Higher Education Ordinance, Chapter 6, Section 4, and the university’s regulations on research study programme qualifications.

\(^{13}\) Point 1, transitional provisions for SFS 2006:1053.
The amendments approved by the Vice-Chancellor on 19 October 2010 shall be in effect from 1 January 2011. They are a result of amendments to the Higher Education Ordinance, but they do not lead to any substantial alterations in the general syllabus.
Appendix 1 to the general syllabus

Extract from the System of Qualifications, appendix 2, Higher Education Ordinance (1993:100)

Objectives for the licentiate degree

Knowledge and understanding
For a degree of Licentiate research students must
– demonstrate knowledge and understanding in the field of research, including current specialist knowledge in a defined part of the field and a deeper knowledge of scientific methods in general and of methods in the specific field of research in particular.

Skills and abilities
For a degree of Licentiate research students must
– demonstrate an ability to identify and formulate issues, critically, independently and creatively, and proceeding with scientific precision; to plan a limited research project and other advanced tasks and to carry them out using appropriate methods within specified time limits, so as to contribute to the development of knowledge; and to evaluate this work;
– demonstrate an ability to clearly present and discuss research and research results in dialogue with the scholarly community and society in general, orally and in writing, in both national and international contexts; and
– demonstrate the skills required to independently participate in research and development work and to work independently in other advanced contexts.

Judgement and approach
For a degree of Licentiate research students must
– demonstrate an ability to make ethical assessments in their own research;
– demonstrate insight into the possibilities and limitations of science, its role in society and people’s responsibility for how it is used; and
– demonstrate an ability to identify their need of further knowledge and to take responsibility for developing their knowledge.

Objectives for the doctoral degree

Knowledge and understanding
For a degree of Doctor research students must
– demonstrate broad knowledge in and a systematic understanding of the field of research, together with deep and up-to-date specialist knowledge in a defined part of the field of research; and
– demonstrate familiarity with scholarly methods in general and with methods in the specific field of research in particular.

Skills and abilities
For a degree of Doctor research students must
– demonstrate an ability to engage in scholarly analysis and synthesis and in independent, critical examination and assessment of new and complex phenomena, issues and situations;
– demonstrate an ability to identify and formulate issues, critically, independently and creatively, and proceeding with scientific precision; and to plan and, using appropriate methods, conduct research and other advanced tasks within specified time limits; and to scrutinise and evaluate such work;
– demonstrate, in a dissertation, their ability to make a substantial contribution to the development of knowledge by their own research;
– demonstrate an ability to present and discuss research and research results with authority, in dialogue with the scholarly community and society in general, orally and in writing, in both national and international contexts;
– demonstrate an ability to identify their need of further knowledge; and
– demonstrate a potential to contribute to the development of society and support other people’s learning, both in the field of research and education and in other advanced professional contexts.

Judgement and approach
For a degree of Doctor research students must
– demonstrate intellectual independence and scholarly integrity and an ability to make ethical assessments relating to research; and
– demonstrate deeper insight into the potential and limitations of scholarship, its role in society and people’s responsibility for how it is used.
Admission to research studies – eligibility and selection

1  Admission requirements – Higher Education Ordinance

The Higher Education Ordinance stipulates that the number of research students that may be admitted by the university is limited to the number that can be offered supervision and acceptable conditions for study, and who have funding for their studies\(^\text{14}\).

In order to be admitted to research studies, the candidate must also
1. have basic eligibility and the special eligibility that the university may have prescribed; and
2. be deemed to have the ability in other respects that is needed to benefit from the education\(^\text{15}\).

2  Eligibility requirements

2.1  Basic eligibility

A person has basic eligibility for third-level education if he or she
1. has taken a second-level qualification;
2. has completed course requirements of at least 240 higher education credits, including at least 60 higher education credits at second level; or
3. has acquired essentially corresponding knowledge in some other way in Sweden or abroad.

The university may permit exemptions from the requirement of basic eligibility in the case of individual applicants, if there are special grounds\(^\text{16}\).

_Transitional provisions_

a) A person with *undergraduate-level education or qualification* corresponding to the eligibility requirements above shall also be eligible\(^\text{17}\). Exemptions may be made also in these cases, if there are special grounds.

b) A person who *has fulfilled the requirements for basic eligibility* for admission to postgraduate education (120 credits from undergraduate education or corresponding knowledge\(^\text{18}\), *before 1 July 2007*, shall also be considered to have basic eligibility for admission to third-level higher education after that date, though until no later than the end of June 2015\(^\text{19}\). Exemptions from this provision are not permitted.

\(^{14}\) Higher Education Ordinance, Chapter 7, Section 34.

\(^{15}\) Higher Education Ordinance, Chapter 7, Section 35.

\(^{16}\) Higher Education Ordinance, Chapter 7, Section 39.

\(^{17}\) Point 10, transitional provisions for SFS 2006:1053.

\(^{18}\) A person who has completed an undergraduate programme of at least 120 credits, or in some other way, in Sweden or abroad, has acquired essentially corresponding knowledge.

\(^{19}\) Point 11, transitional provisions for SFS 2006:1053.
2.2 Special eligibility

Candidates have special eligibility for admission to research studies in the subject if they have obtained a Degree of Master of Science in Engineering or a one-year master’s degree from a programme within the main field of study or a related main field of study. Candidates who have acquired essentially corresponding knowledge, in Sweden or abroad, also meet the special eligibility requirements.

Transitional provisions
Candidates with a completed programme or obtained qualification from undergraduate higher education corresponding to the eligibility requirements in the previous paragraph shall also be deemed eligible\(^{20}\).

2.3 Ability in other respects to benefit from the education

The assessment whether the applicant has such ability in other respects to benefit from the education shall be made based on his/her education and other previous activities, as well as on the essays and other independent projects of a scholarly nature submitted by the applicant (compare section 3 below on the assessment criteria for selection of research students, concerning capability).

3 Selection from among the applicants

Selection from among applicants is to be made with reference to their ability to benefit from the education. The university determines which criteria are to be used in determining the ability to benefit from the education.

However, the fact that an applicant is deemed able to receive credit towards the education for previous education or professional activities may not alone give the applicant precedence over other applicants in the selection process\(^{21}\).

Assessment criteria for selection\(^{22}\)

The criteria A - B aim at facilitating the determination of the applicant’s ability to benefit from the education. They should therefore be relevant to the applicant’s ability to later achieve the objectives of the programme. The objectives are described in appendix 1 to this general syllabus.

A Education and other previous activities – formal qualifications

The assessment is based on submitted certificates and transcripts as well as degree certificates and/or course certificates.

Training and experience contributing to the applicant’s ability to successfully benefit from the programme applied for are considered an additional qualification.

\(^{20}\) Point 10, transitional provisions for SFS 2006:1053.

\(^{21}\) Higher Education Ordinance, Chapter 7, Section 41.

\(^{22}\) Local regulations on the selection of research students to third-level education etc.
- **Education**  
Special emphasis is given to the scope, depth and grades of the applicant’s training within the subject area applied for, particularly the grades on written independent projects. Emphasis is also given to the scope, depth and grades of training within other fields of great relevance to the field applied for.

- **Other previous activities**  
Special emphasis is given to long and independent professional experience of great relevance to the subject area applied for.

**B Capability – demonstrated knowledge, skills and ability**

The assessment is based on a consideration of the applicant’s submitted essays and other written independent projects of a scholarly nature. For those applicants who at this stage are deemed to be most qualified, and if it is deemed necessary, references will be taken and interviews will be carried out.

It is considered an additional qualification if the applicant demonstrates such knowledge, skills and ability, which contribute to his/her being successfully able to benefit from the programme applied for. These are for example:

- sound theoretical, analytic and methodological knowledge;
- sound ability to discuss, in writing as well as orally, issues and conclusions;
- intellectual independence; and
- sound ability to carry out advanced tasks within given time frames.

Special emphasis is given to the applicant’s ability to

- identify and formulate realistic and productive research problems;
- integrate knowledge and experience and apply these in ways and in contexts where they have not previously been used; and
- conduct a dialogue characterised by independence as well as by an ability to cooperate.

**C Weighing up qualifications**

The fact that an applicant is deemed able to receive credit towards the education for previous education or professional activities may not alone give the applicant precedence over other applicants in the selection process (Chapter 7, Section 41, Higher Education Ordinance).

When weighing up the assessment criteria A and B, the greatest emphasis is placed on criteria B, Capability.

**D Gender equality**

If, followed from the above, two applicants are found to have equal qualifications, preference will be given to the applicant of the underrepresented sex among the research students in the subject. Here, the underrepresented sex refers to the share of either female or male students enrolled on the subject’s research programme amounting to less than 40 per cent.

---

23 Higher Education Act (1992:1434), Chapter 1, Section 5, second paragraph; and other provisions.