



Faculty of Technology and Science

## **PROGRAMME STUDY PLAN**

<b>Programme Code</b>	TAMEL
<b>Programme Approval</b>	The Programme Study Plan was approved by the Faculty Board of Technology and Science on 13 September 2007 and is valid from the autumn semester of 2007 at Karlstad University.
<b>Programme Title</b>	Master of Science in Engineering, Degree Programme in Electrical Engineering
<b>Credits</b>	120/60 ECTS
<b>Language of Instruction</b>	English
<b>Degree Level</b>	Master
<b>Degree Type</b>	General degree
<b>Prerequisites</b>	A Bachelor's degree of 180 ECTS cr. in Electrical Engineering, or equivalent, including Mathematics 22.5 ECTS cr., Signal Processing 7.5 ECTS cr and Automatic Control 7.5 ECTS cr or equivalent.

### **General Information**

The Master's degree programme aims at developing the students engineering competence in mathematical modelling, especially in systems engineering with an emphasis on automatic control and signal processing. Students are also prepared for doctoral studies.

### **Aims**

For a Master's degree in engineering students must meet the following requirements as specified in the *Higher Education Ordinance*:

### Knowledge and understanding

Upon completion of the master programme students must

- demonstrate knowledge and understanding of their major field of engineering, that is, broad knowledge in the area and substantially deeper knowledge in certain parts of the field, together with insight into current research and development work, and
- demonstrate deeper methodological knowledge in their major field of study.

### Skills and abilities

Upon completion of the master programme students must

- demonstrate ability to critically and systematically integrate knowledge and analyse, evaluate and handle complex phenomena, issues and situations even with limited information,
- demonstrate critical, independent and creative ability to identify and formulate issues, and to plan and carry out qualified tasks using appropriate methods within specified time limits, so as to contribute to knowledge development and evaluate the work,
- demonstrate ability to clearly present and discuss their conclusions and the data and arguments behind them in dialogue with different groups, orally and in writing, in national and international contexts, and
- demonstrate the ability required to participate in research and development or to work independently in other qualified professions.

### Judgement and approach

Upon completion of the master programme students must

- demonstrate ability to make assessments in the major field of study taking into account relevant scientific, social and ethical aspects, and show awareness of the ethics of research and development,
- demonstrate insight into the potential and limitations of science, its role in society and people's responsibility for its use, and
- demonstrate ability to identify their need of further knowledge and continuously upgrade their knowledge.

## **Programme Structure**

Instruction is usually in the form of lectures, laboratory work and projects.

## **Programme Curriculum**

The programme runs over four terms, the last of which is devoted to the degree project. The first three terms include further studies in mathematical modelling, such as signal processing, analogue electronics, automatic control, mathematics and scientific computing.

### *Mandatory courses*

Automatic control 7.5 ECTS cr

Signal theory 7.5 ECTS cr

Wireless communication 7.5 ECTS cr

Mathematics 7.5 ECTS cr  
 System identification 7.5 ECTS cr  
 Optimal control 7.5 ECTS cr  
 Microwave theory and antennas 7.5 ECTS cr  
 Scientific computing 7.5 ECTS cr  
 Degree project 30 ECTS cr.

*Programme electives*

In addition to the mandatory courses students are free to choose C and D-level courses totalling 30 ECTS cr. in electrical engineering, mathematics or physics. In electrical engineering the following courses are recommended:

Signal detection theory 7.5 ECTS cr.  
 Modulation theory 7.5 ECTS cr.  
 Adaptive signal processing 7.5 ECTS cr.  
 Spectral analysis 7.5 ECTS cr.

**Master degree (one year)**

Students, who meet the requirements, can be awarded a Master's degree (one year) upon completion of 60 ECTS cr, at advanced level.

Mandatory courses (one year Master)

Automatic control 7.5 ECTS cr.  
 Signal theory 7.5 ECTS cr.  
 Wireless communication 7.5 ECTS cr.  
 Mathematics 7.5 ECTS cr.  
 System identification 7.5 ECTS cr.  
 Scientific computing 7.5 ECTS cr  
 Degree project 15 ECTS cr.

**Degree Title**

Master of Science Major Electrical Engineering (two years 120 ECTS cr., or one year 60 ECTS cr.)

Students who meet the requirements for a degree may request a degree certificate to be issued by the university. Requests should be submitted to the Office for Student Services.

**Credit Transfer**

According to the *Higher Education Ordinance* (Ch 6, § 12-14), students may transfer credits from previously completed university courses subject to approval. Transfer of credits for a course module, or university studies generally, is subject to the approval by the course examiner. Transfer of credits for a full course is subject to the approval by the Rector

**Additional Information**

Students who enrolled in the programme before 1 July 2007 will complete their studies in accordance with the requirements of the earlier curriculum. Upon completion

students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

Students are not allowed to start working on their Degree projects until they have completed 30 ECTS cr. towards the one year Master's degree and 75 ECTS cr. towards the two year Master's degree.

The local regulations for undergraduate studies at Karlstad University stipulate the obligations and rights of students and staff.