Programme syllabus

Master's Programme, Communication Systems, 120 credits
Masterprogram, kommunikationssystem
120.0 credits

Valid for students admitted to the education from autumn 19 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

The overall goal of the programme is to graduate qualified students with the ability to apply mathematical and computer-based methods for solving problems in the area of communication systems, with focus on design, implementation, and analysis of communication systems.

The programme is designed so that students, when they graduate, can carry out independent work such as development work within the area. The student should also have developed a critical reflection attitude for scientific knowledge as well as dependable experience within the area of communication systems. The programme will also give a solid basis for graduate (PhD) education within the area. The programme offers three specialisation tracks: Internetworking, Wireless Networking, and Security and Mobile Computing.

The Security and Mobile Computing track is designed for students who go for exchange studies. These exchange studies are organized by a consortium of European universities in different countries, where KTH is one of the partners in the consortium. The students spend the first year in one country and the second year in one of the other countries. After completing the two years, the students can be awarded double degrees from the two universities they attended. The conditions for the education and the requirements for a double degree are determined in a consortium agreement between the rectors of the universities in the consortium.

Knowledge and understanding

For the degree of Master of Science the student should:

- Show knowledge and understanding within information and communication technology with specialisation in communication systems, including broad knowledge of the area as well as the essential in-depth knowledge within certain parts of the area together with in-depth knowledge of the current research and development activities.
- Show in-depth knowledge within information and communication technology.
- Show in-depth knowledge and understanding for the scientific principles within information and communication technology with specialisation in communication systems.
- Identify and describe examples of sustainability aspects related to communication systems.
- Give examples of and explain social, ethical and environmental aspects of sustainable development in the area of communication systems.

Skills and abilities

For the degree of Master of Science the student should:

- Show ability to critically and systematically integrate knowledge and to analyze, estimate and handle complex phenomena, problems and situations even with limited input.
Show ability to critically, independently and creatively identify and formulate problems, to plan and with adequate methods carry out demanding tasks within given time frames and that way contribute to science development and evaluate that work.

Show ability to, nationally as well as internationally, clearly account for and discuss his conclusions and the scientific arguments behind that in dialogues with different groups.

Show such proficiency that is needed to participate in research and development or to independently work in other qualified activity.

Show ability to follow the technical development in communication systems.

Show ability to use fundamental knowledge in order to investigate new and interesting ideas.

Based on various definitions of sustainable development illustrate and point out perspectives where progress within communication systems can be relevant for sustainable development in society.

**Ability to make judgements and adopt a standpoint**

For the degree of Master of Science the student should:

- Show ability to, within communication systems, make assessments with respect to relevant scientific, social and ethical aspects and also show awareness about ethical aspects on research and development.
- Show ability to compare and evaluate possibilities and limitations of communication technology in the society and how communication technology is used from a sustainability perspective.
- Show insight on the possibilities and limitations of science, his/her role in the society and people's responsibility for how it can be used.
- Show ability to identify his/her needs of further knowledge and to have the responsibility for his/her development.

**Extent and content of the programme**

The programme comprises two years and 120 credits. Education level is second-cycle. The instruction language is English.

The programme consists of 1.5 year (90 credits) of course work and half a year (30 credits) of master thesis project work. The programme starts with a set of compulsory courses (30 credits) which provides broad and in-depth knowledge in the fundamental areas of Communication Systems. The programme continues with specialisation tracks including some mandatory courses within the track and a wide range of elective courses, allowing the student to specialise within the programme subject areas. The third semester includes a project-oriented course (compulsory) that gives the student the possibility to work in groups and within research projects that run within the School of Electrical Engineering and Computer Science. The fourth semester is devoted to the master thesis project work.

The following specialisation tracks are offered:

- Internetworking
- Wireless Networking
- Security and Mobile Computing.

**Eligibility and selection**

General admission requirements and the following special admission requirement must be fulfilled in order to be admitted: Bachelor of Science degree in Electrical/Electronic Engineering, Computer Science, Computer Engineering, Computer Science, or Information Technology, including at least 60 ECTS credits courses in computer science, basic data/telecom and internetworking, computer systems (computer architecture and operating systems) and programming, at least 30 ECTS credits course work in mathematics, including calculus, linear algebra and mathematical statistics or probability theory.

The specific requirements may be assessed as not fulfilled if:

- The degree awarding institution is not considered to meet acceptable quality standards by the authorities of the country in which the institution is located.
The degree does not qualify for admission to equivalent master level in the country where the degree is awarded.

The selection process is based on the following selection criteria: university, previous studies (for instance GPA, grades in specific subjects and English), motivation for the studies (for instance letter of motivation, references, thesis proposal and relevant work experience). The evaluation scale is 1-75.

**Implementation of the education**

**Structure of the education**

Each academic year consists of two semesters which are 20 weeks each, and each semester is further divided into two study periods. Teaching, if necessary, can take place outside the school year.

**Courses**

The programme is course-based. Lists of courses are included in appendix 1.

**Grading system**

Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

Grading scale is found in the respective course syllabus.

**Conditions for participation in the programme**

Participation requires admission to courses within the programme and course registration.

For further studies, special admission requirements are listed in the respective course syllabus.

**Degree project**

The degree project is the final part of the education. The project work may begin when special admission requirements for the course are fulfilled.

**Degree**

Degree is entitled “Teknologide masterexamen” - Master of Science. The main field of study is stated in the text on the degree certificate. The text on the degree certificate states the educational programme, Communication systems, completed by the student.

*Appendix 1 - Course list*
*Appendix 2 - Programme syllabus descriptions*
# Appendix 1: Course list

Master's Programme, Communication Systems, 120 credits (TCOMM), Programme syllabus for studies starting in autumn 2019

## General courses

### Year 1

**Mandatory courses (30.0 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
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<tbody>
<tr>
<td>II2202</td>
<td>Research Methodology and Scientific Writing</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IK2206</td>
<td>Internet Security and Privacy</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IK2215</td>
<td>Advanced Internetworking</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>IK2560</td>
<td>Mobile Networks and Services</td>
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### Year 2

**Mandatory courses (45.0 credits)**

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<tbody>
<tr>
<td>IK2200</td>
<td>Communication System Design</td>
<td>15.0</td>
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<td>Degree Project in Electrical Engineering, Second Cycle</td>
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## Track, Internetworking (ITE)

### Year 1

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<tr>
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<td>Research Methodology and Scientific Writing</td>
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<td>Internet Security and Privacy</td>
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<td>Second cycle</td>
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<td>Advanced Internetworking</td>
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<tr>
<td>IK2217</td>
<td>Advanced Internetworking II</td>
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<tr>
<td>IK2220</td>
<td>Software Defined Networking (SDN) and Network Functions Virtualization (NFV)</td>
<td>7.5</td>
<td>Second cycle</td>
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<tr>
<td>IK2560</td>
<td>Mobile Networks and Services</td>
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**Conditionally elective courses**

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<td>Programming of Interactive Systems</td>
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<td>Distributed Computing, Peer-to-Peer and GRIDS</td>
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<td>ID2216</td>
<td>Developing Mobile Applications</td>
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<td>ID2218</td>
<td>Design of Fault-tolerant Systems</td>
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<td>II2302</td>
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<td>IK1332</td>
<td>Internet of Things</td>
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<td>IK2508</td>
<td>Wireless Transmission Techniques</td>
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<td>Hardware Security</td>
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<td>Radio Electronics</td>
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<tr>
<td>ME2062</td>
<td>Technology-based Entrepreneurship</td>
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**Year 2**

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<tr>
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<td>Network Programming</td>
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<td>II2300</td>
<td>Product Realization Processes I</td>
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<tr>
<td>IK2510</td>
<td>Wireless Networks</td>
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<td>IK2514</td>
<td>Wireless Infrastructure Deployment &amp; Economics</td>
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**Year 3**

**Track, Security and Mobile Computing (SMK)**

**Year 1**

**Mandatory courses (45.0 credits)**

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<td>II2202</td>
<td>Research Methodology and Scientific Writing</td>
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<td>IK2215</td>
<td>Advanced Internetworking</td>
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<tr>
<td>IK2560</td>
<td>Mobile Networks and Services</td>
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**Conditionally elective courses**

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<td>Internet of Things</td>
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<td>First cycle</td>
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<tr>
<td>IK2217</td>
<td>Advanced Internetworking II</td>
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<td>IK2508</td>
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<td>Hardware Security</td>
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<td>Radio Electronics</td>
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<td>ME2062</td>
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### Year 2

#### Mandatory courses (45.0 credits)

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<tr>
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<td>Degree Project in Electrical Engineering, Second Cycle</td>
<td>30.0</td>
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<td>RFID Systems</td>
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Year 3

Track, Wireless networking (TRN)

Year 1

Mandatory courses (45.0 credits)

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<td>Wireless Transmission Techniques</td>
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<td>IK2560</td>
<td>Mobile Networks and Services</td>
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Conditionally elective courses

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<tbody>
<tr>
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<td>Building Networked Systems Security</td>
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<td>Programming of Interactive Systems</td>
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<td>Developing Mobile Applications</td>
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<td>Hardware Security</td>
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### Year 2

#### Mandatory courses (45.0 credits)

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### Year 3
Appendix 2: Specialisations

Master's Programme, Communication Systems, 120 credits (TCOMM), Programme syllabus for studies starting in autumn 2019

Track, Internetworking (ITE)

Track, Security and Mobile Computing (SMK)

Track, Wireless networking (TRN)