

# Communication Systems, Master's Programme

120 credits

Communication Systems, masterprogram

6MCSY

Valid from: 2017 Spring semester

**Determined by**

Faculty Board of Institute of Technology

**Date determined**

2017-01-25

## Purpose

The Communication Systems master's program offers a broad curriculum in communications systems focusing on the fundamental principles of systems engineering and the design of digital and wireless communications systems. This master program is highly competitive and requires a high amount of effort and dedication from the students.

The Communication Systems master's programme prepares the students for a continued career as engineers working in the telecommunications industry or as Ph.D. students. It is coordinated by the Communication Systems division at Linköping University and students will have access to a world-class research infrastructure. Current projects at the division focus on the design and optimization of wireless communications networks, and signal processing for communications.

Specifically the program offers a range of courses with a solid theoretical nucleus in communication systems engineering. Topics covered include: communication theory, coding, modulation, signal processing, and design and optimization of communication systems and networks. The program is given in close association with the industry and students will have access both to an extensive network of industry contacts and opportunities to complete their master's thesis work.

Most courses in the program are given by the Communication Systems, Information Coding, and Automatic Control divisions of the EE (ISY) department at LiU.

## Aim

Graduates from the Master's programme in Communication Systems should in Knowledge and reasoning in mathematics, natural sciences, and engineering

- have a solid knowledge of signal theory, telecommunication theory, and modern wireless communication systems.
- have specialized knowledge in modern radio communications and baseband signal processing techniques
- be able to carry out modeling, simulation, and design of modern communication links and networks.

Personal and professional skills and attributes:

- be able to formulate a model for a relevant problem and critically evaluate its validity.
- be creative, enterprising and take responsibility for their own contribution to the solution of a problem.

Interpersonal skills: Teamwork and communication:

- be capable of teamwork and active collaboration within a group by sharing tasks and responsibilities
- be able to initialize, plan, carry out and evaluate scientific and engineering projects
- be able to communicate and to give presentations in English, orally and in writing

Conceiving, designing, implementing, and operating systems in the enterprise and social context:

- have a deep insight into the broad field of science and engineering, from initial concepts to implementation aspects

## Entry requirements

- Bachelor's degree in electrical engineering or equivalent
- 30 ECTS credits in mathematics/applied mathematics relevant to the programme including courses in linear algebra, probability theory and signals and systems
- English corresponding to the level of English in Swedish upper secondary education (English 6/B)

## Degree thesis

The thesis should be based on the high quality scientific content and carried out in close contact with the research groups involved in the programme.

## Degree requirements

The programme is designed to give the Master's Degree "Teknologie masterexamen i elektroteknik" translated to "Master of Science (Two Years) with a major in Electrical Engineering".

The requirements are the following:

- a Bachelor's degree as specified in the entrance requirements
- course requirements for a total of 120 ECTS credits from courses from the curriculum of the programme, or after special decision from the programme board, and thesis work.
- passed the requirements for all compulsory courses
- courses on advancement level A (advanced) 90 ECTS credits including:
  - at least 30 ECTS credits courses from the major subject, Electrical Engineering
  - a 30 ECTS credits Master's Thesis in the major subject, Electrical Engineering
- at least 45 ECTS credits from courses in mathematics or applications of mathematics from the Bachelor level (basic) or Master level (advanced), see list of specific courses
- a Master's thesis presented and passed as per Linköping Institute of Technology degree regulations.

Courses overlapping each other regarding contents are not allowed to be included in the degree. Courses used for the Bachelor's degree can never be included in the Master's degree.

## Degree in Swedish

Master of Science (120 credits) with a major in Electrical Engineering

## Degree in English

Master of Science (two years) with a major in Electrical Engineering

## Specific information

### Graduate Level Courses

Certain PhD courses can be taken by master students. Please contact the directors of graduate studies:

- Department of Electrical Engineering, [forskarstudierektor@isy.liu.se](mailto:forskarstudierektor@isy.liu.se)
- Department of Computer and Information Science, [forskarstudierektor@ida.liu.se](mailto:forskarstudierektor@ida.liu.se)

In order to include graduate course in the degree the student must apply to the Board of Studies

## Curriculum

### Semester 1 (Autumn 2017)

Course code	Course name	Credits	Level	Timetable module	ECV
<b>Period 1</b>					
TSDT14	Signal Theory	6	A1X	1	C
TSKS01	Digital Communication	6*	A1X	4	C
TSKS15	Detection and Estimation of Signals	6	A1X	2	C
<b>Period 2</b>					
TSIN02	Internetworking	6	A1X	1	C
TSKS01	Digital Communication	6*	A1X	4	C
TSRT78	Digital Signal Processing	6	A1X	2	C

### Semester 2 (Spring 2018)

Course code	Course name	Credits	Level	Timetable module	ECV
<b>Period 1</b>					
THEN24	Communication, Ethics and Sustainable Development	6*	G1X	-	C
TSBK08	Data Compression	6	A1X	2	C
TSKS13	Wireless Communications	6	A1X	4	C
TDDD38	Advanced Programming in C++	6*	A1X	2	E
<b>Period 2</b>					
THEN24	Communication, Ethics and Sustainable Development	6*	G1X	-	C
TSBK02	Image and Audio Coding	6	A1X	4	C
TSKS14	Multiple Antenna Communications	6	A1X	2	C
TDDD38	Advanced Programming in C++	6*	A1X	-	E

### Semester 3 (Autumn 2018)

Course code	Course name	Credits	Level	Timetable module	ECV
<b>Period 1</b>					
TSIN01	Information Networks	6	A1X	3	C
TSKS05	Communication Systems, Project Course	12*	A1X	4	C
TSKS12	Modern Channel Coding, Inference and Learning	6	A1X	1	C
TNE071	Microwave Engineering	6	A1X	1	E
TSIT03	Cryptology	6	A1X	2	E
<b>Period 2</b>					
TSKS05	Communication Systems, Project Course	12*	A1X	4	C
TNE083	Antenna Theory	6	A1X	2	E
TSEK02	Radio Electronics	6	A1X	3	E
TSKS11	Networks: Models, Algorithms and Applications	6	G2X	3	E

### Semester 4 (Spring 2019)

Course code	Course name	Credits	Level	Timetable module	ECV
<b>Period 1</b>					
TQXX30	Degree project - Master's Thesis	30*	A1X	-	C
<b>Period 2</b>					
TQXX30	Degree project - Master's Thesis	30*	A1X	-	C

ECV = Elective / Compulsory / Voluntary

\*The course is divided into several semesters and/or periods