



Programme syllabus

Degree Programme in Information and Communication Technology
Civilingenjörsutbildning i informationsteknik
270.0 credits

Valid for students admitted to the education from autumn 06 (HT - Autumn term; VT - Spring term).

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

Programme objectives

Knowledge and understanding

Skills and abilities

Ability to make judgements and adopt a standpoint

Extent and content of the programme

Eligibility and selection

Implementation of the education

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.

[Appendix 1 - Course list](#)

[Appendix 2 - Programme syllabus descriptions](#)



Appendix 1: Course list

Programme syllabus for studies starting in autumn 2006, Degree Programme in Information and Communication Technology (IT)

General courses

Year 1

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
2B1116	Engineering Fundamentals	7.5 hp	
2B1560	Digital Design	7.5 hp	
2G1518	Computer Hardware Engineering	7.5 hp	
2I1080	Objectoriented Programming	7.5 hp	
2I1081	Algorithms and Data Structures	7.5 hp	
5B1146	Algebra and Geometry	7.5 hp	
5B1147	Calculus in One Variable	7.5 hp	
5B1148	Calculus in Several Variable	7.5 hp	

Year 2

Mandatory courses (52.5 Credits)

Code	Name	Credits	Edu. level
EI1102	Electrical Circuit Analysis	7.5 hp	First cycle
ID1218	Applied Programming	7.5 hp	First cycle
IF1613	Electromagnetism and Waves	7.5 hp	First cycle
IK1203	Networks and Communication	7.5 hp	First cycle
IV1301	IT Project, Part 1-Method	7.5 hp	First cycle
SF1610	Discrete Mathematics	7.5 hp	First cycle
SF1913	Mathematical Statistics	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
ID1003	Project IT	7.5 hp	First cycle

[IS1204 IT Project Course, part 2](#) 7.5 hp First cycle

Year 3

Mandatory courses (7.5 Credits)

Code	Name	Credits	Edu. level
ID1015	Logic for Computer Science	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
DD2371	Theory of Automata	6.0 hp	Second cycle
DN1215	Numerical Methods, Basic Course	7.5 hp	First cycle
EQ1100	Signals and Systems, part II	7.5 hp	First cycle
EQ1240	Signal Processing	7.5 hp	First cycle
HL1008	Cellular and Molecular Biology	15.0 hp	First cycle
HL1009	Neuroscience	7.5 hp	First cycle
IC1000	Human-Computer Interaction	6.0 hp	First cycle
IC1008	Cognitive Science	7.5 hp	First cycle
ID1009	Agile Software Construction	9.0 hp	First cycle
ID1011	Introduction to Software Engineering	7.5 hp	First cycle
ID1217	Concurrent Programming	7.5 hp	First cycle
ID2202	Compilers and Execution Environments	7.5 hp	Second cycle
ID2206	Operating Systems	7.5 hp	Second cycle
IE1202	Analog Electronics	7.5 hp	First cycle
IH1611	Semiconductor Devices	7.5 hp	First cycle
IK1550	Internetworking	6.0 hp	First cycle
IL2222	Digital Circuit Design for Nanoscale CMOS	7.5 hp	Second cycle
IS2202	Computer Systems Architecture	7.5 hp	Second cycle
IV1000	Object Oriented Analysis and Design	6.0 hp	First cycle
IV1007	Relational Database Technology	6.0 hp	First cycle
IV1013	Introduction to Computer Security	7.5 hp	First cycle
IV1200	System Modelling and Simulation	7.5 hp	First cycle
SF1635	Signals and Systems, part I	7.5 hp	First cycle

Communication Systems (COMS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Communication Systems.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Communication Systems (TCOMM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Communication Systems.

Computational and Systems Biology (CSBI)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Computational and Systems Biology.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Computational and Systems Biology (TBSBM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Computational and Systems Biology.

Design and Implementation of ICT Products and Systems (DIPS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Design and Implementation of IT Products and Systems.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Design and Implementation of IT Products and Systems (TDIPM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Design and Implementation of IT Products and Systems.

Embedded Systems (EMBS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to the track "System and Architecture" year 1 in the master's programme System-on-Chip-Design.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the track "System and Architecture" see "Master (2 yrs) System-on-Chip-Design (TSKKM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to the track "System and Architecture" year 2 in the master's programme System-on-Chip-Design.

Engineering and Management of Information Systems (EMIS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Engineering and Management of Information Systems.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Engineering and Management of Information Systems (TEMSM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Engineering and Management of Information Systems.

Information and Communication Systems Security (ICSS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Information and Communication Systems Security.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Information and Communication Systems Security (TICSM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Information and Communication Systems Security.

International Profile (INT)

Year 1

Conditionally elective courses

Code	Name	Credits	Edu. level
9E1323	German, Advanced Beginner's Level	7.5 hp	
9E1339	French, Advanced Beginners' Level	7.5 hp	
9E1344	Spanish, Advanced Beginners' Level	7.5 hp	
9E1380	Elementary Japanese and Japanese Studies	6.0 hp	
9E1390	Elementary Chinese and Chinese Studies	6.0 hp	

Year 2

Conditionally elective courses

Code	Name	Credits	Edu. level
DS1324	Technical German, Intermediate Level	9.0 hp	First cycle
DS1334	Technical French, Intermediate Level	9.0 hp	First cycle
DS1348	Technical Spanish, Intermediate Level	9.0 hp	First cycle

[DS1382 Japanese, Advanced Beginners Level I](#) 6.0 hp First cycle

[DS1392 Chinese, Advanced Beginners Level I](#) 6.0 hp First cycle

Year 3

Optional courses

Code	Name	Credits	Edu. level
DS1319	German - Language, Culture and Social Studies	4.5 hp	First cycle
DS1337	French - Language, Culture and Social Studies	4.5 hp	First cycle
DS1347	Spanish - Language, Culture and Social Studies	4.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
DS1384	Japanese, Advanced Beginners Level II	9.0 hp	First cycle
DS1394	Chinese, Advanced Beginners Level II	9.0 hp	First cycle
DS2326	Technical German, Advanced Level	9.0 hp	Second cycle
DS2336	Technical French, Advanced Level	9.0 hp	Second cycle
DS2349	Technical Spanish, Advanced Level	9.0 hp	Second cycle

Year 4

Conditionally elective courses

Code	Name	Credits	Edu. level
DS1386	Japanese, Intermediate Level	9.0 hp	First cycle
DS1396	Chinese, Intermediate Level	9.0 hp	First cycle

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in a master's programme (2 yrs).

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programmes and the courses see specific programme;

Master (2 yrs), Communication Systems (TCOMM). Master (2 yrs), Computational Systems Biology (TBSBM). Master (2 yrs), Design and Implementation of ICT-products and -systems (TDIPM). Master (2yrs), Engineering and Management of Information Systems (TEMSM). Master (2 yrs), Information and Communication Systems Security (TICSM). Master (2yrs), Interactive Systems Engineering (TISYM). Master (2yrs), Software Engineering of Distributed Systems (TSEDM). Master (2yrs), Wireless Systems (TTLSM). Master (2yrs), System-on-Chip-Design, track "System and Architecture" (TSKKM).

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in a master's programme (2 yrs).

Interactive Systems Engineering (ISEE)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Interactive Systems Engineering.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Interactive Systems Engineering (TISYM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Interactive Systems Engineering.

Individual (ITX)

Software Engineering of Distributed System (SEDS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Software Engineering of Distributed Systems.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Software Engineering of Distributed Systems (TSEDM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Software Engineering of Distributed Systems.

Wireless Systems (WLSS)

Year 4

Supplementary information

Year 4 in the degree programme in Information and Communication Technology is equivalent to year 1 in the master's programme Wireless Systems.

A minimum of 90 hp, Master's Project 30 hp included, must be elected from the master's programme.

For detailed information about the master's programme and the courses see "Master (2 yrs) Wireless Systems(TTLSM)".

Year 5

Supplementary information

Year 5 in the degree programme in Information and Communication Technology is equivalent to year 2 in the master's programme Wireless Systems.



Appendix 2: Specialisations

Programme syllabus for studies starting in autumn 2006, Degree Programme in Information and Communication Technology (IT)

Communication Systems (COMS)

Following courses are required to entrance this specialisation:

ID2206 Operating systems

IK1550 Internetworking

The Internet is one of the most powerful technologies of our time and has proven to be an extremely enabling tool. Its expected impact on all levels of society has only just started to show. Now the challenges are to integrate the various technologies and to make them scale, to ensure ubiquitous access, reliability, security and manageability and to make the network recede and become eclipsed by its functionality.

The programme is focused on issues that will take Internet technology to the next level, not only to a new generation of global communication systems, but also to a new dynasty! Students work in a research environment with ample experimental resources and in close contact with the industry, including leading system manufacturers, service developers, network operators, service providers and advanced user groups of early adopters.

In our minds, the new global information infrastructure includes workplaces, homes and mobile users wearing personal computing and communication environments capable of ad-hoc networking, ubiquitous access networks and a high-performance infrastructure with connected servers and fixed resourceful spaces for events, meetings and group work. Some of the key issues to which we attach particular importance are economic and market considerations, technical scalability, support for mobility, network operator neutral access to services, security, management etc.

Students have access to unique experimental resources that make it possible to study the issues using real state-of-the-art networks used by real users generating real data.

Computational and Systems Biology (CSBI)

Following courses are required to entrance this specialisation:

IV1200 System Modelling and Simulation

IV1007 Relational Database Technology

En kurs i grundläggande numeriska metoder: DN1215 Numeriska metoder grundkurs eller motsvarande som DN1214 eller DN1240

Inriktningen sammanfaller med masterprogrammet i Beräkningsbiologi och systembiologi.

The programme provides knowledge, skills and networks to continue on entrepreneurial, engineering or research leader tracks to the bio tech and pharmaceutical industries and to academia in the post-genome and bio-simulation era.

The programme is directed by the staff of KTH Department of Computational Biology in the School of Computer Science and Communication (CSC).

Lecturers and Student advisors on the first year courses are mainly from Computational Biology/CSC. In the second year, specialisation courses are also offered by the Schools of Biotechnology and Industrial Engineering and Management, and from the Stockholm School of Entrepreneurship.

Programme outline

The programme comprises compulsory and elective courses with a focus on biomodelling, bioinformatics and systems biology. The curriculum of the first year (60 ECTS) consists mainly of compulsory courses, while in the second year most of the courses (30 ECTS) are elective. The Master's thesis project (30 ECTS) is also normally undertaken in the second year.

The elective courses are organized in three streams as follows:

The Biomodeling stream

You will learn how to set up a biochemical or biophysical model representing for instance a set of biochemical reactions within a cell or the interaction between model nerve cells in a brain region. You learn how to use state of the art numerical methods to simulate the models, as well as how these are run on standard PCs as well as parallel super computers such as the IBM Blue Gene at our department

The Bioinformatics stream

You will learn how to use and develop further basic algorithms in bioinformatics, and how to handle and use productively the main genomic databases (sequences, interactions, microarray data, proteomics data, etc.). You can also choose to go further into algorithmic complexity theory and other topics in computer science, comparative genomics, statistics, optimization or the experimental side of genomics.

The Biotech and entrepreneurship stream

This stream prepares you for utilizing your professional know-how in entrepreneurial environments, including but not limited to self-sustained industrial projects and biotech start-ups. The courses will give you both hands-on knowledge on how to start your own company or other endeavors, as well as a better understanding for the commercial aspects of biotech. You will learn not only how to turn a scientific insight into a feasible business idea, but also how to combine knowledge sets from different spheres and thus enrich and develop your professional profile.

Design and Implementation of ICT Products and Systems (DIPS)

Following courses are required to entrance this specialisation:

IE1202 Analog Electronics

The goal of the program is to equip students with the tools necessary to realize future ICT products and systems, taking into account technology, business and society. Students emerging from the program will understand how components ranging from new micro-machined devices through advanced software objects are aggregated into final ICT solutions. Students will leverage prerequisite knowledge of hardware, software and communication technologies to focus on the fusion of ICT across levels that include data, devices, and applications. Instruction will be tied to research in emerging advanced technologies, allowing students to enrol in elective courses in areas such as system modelling, embedded systems exploiting sensors and actuators, and product realization processes. A strong aspect of the goals of the program is to associate these elective courses closely with industrial trends, business markets and social policy. A significant component of the program goal is the expectation that students will understand the ties of ICT products to the needs of business and society. Students will acquire tools in business methods and product development processes so that they have the means to formulate why a solution has been developed, and to measure its technical correctness, societal impact and commercial success.

Embedded Systems (EMBS)

Following courses are required to entrance this specialisation:

ID2206 Operating Systems

IS2202 Computer System Architecture

ID2202 Compilers and Execution Environments

Two mandatory courses, totaling 15 credits, will be excluded from this programme. The reason is that the objectives of these courses is fulfilled by the project work in grade 3.

This Master degree program for internationally oriented students prepares students to meet the global career challenges in integrating wireless and wired communication electronics utilizing the next revolution in microelectronics, System-on-Chip Design, or Socware. This program provides the knowledge and skills needed for such integration work and the program bridges the computer engineering and microelectronics curriculums. The program enhances students capabilities to work in global project teams, provides solid foundation for life-long learning and personal development based on the pedagogic model used. Many of the courses are based on the world class research at Royal Institute of Technology (Kungliga Tekniska Hogskolan, KTH).

Our live and our future is changing due to rapid growth of the internet, communication technologies, pervasive and ubiquitous computing enabling the availability and invisibility of the complex electronics. The key driving force for this development during this decade will be System-on-Chip technologies and Socware engineering, where the complex functionality is integrated towards ULSI scale single chip solutions. This on-going transition from traditional Application Specific Integrated Circuits (ASIC) has lead to new challenges and paradigm shifts in design methods and automation, system and circuit architectures and circuit techniques in order to harvest the potential benefits of the deep submicron CMOS technologies. This new Master study program will address the key strategic concepts and issues in system integration on silicon. To achieve the overall objectives of preparing students for the global career market,

we offer truly international environment for studies, dynamic learning environment, state-of-the-art resources, and close integration to world leading research at Royal Institute of Technology.

Engineering and Management of Information Systems (EMIS)

Following courses are required to entrance this specialisation:

ID2206 Operating Systems

IV1007 Rational Database Technology

IV1200 System Modelling och Simulation

Information technology is rapidly becoming a key enabler in the evolution and transformation of organisations and society. As a consequence of this development, there is increased demand for skilled engineers who can undertake the role as tomorrow's information leaders.

The aim of this programme is to educate students who can manage and participate in the design, development, establishment, usage, management and administration of large IT systems that support organisations on the operational, tactical as well as strategic levels.

The programme will give students advanced knowledge of systems design including requirements engineering, software maintenance and agile systems development. The programme will provide the students with a strong background in project management for the design and operation of IT systems, including process management, leadership and financial aspects. The programme will also give a firm understanding of the opportunities and limitations of IT in supporting and transforming organisational activities, including business models, business processes, decision support and knowledge management.

Information and Communication Systems Security (ICSS)

Following courses are required to entrance this specialisation:

ID2206 Operating Systems

IV1007 Rational Database Technology

IV1200 System Modelling och Simulation

An information society involving users, computers and networks as well as complex information and communications technology, leads to vulnerabilities that must be prevented, detected and remedied. Both industry and the public sector face rapidly growing, security-related challenges. As a consequence of this development, there is an increased demand for skilled information security professionals.

After completing this programme, students should possess the knowledge, skills and attitude necessary to develop, plan, manage and perform, in a professional manner, necessary activities in the field of information and communication security in the public as well as the private sectors. Students will acquire a solid foundation for further development in the information and communication security field and for the extension of their own competence.

International Profile (INT)

No information entered.

Interactive Systems Engineering (ISEE)

Following courses are required to entrance this specialisation:

ID2206 Operating Systems

IV1007 Rational Database Technology

IV1200 System Modelling och Simulation

Engineers with a specialisation on interactive systems are demanded both in industry and in other sectors of society. Important industrial sectors are the manufacturing industry, process oriented industry, the telecom industry including manufacturers and operators, transportation, medical and health care sectors, as well as media and entertainment industries. Perhaps the most recent example of the importance of interactive systems design is the design of services in mobile and wireless communication environments. The aim of the programme is to teach students to manage and participate in the design, development and management of interactive systems.

Individual (ITX)

No information entered.

Software Engineering of Distributed System (SEDS)

Following courses are required to entrance this specialisation:

ID2206 Operating Systems

ID1217 Concurrent Programming

The program objective is to educate engineers who will be able to design, implement and maintain distributed software systems for a wide range of applications including peer-to-peer, grid computing, web-services and internet-based applications. The program will provide students with a system of knowledge both in formal foundations, technological platforms and practical skills in implementing distributed software applications. The program will also provide an insight into current and future directions of the distributed software development. The education will be based on carefully selected topics in theory, experiments and engineering practice.

The program is given by the Departments of Microelectronics and Information Technology. The program duration is 1.5 years (3 semesters) and it leads to an internationally respected degree. The program provides both good foundations for future industrial career and opportunity for continuation of education towards a PhD.

Wireless Systems (WLSS)

Following courses are required to entrance this specialisation:

IE1202 Analog elektronics

SF1635 Signals and Systems, part I

EQ1100 Signals and Systems, part II

EQ1200 Signal Theory

The M.Sc. program in Wireless Systems is taught in English and focuses on enabling technologies for wireless systems. It provides a broad curriculum composed of courses on communication theory, signal processing, radio communication, and communication networks. Additionally, students are given the opportunity of taking one or two classes on project management, leadership or intellectual property rights, and count these towards the degree. The program is 2 years long (80 Swedish credit units), and it consists of 1½ year of full-time coursework (60 credits) and a one semester thesis project (20 credits).

The program prepares the students for a successful future career. Some of our graduates choose to start their career in industry, and many continue their education towards a Ph.D., at KTH or elsewhere.