# Programme syllabus

Degree Programme in Electrical Engineering
Civilingenjörsutbildning i elektroteknik
*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

Degree Programme in Electrical Engineering (E), Programme syllabus for studies starting in autumn 2006

## Programme syllabus

Established Programme syllabus as PDF:

- Valid for studies starting in autumn 2006

## General courses

### Year 1

#### Mandatory courses (72.0 credits)

| Course code | Course name | Credits Edu. level |
|---|---|---|
| 2A1800 | Electrical Circuit Analysis | 7.5 |
| 2B1520 | Electronics | 12.0 |
| 2D1343 | Computer Science | 12.0 |
| 2U1700 | Project Course in Electrical Engineering | 7.5 |
| 5B1115 | Mathematics I | 9.0 |
| 5B1116 | Mathematics II | 9.0 |
| 5B1117 | Mathematics III | 9.0 |
| 5C1102 | Mechanics, Smaller Course | 6.0 |

#### Optional courses

| Course code | Course name | Credits Edu. level |
|---|---|---|
| 2E1215 | Introductory Matlab Course | 1.5 |

### Year 2

### Mandatory courses (106.5 credits)

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| 2A1810 | Electromagnetic Theory EA | 6.0 | |
| 2A1820 | Electromagnetic Theory EB | 6.0 | |
| 2B1100 | Physics part 1, Thermodynamics and Wave Physics | 6.0 | |
| 2D1240 | Numerical Methods, Basic Course II | 6.0 | |
| 2E1117 | Measurement Technology | 7.5 | |
| 2E1313 | Signals and Systems, part II | 7.5 | |
| 5B1209 | Signals and Systems, part I | 7.5 | |
| 5B1501 | Probability Theory and Statistics | 6.0 | |
| DN1240 | Numerical Methods, Basic Course II | 6.0 | First cycle |
| EI1200 | Electromagnetic Field Theory | 7.5 | First cycle |
| EI1210 | Wave Propagation and Antennas | 7.5 | First cycle |
| EQ1100 | Signals and Systems, part II | 7.5 | First cycle |
| IF1601 | Physics part 1, Thermodynamics and Wave Physics | 6.0 | First cycle |
| SF1635 | Signals and Systems, part I | 7.5 | First cycle |
| SF1901 | Probability Theory and Statistics | 6.0 | First cycle |
| SG1102 | Mechanics, Smaller Course | 6.0 | First cycle |

## Year 3

### Mandatory courses (39.0 credits)

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| EJ1200 | Electric Power Systems | 6.0 | First cycle |
| EK1190 | Measurement Technology | 7.5 | First cycle |
| EL1110 | Automatic Control, General Course | 6.0 | First cycle |
| IE1202 | Analog Electronics | 7.5 | First cycle |
| IF1602 | Physics part 2, Material Physics | 6.0 | First cycle |
| SF1851 | Optimization | 6.0 | First cycle |

# Biomedical Electrical Engineering (BIOE)

### Optional courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| DD2426 | Robotics and Autonomous Systems | 7.5 | Second cycle |
| DD2432 | Artificial Neural Networks and Other Learning Systems | 6.0 | Second cycle |
| DD2433 | Artificial Neural Networks, Advanced Course | 6.0 | Second cycle |

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|---|---|---|---|
| DD2435 | Mathematical Modelling of Biological Systems | 9.0 | Second cycle |
| DD2436 | Modelling of Processes in Cell Biology | 6.0 | Second cycle |
| DD2450 | Algorithmic Bioinformatics | 6.0 | Second cycle |
| DT2112 | Speech Technology | 7.5 | Second cycle |
| EK2260 | Measurement Systems, Project Course | 6.0 | Second cycle |
| EK2350 | Microsystem Technology | 7.5 | Second cycle |
| EN2100 | Sound Perception | 7.5 | Second cycle |
| EN2200 | Pattern Recognition | 6.0 | Second cycle |
| EQ2300 | Digital Signal Processing | 7.5 | Second cycle |
| EQ2310 | Digital Communications | 9.0 | Second cycle |
| HL1000 | Quality and Regulatory Aspects on Medical Devices | 3.0 | First cycle |
| HL1009 | Neuroscience | 7.5 | First cycle |
| HL1010 | Systems Biology | 7.5 | First cycle |
| HL2004 | Engineering in Intensive Care and Anesthesia | 6.0 | Second cycle |
| HL2005 | Implants and Biomaterials | 6.0 | Second cycle |
| IH2653 | Simulation of Semiconductor Devices | 7.5 | Second cycle |
| IH2655 | Design and Characterisation of Nano- and Microdevices | 7.5 | Second cycle |
| SH2310 | Radiation Detectors and Medical Imaging Systems | 7.5 | Second cycle |

**Conditionally elective courses**

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| DD2385 | Software Engineering | 6.0 | Second cycle |
| EQ1200 | Signal Theory | 7.5 | First cycle |
| HL1008 | Cellular and Molecular Biology | 15.0 | First cycle |
| HL2006 | Medical Engineering, Basic Course | 7.5 | Second cycle |
| IH1611 | Semiconductor Devices | 7.5 | First cycle |

**Recommended courses**

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| HL2002 | Medical Instrumentation and Signal Processing | 6.0 | Second cycle |
| HL2003 | Radiation Physics and Biology | 6.0 | Second cycle |

**Supplementary information**

For further information please contact the student office at the School of Electrical Engineering EES.

# Electronics (ELNI)

**Optional courses**

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| EK2350 | Microsystem Technology | 7.5 | Second cycle |
| IH2652 | Methods and Instruments of Analysis | 7.5 | Second cycle |
| IH2653 | Simulation of Semiconductor Devices | 7.5 | Second cycle |
| IH2654 | Nanoelectronics | 9.0 | Second cycle |
| IH2655 | Design and Characterisation of Nano- and Microdevices | 7.5 | Second cycle |
| IH2656 | Advanced Semiconductor Materials | 7.5 | Second cycle |
| IH2657 | Design of Nano Semiconductor Devices | 7.5 | Second cycle |
| IH2661 | Power Semiconductor Devices | 7.5 | Second cycle |
| IL2200 | ASIC-design Methodology with High-level Languages | 7.5 | Second cycle |
| IL2201 | Design of Digital Integrated Circuits - VLSI | 7.5 | Second cycle |
| IL2202 | System Modelling | 7.5 | Second cycle |
| IL2204 | DSP-Construction with HDL | 7.5 | Second cycle |
| IL2206 | Embedded Systems | 7.5 | Second cycle |
| IL2207 | System-On-Chip Architectures | 7.5 | Second cycle |
| IL2212 | Embedded Software | 7.5 | Second cycle |
| IL2217 | Digital Design with HDL | 7.5 | Second cycle |
| IL2219 | Radio Electronics | 7.5 | Second cycle |
| IL2220 | Low Power Analogue and Mixed Signal ICs | 7.5 | Second cycle |
| IM2651 | Physics of Electronic Materials | 7.5 | Second cycle |
| IO2653 | Fiber-optical Communication | 7.5 | Second cycle |
| IO2654 | Optical Networking | 7.5 | Second cycle |
| IO2655 | Photonics | 7.5 | Second cycle |
| IS1202 | Computer Systems Architecture | 7.5 | First cycle |
| IS2206 | Research Methods in Computer Systems Engineering | 7.5 | Second cycle |
| IT2651 | Microwave Engineering | 7.5 | Second cycle |

**Conditionally elective courses**

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| EQ1200 | Signal Theory | 7.5 | First cycle |
| IH1611 | Semiconductor Devices | 7.5 | First cycle |
| IL1203 | Design of Digital Integrated Circuits - LSI | 7.5 | First cycle |
| IL2218 | Analog Electronics, Advanced Course | 7.5 | Second cycle |
| IS1200 | Computer Hardware Engineering | 7.5 | First cycle |

**Supplementary information**

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# Electrical Engineering (ELTE)

### Optional courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| ED2200 | Energy and Fusion Research | 6.0 | Second cycle |
| ED2210 | Electromagnetic Processes in Dispersive Media | 6.0 | Second cycle |
| EF2200 | Plasma Physics | 6.0 | Second cycle |
| EF2210 | Plasma Physics, Supplementary Course | 3.0 | Second cycle |
| EG2030 | Power Systems, Advanced Course | 7.5 | Second cycle |
| EG2050 | System Planning | 7.5 | Second cycle |
| EH2020 | Industrial Control and Information Systems | 7.5 | Second cycle |
| EH2040 | Industrial Information Systems, Systems Engineering | 7.5 | Second cycle |
| EI2400 | Applied Antenna Theory | 7.5 | Second cycle |
| EI2410 | Field Theory for Guided Waves | 7.5 | Second cycle |
| EI2420 | Electromagnetic Wave Propagation | 7.5 | Second cycle |
| EI2430 | High-voltage Engineering | 7.5 | Second cycle |
| EI2440 | Electrotechnical Design | 7.5 | Second cycle |
| EJ2200 | Electrical Machines and Drives | 7.5 | Second cycle |
| EJ2210 | Analysis of Electrical Machines | 7.5 | Second cycle |
| EJ2300 | Power Electronics | 7.5 | Second cycle |
| EL2520 | Control Theory and Practice, Advanced Course | 7.5 | Second cycle |
| IH2661 | Power Semiconductor Devices | 7.5 | Second cycle |
| IT2651 | Microwave Engineering | 7.5 | Second cycle |

### Conditionally elective courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| EG2020 | Power Systems, Basic Course | 7.5 | Second cycle |
| EI2333 | Electrotechnical Modelling | 7.5 | Second cycle |
| EL1820 | Modelling of Dynamical Systems | 6.0 | First cycle |
| SF1628 | Complex Analysis | 6.0 | First cycle |
| SI1141 | Mathematical Methods in Physics, Course I | 6.0 | First cycle |

### Supplementary information

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# Communication Systems (KSY)

### Optional courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| EN2200 | Pattern Recognition | 6.0 | Second cycle |
| EN2300 | Speech Signal Processing | 6.0 | Second cycle |
| EN2400 | Image Processing | 6.0 | Second cycle |
| EP2120 | Internetworking | 7.5 | Second cycle |
| EP2200 | Queuing Theory and Teletraffic Systems | 7.5 | Second cycle |
| EP2300 | Management of Networks and Networked Systems | 7.5 | Second cycle |
| EQ2300 | Digital Signal Processing | 7.5 | Second cycle |
| EQ2310 | Digital Communications | 9.0 | Second cycle |
| EQ2400 | Adaptive Signal Processing | 6.0 | Second cycle |
| EQ2410 | Advanced Digital Communications | 6.0 | Second cycle |
| EQ2420 | Antenna Theory | 7.5 | Second cycle |
| EQ2430 | Project Course in Signal Processing and Digital Communication | 12.0 | Second cycle |
| EQ2450 | Seminars in Signals, Sensors and Systems | 3.0 | Second cycle |
| IK2500 | Radio Communication, Basic Course | 6.0 | Second cycle |
| IK2502 | Wireless Networks | 12.0 | Second cycle |
| IK2555 | Wireless and Mobile Network Architectures | 7.5 | Second cycle |
| IL2219 | Radio Electronics | 7.5 | Second cycle |
| IT2651 | Microwave Engineering | 7.5 | Second cycle |

### Conditionally elective courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| DD2385 | Software Engineering | 6.0 | Second cycle |
| EP1100 | Data Communications and Computer Networks | 7.5 | First cycle |
| EQ1200 | Signal Theory | 7.5 | First cycle |
| IS1200 | Computer Hardware Engineering | 7.5 | First cycle |

### Supplementary information

For further information please contact the student office at the School of Electrical Engineering EES.

# Systems Engineering (SYS)

### Optional courses

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| DD2422 | Image Analysis and Computer Vision | 6.0 | Second cycle |

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|---|---|---|---|
| DD2426 | Robotics and Autonomous Systems | 7.5 | Second cycle |
| DD2432 | Artificial Neural Networks and Other Learning Systems | 6.0 | Second cycle |
| EG2030 | Power Systems, Advanced Course | 7.5 | Second cycle |
| EG2050 | System Planning | 7.5 | Second cycle |
| EH2020 | Industrial Control and Information Systems | 7.5 | Second cycle |
| EH2040 | Industrial Information Systems, Systems Engineering | 7.5 | Second cycle |
| EH2050 | Industrial Information Systems, Case Studies | 7.5 | Second cycle |
| EJ2200 | Electrical Machines and Drives | 7.5 | Second cycle |
| EK2260 | Measurement Systems, Project Course | 6.0 | Second cycle |
| EK2350 | Microsystem Technology | 7.5 | Second cycle |
| EL1850 | Modelling of Dynamical Systems | 3.0 | First cycle |
| EL2420 | Automatic Control, Project Course | 12.0 | Second cycle |
| EL2450 | Hybrid and Embedded Control Systems | 7.5 | Second cycle |
| EL2520 | Control Theory and Practice, Advanced Course | 7.5 | Second cycle |
| EL2620 | Nonlinear Control | 7.5 | Second cycle |
| EP2300 | Management of Networks and Networked Systems | 7.5 | Second cycle |
| EQ2300 | Digital Signal Processing | 7.5 | Second cycle |
| EQ2310 | Digital Communications | 9.0 | Second cycle |
| EQ2400 | Adaptive Signal Processing | 6.0 | Second cycle |
| SF1628 | Complex Analysis | 6.0 | First cycle |
| SF2842 | Geometric Control Theory | 7.5 | Second cycle |
| SF2852 | Optimal Control Theory | 7.5 | Second cycle |

**Conditionally elective courses**

| Course code | Course name | Credits | Edu. level |
|---|---|---|---|
| DD2385 | Software Engineering | 6.0 | Second cycle |
| EG2020 | Power Systems, Basic Course | 7.5 | Second cycle |
| EL1820 | Modelling of Dynamical Systems | 6.0 | First cycle |
| EQ1200 | Signal Theory | 7.5 | First cycle |
| IS1200 | Computer Hardware Engineering | 7.5 | First cycle |

**Supplementary information**

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# Appendix 2: Specialisations

Degree Programme in Electrical Engineering (E), Programme syllabus for studies starting in autumn 2006

## Programme syllabus

Established Programme syllabus as PDF:

- Valid for studies starting in autumn 2006

## Biomedical Electrical Engineering (BIOE)

Medical research and processing is becoming increasingly dependent on advanced technical systems. This specialisation provides students with the extensive knowledge necessary to be able to work with the development of systems and components in medical applications. This degree will qualify students for jobs within a broad engineering field connected to medical and biological operations.

## Electronics (ELNI)

This specialisation suits people interested in semi-conductors, analogue and digital systems and computer components. After graduation possible jobs include semi-conductor or analogue and digital electronic system construction or perhaps work with the optical and electronic systems connected to these.

## Electrical Engineering (ELTE)

This specialisation suits students who are interested in electrical magnetism, electrical systems and similar fields. Jobs are to be found at companies who manufacture advanced electronic machines or techniques for transfer of electrical energy.

## Communication Systems (KSY)

This specialisation provides extensive knowledge on the rapidly-growing area of communications, i.e. transferring information from one location to another. As a Master of Science in Communications Systems there are many job opportunities working with technical solutions for the development, construction or operation of future communication systems.

# Systems Engineering (SYS)

Studies in this specialisation cover electrical engineering systems with the emphasis on the big picture rather than the component parts – not as easy as it sounds as in-depth knowledge of all the parts is essential in order to be able to reject those that do not affect the whole. There are many possible routes to go after studying this specialisation – working with industrial systems in some form or with research.