



The Faculty of Engineering and Sustainable Development

Programme Syllabus

For

Study Programme in Automation Engineering, 180 HE credits
Automationsingenjör, Co-op, 180 hp

Programme code:	TGAIY
Specialisation code:	
Level:	First cycle
Valid from:	The autumn semester of 2012
Established:	2011-11-16
Latest revised:	
Diary Number:	HIG 2011/915
Established by:	The Faculty Board

Entry Requirements

Specific Entry Requirements 8. Mathematics D, Physics B and Chemistry A.

Expected Learning Outcomes

Qualification Descriptor According to the Higher Education Ordinance, Appendix 2

Bachelor of Science in Engineering

Extent

Bachelor of Science in Engineering is achieved when the student has successfully completed required courses of 180 HE credits.

Expected Learning Outcomes

For a Bachelor of Science in Engineering, the student should demonstrate the knowledge and abilities required to work independently as an engineer.

Knowledge and Understanding

For a Bachelor of Science in Engineering, the student should

- demonstrate knowledge of the disciplinary foundation of the chosen technological field and its best practice, and knowledge of current research and development, and
- demonstrate a broad expertise in the chosen field of technology, and relevant knowledge in mathematics and natural sciences.

Skills and Abilities

For a Bachelor of Science in Engineering, the student should

- demonstrate the ability to independently and creatively identify, formulate and handle issues with an overall view, and analyse and evaluate different technical solutions
- demonstrate the ability to plan and with adequate methods, carry out assignments within given frames
- demonstrate the ability to critically and systematically use knowledge, and to model, simulate, predict and evaluate developments based on relevant information
- demonstrate the ability to design and handle products, processes and systems, with consideration to people's conditions and needs and the targets of society for an economically, socially and ecologically sustainable development,
- demonstrate the ability to work in teams and cooperate in groups with different compositions, and
- demonstrate the ability to account for and discuss information, problems and solutions in dialogue with different groups, orally and in writing.

Judgement and Approach

For a Bachelor of Science in Engineering, the student should

- demonstrate the ability to make assessments with consideration to relevant scientific, social and ethical aspects
- demonstrate an understanding of the possibilities and limitations of technology, its role in society and people's responsibility for its use, including social and economic aspects and environmental and working environmental aspects, and
- demonstrate the ability to identify the own need of additional knowledge and to continuously develop the own skills.

Thesis (degree project)

For a Bachelor of Science in Engineering, the student must have successfully completed an individual assignment (degree project) of at least 15 HE credits, within the framework of the required courses.

The Contents and Arrangement of the Programme

The main field of study is electronics with a specialisation in automation

Within the programme, electronics with a specialisation in automation constitutes the technical main field of study.

The basics in electronics with focus on digital control and design are studied during the initial year.

In year two, the basics of programming in automation systems and advanced studies in electronics, control engineering and robotics are included.

In the third year, Applied Electronics and basic courses in mechanical engineering and energy technology are studied, to provide knowledge of the processes in which automation systems function, and specialisation in measurement systems.

Primary Arrangement

In the first year, basic courses in electronics and mathematics are studied.

This foundation is considered necessary in order to begin the first work period. Year two includes in-depth studies in mathematics, electronics and object-oriented programming.

This provides a good basis for more qualified tasks during work period two.

After the second work period, maintenance techniques and total quality management are studied. Before the third work period, applied electronics and hydraulics and pneumatics are studied. This enables the student to work with simple assignments in these fields during the third work period. Before the last work period, introduction to data communication, control engineering, robotics and power engineering are studied. This enables relatively advanced tasks during this work period.

During the last part of the education, energy technology, machine elements, measurement systems and a theory and method course are studied prior to the degree project.

Study visits are made at industrial and manufacturing companies. Themes for group assignments and projects are gathered from companies in the region, and the studies are carried out in close cooperation and often on location at a company.

Cooperative Education, Co-op

The programme may be studied as a traditional higher education resulting in a Bachelor of Science in Engineering after three years, or with Cooperative Education (Co-op), which take four years.

Co-op implies that the student alternates studies and work during the planned work periods.

The co-op positions are limited and the higher education institution cannot guarantee a position at any of the companies linked to the higher education institution, and the company decides if the student's application and interview lead to employment during the education.

Students who do not receive a Co-op position will study for three years instead for four.

The first semester gives further information about what Co-op implies and how to apply for the Co-op positions.

The Co-op students' experiences will be utilised in several of the programme courses.

Each work period should be reported in a written report and an oral presentation.

The first work period must be preceded by studies of at least 45 HE credits within the programme at Högskolan i Gävle, of which at least 30 HE credits must be passed. In order to begin the second, third and fourth work period, courses within the programme of at least 45 HE credits, 60 HE credits and 75 HE credits must be passed.

Courses

The students have guaranteed admission to the courses within the programme.

Course applications for the following semester must be submitted.

Changes in the order of courses may be made in consultation with students in the programme.

Changes in the programme courses are determined by the Faculty Board.

Alternative course choices may be made in consultation with the faculty programme director, provided that the expected learning outcomes for the programme are fulfilled.

F = First-cycle

Study path according to the three-year model

Year 1

Period	Course Name	HE credits	Level	Main Field of Study
1:1	Introduction to Automation	7.5	F	Electronics
1:1	Control Technology and Digital Technology A	7.5	F	Electronics
1:2	Calculus	7.5	F	Mathematics
1:2	Embedded Systems	7.5	F	Electronics
1:3	Linear Algebra	7.5	F	Mathematics
1:3	Electric Circuits	7.5	F	Electronics
1:4	Basic Maintenance Techniques	7.5	F	Mechanical Engineering
1:4	Total Quality Management I	7.5	F	Industrial Management

Year 2

Period	Course Name	HE credits	Level	Main Field of Study
2:1	Applied Differential Equations	7.5	F	Mathematics
2:1	Object-oriented Programming 1	7.5	F	Computer Science
2:2	Transform Methods and Discrete Mathematics	7.5	F	Mathematics
2:2	Fundamental Electronics and Measurement Systems A	7.5	F	Electronics
2:3	Introduction to Data Communications	7.5	F	Computer Science
2:3	Control Engineering	7.5	F	Electronics
2:4	Robotics	7.5	F	Electronics
2:4	Power Engineering	7.5	F	Electronics

Year 3

Period	Course Name	HE credits	Level	Main Field of Study
3:1	Applied Electronics	7.5	F	Electronics
3:1	Hydraulics and Pneumatics	7.5	F	Mechanical Engineering
3:2	Fundamentals in Fluid Mechanics	7.5	F	Energy Technology
3:2	Machine Elements	7.5	F	Mechanical Engineering
3:3	Measurement Systems	7.5	F	Electronics
3:3	Scientific Theory and Writing	7.5	F	Electronics
3:4	Degree Project in Electrical Engineering	15	F	Electronics

Study path according to the Co-op model**Year 1**

Period	Course Name	HE credits	Level	Main Field of Study
1:1	Introduction to Automation	7.5	F	Electronics
1:1	Control Technology and Digital Technology A	7.5	F	Electronics
1:2	Calculus	7.5	F	Mathematics
1:2	Embedded Systems	7.5	F	Electronics
1:3	Linear Algebra	7.5	F	Mathematics
1:3	Electric Circuits	7.5	F	Electronics
1:4	Work Period 10 weeks			

Year 2

Period	Course Name	HE credits	Level	Main Field of Study
2:1	Applied Differential Equations	7.5	F	Mathematics
2:1	Object-oriented Programming 1	7.5	F	Computer Science
2:2	Transform Methods and Discrete Mathematics	7.5	F	Mathematics
2:2	Fundamental Electronics and Measurement Systems A	7.5	F	Electronics
2:3	Work Period 10 weeks			
2:4	Power Engineering	7.5	F	Electronics
2:4	Total Quality Management I	7.5	F	Industrial

Management

Year 3

Period	Course Name	HE credits	Level	Main Field of Study
3:1	Applied Electronics	7.5	F	Electronics
3:1	Hydraulics and Pneumatics	7.5	F	Mechanical Engineering
3:2	Work Period 10 weeks			
3:3	Introduction to Data Communications	7.5	F	Computer Science
3:3	Control Engineering	7.5	F	Electronics
3:4	Robotics	7.5	F	Electronics
3:4	Basic Maintenance Techniques	7.5	F	Mechanical Engineering

Year 4

Period	Course Name	HE credits	Level	Main Field of Study
3:1	Work Period 10 weeks			
3:2	Fundamentals in Fluid Mechanics	7.5	F	Energy Technology
3:2	Machine Elements	7.5	F	Mechanical Engineering
3:3	Measurement Systems	7.5	F	Electronics
3:3	Scientific Theory and Writing	7.5	F	Electronics
3:4	Degree Project in Electrical Engineering	15	F	Electronics

Higher Education Qualification

Those who have successfully completed all programme courses fulfil the requirements for:

Bachelor of Science in Electrical Engineering

Högskoleingenjörsexamen med huvudområdet elektronik.

Student Influence and Evaluation

The council for educational affairs should be linked to the study programme. The faculty programme director should be the chairman and summoner of the council. The purpose of the council for educational affairs is to give students and representatives from the working life/society influence over the study programmes. The programme students should be given the

opportunity to give their opinions about the study programme annually through a programme evaluation.

The programme evaluation should be carried out using the evaluation tool of the higher education institution. A compilation of the results of the evaluation should be submitted to the Faculty Board.

Other

Interim Regulations.

Credit transfers of previous studies are made in consultation with the faculty programme director and the concerned head of department.

Students admitted to the earlier years of the Study Programme in Automation Engineering follow the programme syllabus for that year.

For students admitted to the later part of the programme and for students who have had approved leave from studies, a specific study plan is established by the faculty programme director in consultation with the student, and when necessary with study advisers or the director of studies.