



HÖGSKOLAN I GÄVLE

PROGRAMME SYLLABUS

FIRST CYCLE

STUDY PROGRAMME IN
INDUSTRIAL ENGINEERING AND
MANAGEMENT

Programme code: TGEIY

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Programme Syllabus

**Study Programme in Industrial
Engineering and Management, 180 HE
credits**

(Ekonomiingenjörprogrammet, 180 högskolepoäng)

This programme syllabus applies to students admitted to the autumn semester of 2010 or later.

STUDY PROGRAMME IN INDUSTRIAL ENGINEERING AND MANAGEMENT

at Högskolan i Gävle

1 General Arrangement

The Study Programme in Industrial Engineering and Management combines courses into a Bachelor of Science in Engineering of 180 HE credits. The education provides a specialisation in management control and organisational development, mainly of industrial activities with emphasis on the fields of logistics, total quality management, industrial organisation and industrial environmental economics. The programme contains one year of basic courses, one year of broadening continuation courses and one year of advanced studies. During the education, projects of different size occur and the education ends with a degree project. The projects are carried out in close cooperation with companies.

The programme is based on problem-based learning with project work as the most common working method. During projects, the students will take on the different roles of a project group and thereby learn to cooperate in a project and also between different project groups. Elements of group dynamics give the students understanding of how conflicts may arise and be handled in a project group. Planning, management and documentation of projects are included as a natural part of the different projects. The students are also given an orientation in different tools used for planning and control of projects. The students have access to specific project rooms with computers throughout the programme.

Courses and projects are alternated in the programme. The courses are given both as project and engineering support. Project supporting courses are given in parallel with the projects and are applied in these. Engineering supporting courses provide the engineering range of knowledge used within the education and the future profession as an engineer.

2 Expected Learning Outcomes

2.1 Expected Learning Outcomes for First-cycle Programmes According to the Higher Education Act, Chapter 1, Section 8, and Qualification Descriptor According to the Higher Education Ordinance, Appendix 2

2.1.1 Expected Learning Outcomes for First-cycle Programmes According to the Higher Education Act, Chapter 1, Section 8

First-cycle studies should essentially expand upon the knowledge acquired by pupils in national or specially designed programmes in upper-secondary school, or equivalent knowledge. However, the government may make exemptions concerning programmes in fine, applied and performing arts.

First-cycle studies should develop the students

- ability to make independent and critical assessments,
- ability to independently discern, formulate and solve problems, and
- readiness to address changes in the working life.

Within the field of the education and in addition to knowledge and skills, the students should develop the ability to

- search and evaluate knowledge on an academic level,

- follow the knowledge development, and
- exchange knowledge also with individuals without expertise in the area

2.1.2 Qualification Descriptor According to the Higher Education Ordinance, Appendix 2 Bachelor of Science in Engineering

Extent

A 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 academic basis and best practice of the chosen field of technology, and knowledge of current research and development, and
- demonstrate advanced knowledge 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 and analyse and evaluate different technical solutions with an overall view,
- 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 model, simulate, predict and evaluate developments based on relevant information,
- demonstrate the ability to design and handle products, processes and systems with consideration to the conditions and needs of people and the goals of society for economically, socially and ecologically sustainable development,
- demonstrate the ability to work in teams and cooperate in different kinds of groups, 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 considering relevant scientific, social and ethical aspects,
- show 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 environment 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 should have successfully completed an individual assignment (degree project) of at least 15 HE credits, within the framework of the course requirements.

Other

For a Bachelor of Science in Engineering, the specific requirements of each individual higher education institution, within the framework of the requirements, should apply in this qualification descriptor.

2.2 Specific Expected Learning Outcomes for the Programme

After the education, the student should have knowledge and skills in both the technical and economical fields, for activities mainly within fields outside the industry:

- Logistics
- Total quality management
- Industrial organisation
- Industrial environmental economics

The Study Programme in Industrial Engineering and Management should be of high standard, and the higher education qualification should be attractive also on the international market.

Knowledge and Understanding

For a Bachelor of Science in Engineering, the student should

- demonstrate knowledge within logistics, total quality management, industrial organisation and industrial environmental economics, and understand how these interact
- be able to present results orally and in writing
- be able to define and explain central concepts concerning project work and project management, and be able to account for different roles in a project group
- understand the relationship between planning, organisation and follow-up of a project
- interact with other members of a project group and actively contribute to the work of the group, and understand the different stages of the process in a project and how these interact over time

Skills and Abilities

For a Bachelor of Science in Engineering, the student should

- be able to utilise modern information technology
- be able to carry out engineering calculations in the applications of the technology field
- demonstrate knowledge of business economic theory in regards to investment and cost calculation
- demonstrate the ability to apply the economic and technical knowledge in exercises, project work and degree projects, where also environmental aspects should be observed
- demonstrate the ability to methodologically identify and solve problems through extensive information collection, analysis, design of alternative solutions, evaluation and implementation

- be able to plan a project based on given specifications
- demonstrate the ability to make assessments of the suitability of different tools for control and quality assurance of projects
- in the capacity of project manager, delegate the responsibility to the other project members, and be able to discover and handle potential conflicts in a project group
- be aware of the importance of the different roles in a project group
- demonstrate the ability to assess the status of a project and its possibility of target achievement
- observe the dynamics of the group and act when problems arise

Judgement and Approach

For a Bachelor of Science in Engineering, the student should

- demonstrate the ability to formulate search questions and retrieve information from relevant sources
- demonstrate the ability to interpret and write references
- be able to account for the difference between academic material and other types of material
- be able to follow the knowledge development in the own subject area
- be familiar with the forms of academic communication and publication
- demonstrate the ability to review, analyse and evaluate both the search process and the search results
- demonstrate the ability to present criteria for evaluation of sources of information and application of these.

3 Description of the Programme

3.1 Main Field of Study and Programme-specific Courses

3.1.1 The Main Field of Study of Industrial Management

Within the programme, industrial management constitutes the main field of study. The basics of industrial management are studied in the initial project semester and during the second semester, in the courses Fundamentals of Logistics and Total Quality Management. The second year includes advanced courses in industrial management and a major project course. In the courses Manufacturing Logistics and Business Logistics - Physical Distribution, a company's organisation for efficient management and control and examples of different companies' logistics solutions are studied. In the project course Concurrent Engineering, previous studies are applied by the project groups being assigned themes for the projects retrieved from companies.

The third year includes advanced studies in total quality management and simulation technique, which is applied in the project course Industrial Systems. The courses Innovation Management and Logistics and Supply Chain Management focus on management of businesses and provide knowledge needed for the degree project. The programme ends with a degree project. The degree project may be carried out in concentrated form at the end of the education, or initiated at the beginning of the last semester. In the latter case, a connection and continuation may be made with the project course Industrial Systems. Through the degree project, knowledge acquired during previous studies should be applied, broadened and advanced. Through the degree project, the student should show that the goals for first-cycle programmes stated in the Higher Education Act, the goals for

engineering stated in the Higher Education Ordinance and the specific goals stated in this programme syllabus have been achieved.

3.1.2 Project Courses

Within the programme, three major project courses with clear progression are carried out. In the first semester of the first year, the courses Project methodology, Management Accounting and Control, Industrial Management and Environmental Issues are studied in parallel with the project course Product Development and Production Systems. These courses are integrated with emphasis on basic project methodology, presentation and communication technique and introduction to the chosen technical main field of study. Study visits are made at industrial companies. During the fourth semester, the project course Concurrent Engineering is carried out, to which the project themes are retrieved from companies in the region, and the studies are carried out in close cooperation and often in a business environment. The chosen themes provide the basis for both independent work in the project groups and for presentations at seminars and in discussions. During the fifth semester, the project course Industrial Systems is carried out, where the project assignments are retrieved from companies and the work of the project groups is characterised by a high degree of independence. Supervision is carried out both by teachers from the higher education institution and by concerned companies. The projects are presented at seminars, where the project-initiating companies are represented.

3.1.3 Engineering Support and Project Support Courses

The engineering support courses consist of courses in linear algebra, calculus, industrial management, electronics and energy technology. The project support courses are studied in parallel with the major project courses, which are applied in the projects.

3.2 Teaching and Examination

3.2.1 Teaching

The educational view is based on the fact that all learning is an active dynamic process that takes place in collaboration between teachers and students. All teaching and supervision should be based on the fact that the student takes responsibility for the own studies and for active knowledge acquisition. The learning implies that the theoretical and practical elements of the courses should be integrated as useful knowledge and skills in each individual. In that way, the student is given the opportunity of personal development, which is of great importance for the future profession and a lifelong learning. The student should also be prepared to address changes and acquire the ability to review the own knowledge in order to actively participate in development and evaluation of the profession. Different teaching and working methods should teach the student to actively seek knowledge, critical thinking and reflection, practice expressing oneself in speech and writing and using scientific literature.

Within the education, the ability to work in project form is practiced. In the initial joint semester, the students acquire the necessary knowledge of carrying out a project. The students will take on different roles and also try the role as project manager. The different projects are carried out with clear progression. Each project includes clear goals for what knowledge the student should acquire. Through examination of the projects, the level of knowledge is assessed, both in the group and individually. Later in the education, a larger part of problem-based learning

within certain frames is allowed.

The scheduled teaching is given in the form of lectures, teaching sessions, laboratory sessions, project work and seminars. Part of the teaching is carried out as group work. Attendance is compulsory at certain teaching parts. Apart from the scheduled teaching, self-studies occur. The teaching is mainly given in Swedish but lectures in English and English course literature may occur.

The progression of the education is carried out through a gradual specialisation in the chosen field of technology, both through in-depth subject studies and development of the scientific approach, and through improved skills regarding the engineering profession. Within the technical main field of study, progression is carried out through a broadening of the knowledge in the project courses and through other courses in energy technology and mechanical engineering. The engineering supporting courses provide additional broadening.

3.2.2 Examination

In the courses of the programme, varying forms of examination are applied, such as traditional exams, take-home examination, active participation in seminars with both presentations and public discussions, written assignments etc.

3.3 Placement

Placement at workplaces which give an insight in and preparation for the future profession is recommended. The main purpose of the placement is to give an insight in the working conditions of the future engineers. Placement certificate with clear information about the specifics of the work and duration is submitted to the faculty programme director for approval. Apart from the placement, different forms of cooperation with companies in the region occur in parts of the teaching. These parts may be carried out on campus and at the company. The higher education institution does not provide placements.

3.4 Student Influence

The programme has a council for educational affairs, which consists of representatives from the working life, teachers and students. The council for educational affairs is advisory. Gefle Student Union appoints student representatives. There are student representatives in the board of governors, the faculty boards and the department boards.

3.5 Internationalisation

In the area of industrial management, there are possibilities for international student exchange. Högskolan i Gävle currently has exchanges with the University of Glamorgan in Wales's and Fachhochschule Offenburg in Germany within the framework of Erasmus/Socrates, Guizhou University, Guiyang in China within the framework of Linneus Palme and the University of Wollongong in Australia. It is possible to take courses and carry out degree projects abroad.

In the same way that students from HiG study abroad, Högskolan i Gävle may receive exchange students from the higher education institutions above.

As a part of the internationalisation, we receive teachers from other countries for

teaching in the area of Industrial Management. Parts of certain courses are given in English. In year 3, certain courses are given completely in English if there are exchange students in the student groups. Both English and Swedish course literature are used in the programme.

Appropriate semesters to study abroad in the programme are semesters 5 and 6. Assessment and credit transfer of courses studied abroad is made by the responsible for internationalisation at the Faculty of Engineering and Sustainable Development at Högskolan i Gävle.

Regarding research in the department, today there is an established cooperation between the University of Wollongong and Guizhou University, Guiyang in China.

3.6 Technology and Society

An important starting point for the education is that an engineer must be able to view new technology from a social perspective. The engineer needs knowledge of and skills in managing products, processes and working environment with consideration to the conditions and needs of people, and to the goals of society concerning social relations, resource management, environment and economics. After the education, the student should be able to consider human-science and environmental requirements in problem-solving and product development, and have the qualifications to promote environmental friendly technology. Working methods teaching these abilities are therefore important elements of the education.

4 Courses in the Programme

The students have guaranteed admission to the courses in the programme. Course applications to the following semester should be submitted. Changes in the order of the courses may be done in consultation with in the programme-active students. Changes in the courses included in the programme are determined by the faculty board. Change of period when the course is given is determined on department level. Alternative choice of courses may be made in consultation with the faculty programme director, provided that the expected learning outcomes of the programme will be fulfilled.

F = First Cycle

Year 1

Period	Course Name	HE credits	Level	Main Field of Study
1:1	Project Methodology	5	F	Industrial Management
1:2	Total Management Control	5	F	Industrial Management
1:1-1:2	Product Development and Production Systems	20	F	Mechanical Engineering
1:3-1:4	Mathematics for Engineers	15	F	Mathematics
1:3	Fundamentals of Logistics	7.5	F	Industrial Management
1:4	Total Quality Management	7.5	F	Industrial Management

Year 2

Period	Course Name	HE credits	Level	Main Field of Study
2:1	Data Analysis and Statistics for Engineering	7.5	F	Mathematical Statistics
2:1	Manufacturing Logistics	7.5	F	Industrial Management
2:2	Management			Accounting and

	Analysis	7.5	F	Business Administration
2:2	Business Logistics - Physical Distribution	7.5	F	Industrial Management
2:3-2:4	Concurrent Engineering	15	F	Industrial Management
2:3	Financial Accounting	7.5	F	Business Administration
2:4	Material Science and Manufacturing Processes	7.5	F	Mechanical Engineering

Year 3

Period	Course Name	HE credits	Level	Main Field of Study
3:1-3:2	Industrial Systems	15	F	Industrial Management
3:1	Reliability Engineering	7.5	F	Industrial Management
3:2	Simulation Techniques in Logistics	7.5	F	Industrial Management
3:3	Innovation Management	7.5	F	Industrial Management
	Scientific Methodology	7.5	F	Industrial Management
3:3	Logistics and Supply Chain Management	7.5	F	Industrial Management
3:4	Degree Project	15	F	Industrial Management

5 Entry Requirements

General entry requirements and specific entry requirements 8, e g the following specific entry requirements:

Subject	Course
Mathematics	Ma D
Physics	Fy B
Chemistry	Ke A

The grade for each of the above subjects must be at least Pass.

6 Grades

Grades are given for courses included in the programme, according to the current course syllabus.

7 Examination Regulations

7.1 Title of Qualification

Degree of Bachelor of Science in Industrial Engineering and Management.
Högskoleingenjörsexamen.

7.2 Qualification Criteria

To receive a certificate of Bachelor of Science in Engineering in the technical main field of industrial economy, the student must have successfully completed courses of 180 HE credits. Higher education qualification should include at least 15 HE credits in mathematics, at least 90 HE credits with gradual progression in the technical main field of industrial economy including a degree project of 15 HE credits and 30 HE credits in other technical courses. Remaining space is used for broadening and/or advanced studies in the technical main field of study, other technical courses and engineering supporting courses in the area.

To fulfil the qualification requirements for Bachelor of Science, students on the Study Programme in Industrial Engineering and Management must supplement with e g studies in mathematics. Individual study plans may be established by faculty programme directors.

7.3 Degree Certificates

Students who fulfil the requirements for higher education qualification should receive degree certificates on request. For each degree certificate, a diploma supplement describing the education and its place in the education system should be included (The Higher Education Ordinance chapter 6, section 15). The appendix is called Diploma Supplement. Diploma Supplement should facilitate recognition and credit transfer of a Swedish higher education qualification in employment and continued studies abroad, but also in Sweden.

8 Further Instructions

Interim Regulations.

Students admitted to the earlier years of the Study Programme in Industrial Engineering and Management follow the concerned programme syllabus.

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 study advisers.