



Programme syllabus

[An accessible version of the syllabus can be found in the Course and programme directory.](#)

Degree Programme in Constructional Engineering and Design 180 credits

Högskoleingenjörsutbildning i byggt teknik och design

Valid for students admitted to the education from autumn 16 (HT - Autumn term; VT - Spring term).

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

Programme objectives

The information applies to students who started their studies in the academic year 2016-2017. Changes to the content of the Programme may be made for years 2 and 3. Always refer to the KTH website for information on the latest approved syllabus.

The Degree Programme in Constructional Engineering and Design provides training for work within the field of construction, such as planning, production and/or property development/management.

The programme will provide the student with the basic skills within the subject field and good orientation within leading aspects such as: planning, production and property development /management of buildings and constructions. Great emphasis is placed on providing insights through subject integration and links to finance and law. The programme also aims to make the student

aware of sustainable construction, how construction affects society, with focus on the needs and expectations of the people; the importance of sustainable construction and society's targets regarding resource efficiency, finance and environment.

In order to follow the increasingly rapid technological developments and the changes they bring, the student should acquire the ability to place themselves in the new technological areas and is provided with a good basis for continued personal development through “life-long learning” in both this and new subject fields.

Knowledge and understanding

Upon completion of the programme, the student shall:

- • have the ability to apply basic knowledge within scientific subjects such as mathematics and mechanics
- be able to put fundamental, industry-specific knowledge into practice within areas such as constructional engineering, structural design in civil engineering, production and computer-based engineering tools such as CAD and other prevalent computer programmes within BIM
- have knowledge of Swedish construction and environmental legislation, such as the Building and Planning Act, specified building standards, energy legislation, work environment legislation and procurement forms
- have knowledge of the actors and work forms of the construction sector;
- possess basic knowledge of construction logistics and industrial construction.

Skills and abilities

Upon completion of the programme, the student shall:

- • have the ability in planning to understand the connection between structural design in civil engineering, building services engineering and architecture (understanding the work of the constructor and the architect)
- be able to independently solve commonly occurring technical problems within the building technology fields
- have proficiency in business economics, logistics, industrial construction and organisation
- have written and spoken proficiency in Swedish, as well as the ability to effectively work in projects
- have the opportunity to apply to the latter part of the degree programme in Built Environment and Society (300 credits) and the Master's Programme (120 credits).

Ability to make judgements and adopt a standpoint

Upon completion of the programme, the student shall:

- • have awareness of how construction affects society, with focus on the needs and expectations of the people; the importance of sustainable construction and society's targets regarding resource efficiency, finance and environment
- have awareness of the importance of sustainable construction
- have knowledge of the effects operations have on people and the environment.

Extent and content of the programme

The programme is 180 credits at first-cycle level, beginning in the Autumn Term. The nominal study period is 3 years and the language of instruction is Swedish.

Eligibility and selection

In accordance with the Higher Education Ordinance, basic eligibility is required for eligibility for KTH's programmes at first/second cycle.

There are additional specific entry requirements/field-specific entry requirements for the programme, as follows: Mathematics 3c, Physics 2, Chemistry 1. A pass mark or grade E is required as a minimum in each of the subjects.

Selection based on grades is applied to two-thirds of the places -Selection based on the Swedish Scholastic Aptitude Test is applied to one-third of the places.

For entry requirements and selection principles, see the KTH admission regulations.

Selection

Selection will take place if the number of applicants exceeds the number of available places. The selection process is based on grades and a combined evaluation of completed courses within the programme's main areas.

For other eligibility requirements and selection principles refer to KTH's admission regulations in KTH's regulatory framework.

Implementation of the education

Structure of the education

The academic year covers 40 weeks and 60 credits. It is divided into two terms, autumn and spring. Each term covers two study periods.

For information about the academic year's scope, examination and re-examination periods, refer to <http://www.kth.se/student/schema>.

To help give the student insight into the links between the programme's goals and the industry, there is a focus on cooperation between courses and between different years in the same programme. A number of educational field trips are included, and take place in a logical order. The programme is completed in the final term with a degree project, often carried out with a client in the industrial sector.

For a detailed layout of the academic year, see the Student Web.

First Year

The first term begins with you studying the course Technical Work, Methods and Tools and Building Technology. This provides you with an overview of the constructional engineering field and an insight into what work as an engineer entails. You will read about group dynamics, presentation techniques and what project-oriented work deals with.

You will be given a good introduction to CAD supported drawing techniques over two modules. In your first year, you will obtain basic knowledge within building technology, sustainable building, building physics, engineering materials and structural mechanics. You will read about the properties of various building materials and how they are affected by heat, moisture and air. You will carry out calculations for heat and moisture transfer, in addition to the energy needs of buildings. The Structural Mechanics course will help you to understand the link between the inner and outer forces' effect on the magnitude of materials. You will also learn how to analyse the effects of different loads on joists.

In the first year, you will study both Mathematics 1 and 2. The courses will consolidate your mathematical knowledge from previous studies, but will also enhance your knowledge within algebra and analysis. Other areas covered are linear equation systems, matrices, determinants, derivatives and integrals. You will understand the range of applications within the engineering profession.

Over the summer term, you also take a course in Surveying and Mathematical Statistics. In this course, you will learn how to use the methods for measurements and land surveying, as well as how to use the most common measuring instruments. After the course, you will be able to interpret coordinates from drawings and calculate data from these. Additionally, you will also learn how GPS works and how to use some of the calculation programmes that exist.

Second Year

To be able to work professionally within the construction field, you must be aware of how the construction process works, the roles of different actors and their work tasks, which aids are used for planning and production, how a procurement works and what demands are put forward by society. You must also be aware of juridical contract decisions and what is applicable in the event of a dispute. You will learn this in the Building Process course.

In the Building Logistics course, you will learn about the different logistics systems for optimisation in planning, production and maintenance.

You will also learn about environmental and work science and legislation surrounding this. You will acquire an overall perspective of environmental work, environmental effects and various environmental techniques for sustainable building. You will also learn how to prevent workplace injury and actively participate in workplace environment management in your future workplace. These two courses include a project in which the project group will investigate the answers out on a building site.

In the Building Logistics course, you will learn how to use the different logistics models and tools that are used within the construction industry's supply chain. The course highlights the basic economic concepts, the relationship between project planning, building site planning and supply chain planning, in addition to exercises carried out with IT-based planning systems.

In the Economics and Organization course, you will obtain an understanding of company finances, organisation and surroundings. Some additional concepts addressed include business ideas, company culture, marketing and accounting.

In the second year, there is a course in Fluid Mechanics which deals with the fluid mechanics of water and air. Some areas also covered include dimensioning methods, design methods for hydraulic engineering, air flow and energy management in buildings, as well as measuring techniques and calculation methods. How do you build houses that will last? You will learn this and more when you take the Structural Design in Civil Engineering course. You will learn the general rules and loads common to load-bearing constructions and how to plan and dimension simple constructions made of concrete, timber and steel. During the spring term, you will also take the Urban Planning course, which covers the home and urban planning process, development/planning of housing, premises in and planning of roads, water supply and sanitation. A project is included in the course, in which the group designs a housing area with infrastructure in an environmentally sustainable manner. Areas explored include the Swedish Building and Planning Act, the Swedish Environmental Code, detailed plans, living environments and housing planning, as well as community water supply and waste management.

In addition, you will take a course in geology and geotechnics in which you will learn about ground conditions for the choice of foundation method. You will learn about soil and rock types in Sweden, their composition and technical properties. You will become familiar with the most common field and laboratory investigation methods, in addition to various calculation models.

You will also take a course in Building Information Modeling (BIM), which will provide you with knowledge about modern planning techniques and competence in planning using CAD tools – in both 2D and 3D.

Third Year

In the final year, you are able to specialise in the subject areas in demand within industry. Everyone studies the courses Structure and Design, an advanced BIM course and a course in coordination.

You can choose from five different specialisations/course blocks from the following areas:

- Building, Planning and Design (HUPK)
- Production/Construction Management and Design
- Structures
- Property Development and Installation Coordination
- Architecture for Construction Engineers

The relevant specialisation descriptions are provided in Appendix 2.

The programme concludes with a 15 credit degree project.

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.

Information regarding the grading scale is available in the course plan.

Conditions for participation in the programme

Semester registration/Course registration

Prior to each new term, it is necessary for students to register for courses and the term for participation in studies at KTH.

Before the first term, students are automatically registered for the term, in connection with initial enrolment.

Prior to terms 2-6, students register themselves online in the personal menu by logging in to the website.

Registration is necessary for reporting of the results and is a prerequisite for granted student aid to be paid by CSN.

From the second semester, all programme students make course applications via www.antagning.se and register on the courses in the personal menu.

Terms and conditions for advancing

For studies in the second year, a minimum of 37.5 credits from the first year must be completed, before second year may begin. For those students who do not meet this requirement, an individual study plan will be devised in consultation with a study advisor.

For studies in the third year, a minimum of 90 credits from the first and second years must be completed, before the third year may begin. For those students who do not meet this requirement, an individual study plan will be devised in consultation with a study advisor.

Recognition of previous academic studies

Students have the opportunity to apply for credit transfer of results from courses at another higher education institution/university within or outside the country. The entire KTH policy for credit transfer is included in KTH's regulatory framework, www.kth.se.

For more information, refer to the Programme's study advisory service.

Studies abroad

There is the option of student exchange during the Programme within the framework of existing agreements.

For more information and recommendations of appropriate term for studies abroad, refer to the Programme's international administrator.

Degree project

A degree project is included in the programme, with in-depth studies for the specialisation chosen equating to 15 credits. This is a total of 10 weeks full-time study. Further information: Guidelines for degree projects, School of Architecture and the Built Environment

The following applies to the degree project:

- The degree project not begin until a minimum of 120 credits have been achieved and final grades have been awarded courses relevant to the project's contents, of which 60 credits are successive specialisation in the field of technology.
- It may begin once the task has been approved by examiners.
- It is based upon the knowledge acquired throughout the period of study and shall usually be completed during the sixth term.
- It is to consist of a display of independent work, comprising theoretical and/or experimental activities, with an accompanying written report and oral presentation.
- It shall be connected to issues from industry, authorities or researching institutions.
- It shall have an academic supervisor appointed by the degree project coordinator; an examiner and an external supervisor from the industry suggested by the student.
- Shall be jointly completed by two students.

The syllabus contains information on the grading scale for degree projects.

More information regarding the degree project for construction engineering can be found in the KTH regulations.

Degree

Conditions for 180-credit degree

To be awarded the degree of Construction Engineering and Design, a passing grade is required in all courses included in the student's study plan. The student follows the study plan, which is made up of compulsory courses and elective courses (subject to conditions) and a degree project within the chosen specialisation.

The degree is titled, "Högskoleingenjörsexamen/Degree of Bachelor of Science in Engineering"

The degree certificate specifies the degree programme completed by the student.

The Degree of Bachelor of Science in Engineering is obtained once the degree programme with courses totalling 180 credits has been completed. The programme is structured so upon completion of the degree, the student meets the national qualification requirements, of which

- mathematical/scientific subjects of a minimum 25 credits and an additional minimum of 90 credits (incl. 15 credit degree project) in the subjects central to Constructional Engineering and Design.

The degree programme will provide the students with complementary technological knowledge within the programme, in accordance with the national qualifications ordinance and the targets specific to the degree programme.

Courses in which the content overlaps another course/courses in the programme cannot be included in the 180 credits which form the basis of the degree.

Application for the degree certificate is made through the online service in the personal menu on KTH's website.

More information about the degree can be found in the KTH regulations, www.kth.se

Appendix 1 - Course list

Appendix 2 - Specialisation descriptions

Appendix 1 - Course list

Appendix 2 - Programme syllabus descriptions



Appendix 1: Course list

Degree Programme in Constructional Engineering and Design (TIBYH)

General courses

Year 1

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
AF1710	Building Technology 1, Constructional Engineering and Design	7.5 hp	First cycle
AF1711	Building Technology 2, Building Physics and Materials	7.5 hp	First cycle
AF1717	Technical Work, Methods and Tools	7.5 hp	First cycle
HF1004	Mathematics and Statistics	7.5 hp	First cycle
HF1903	Mathematics 1	7.5 hp	First cycle
HS1003	Structural Mechanics 1	7.5 hp	First cycle
HS1004	Structural Mechanics 2	7.5 hp	First cycle
HS1005	Surveying and Mathematical Statistics	7.5 hp	First cycle

Optional courses

Code	Name	Credits	Edu. level
HF0009	Introduction to Mathematics	1.5 fup	Pre-university level
HF0017	Introduction to Computer Studies	1.5 fup	Pre-university level

Year 2

Mandatory courses (60.0 Credits)

Code	Name	Credits	Edu. level
AF1721	Environmental Science and Work Science	5.0 hp	First cycle
AF1722	The Building Process	5.0 hp	First cycle
AF1723	Building Logistics and Risk Management	5.0 hp	First cycle
AF1730	Building Information Modeling	7.5 hp	First cycle
AF1740	Economics, calculation and organization	7.5 hp	First cycle
HS1007	Fluid Mechanics	7.5 hp	First cycle
HS1008	Structural Design in Civil Engineering	7.5 hp	First cycle
HS1009	Urban Planning	7.5 hp	First cycle
HS1029	Geology and Soil Mechanics	7.5 hp	First cycle

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
AF2720	BIM2, Design, Installation and Integrated Planning <i>Mandatory for all students in TIBYH</i>	7.5 hp	Second cycle
HS1001	Structure and Design <i>Mandatory for all students in TIBYH</i>	7.5 hp	First cycle

Supplementary information

HS1001 and AF2720 are Mandatory courses for all students in TIBYH.

Architecture for Construction Engineers (ABYI)

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
AF1714	Indoor Surveying <i>Mandatory for (abyi) och (fuis)</i>	7.5 hp	First cycle
AF1716	Architecture and Building Techniques <i>Mandatory for (abyi)</i>	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AF1715	Architecture, the Sketch Process	7.5 hp	First cycle
AF1728	The Sketch Process, Lightdesign and Acoustics	7.5 hp	First cycle
AF173X	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
AF177X	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
AF179X	Degree Project in Constructional Engineering and Design, First Cycle	15.0 hp	First cycle
HS1013	Building Services and Energy	7.5 hp	First cycle
HS1020	Moisture Related Damages	7.5 hp	First cycle
HS1735	Project Building and Installations	7.5 hp	First cycle

Construction (ANL)

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
HS1014	Design of Civil Engineering Constructions <i>Mandatory for (anl) and (hupk)</i>	7.5 hp	First cycle
HS1015	Construction Management <i>Mandatory for (anl) and (pbeo)</i>	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AF1729	Structural Design of a House Project and/or a Infra Structural Project	7.5 hp	First cycle
AF175X	Degree Project in Structural Engineering, First Cycle	15.0 hp	First cycle
AF176X	Degree Project in Facilities for Infrastructure, First Cycle	15.0 hp	First cycle
AF177X	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
AF178X	Degree Project in Civil Engineering Management, First Cycle	15.0 hp	First cycle
AH1907	Installation .1 Road, Railways and Wastewater Networks	7.5 hp	First cycle
AH1908	Installation 2. Construction, Management and Maintenance of Roads and Railways	7.5 hp	First cycle
HS1013	Building Services and Energy	7.5 hp	First cycle
HS1018	Water Resources Engineering with GIS	7.5 hp	First cycle
HS1020	Moisture Related Damages	7.5 hp	First cycle

Property Development and Installation Coordination (FUIS)

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
AF1714	Indoor Surveying <i>Mandatory for (abyi) and (fuis)</i>	7.5 hp	First cycle
AF1727	Development of Residential Buildings. Renovation, Rebuilding and Extension <i>Mandatory for (fuis) and (pbeo)</i>	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AF1728	The Sketch Process, Lightdesign and Acoustics	7.5 hp	First cycle
AF173X	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
AF174X	Degree Project in Building Services Engineering and Energy, First Cycle	15.0 hp	First cycle
AF177X	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
AI1147	Real Estate Valuation	7.5 hp	First cycle
HS1013	Building Services and Energy	7.5 hp	First cycle
HS1020	Moisture Related Damages	7.5 hp	First cycle
HS1735	Project Building and Installations	7.5 hp	First cycle

Building, Planning and Design (HUPK)

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
HS1014	Design of Civil Engineering Constructions <i>Mandatory for (anl) and (hupk)</i>	7.5 hp	First cycle
HS1021	Steel- and Timber Structures <i>Mandatory for (hupk)</i>	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AF1024	Structural Analysis with Finite Element Methods (FEM)	7.5 hp	First cycle
AF1729	Structural Design of a House Project and/or a Infra Structural Project	7.5 hp	First cycle
AF175X	Degree Project in Structural Engineering, First Cycle	15.0 hp	First cycle
AF176X	Degree Project in Facilities for Infrastructure, First Cycle	15.0 hp	First cycle
AF177X	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
HS1013	Building Services and Energy	7.5 hp	First cycle
HS1020	Moisture Related Damages	7.5 hp	First cycle
HS1735	Project Building and Installations	7.5 hp	First cycle

Supplementary information

AF1024 Strukturanalys med finita elementmetoder (FEM) är new from H16

Production / Construction Management and Economics (PBE0)

Year 3

Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
AF1727	Development of Residential Buildings. Renovation, Rebuilding and Extension <i>Mandatory for (fuis) and (pbeo)</i>	7.5 hp	First cycle
HS1015	Construction Management <i>Mandatory for (anl) and (pbeo)</i>	7.5 hp	First cycle

Conditionally elective courses

Code	Name	Credits	Edu. level
AF173X	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
AF177X	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
AF178X	Degree Project in Civil Engineering Management, First Cycle	15.0 hp	First cycle
AH1907	Installation .1 Road, Railways and Wastewater Networks	7.5 hp	First cycle
AH1908	Installation 2. Construction, Management and Maintenance of Roads and Railways	7.5 hp	First cycle
HS1013	Building Services and Energy	7.5 hp	First cycle
HS1019	Planning of a Construction Project	7.5 hp	First cycle
HS1020	Moisture Related Damages	7.5 hp	First cycle
HS1735	Project Building and Installations	7.5 hp	First cycle



Appendix 2: Specialisations

Degree Programme in Constructional Engineering and Design (TIBYH)

Architecture for Construction Engineers (ABYI)

The Architecture for Construction Engineers specialisation will give you an understanding of the working methods and tools used by architects. Courses give you insight into planning issues, design, construction details, and you will work more closely with CAD and BIM. You will learn to create property documents containing key data for measurement techniques. You will also have the opportunity to take a lighting and acoustics course, a project course that covers lighting in a building that contains various activities.

Construction (ANL)

The Construction Works specialisation will give you specialised knowledge in several key areas in civil engineering. The development of infrastructure in society results in very large construction works such as roads, bridges, tunnels, docks, and water and sewage systems. The construction works include new productions, repairs, and maintenance on existing works. You will gain specialised knowledge in planning for buildings, construction works, roads, railroads, water supply and sewage, as well as the importance of creating operation and maintenance plans.

Property Development and Installation Coordination (FUIS)

The Property Development and Installation Coordination specialisation gives students more in-depth knowledge in how to increase the function, life length, and economic value of properties. Both economic and technical knowledge as well as awareness of customer needs are required to successfully manage and develop properties. The real estate sector is constantly undergoing major interesting changes. Knowledge in the importance of coordination of integrated subjects for project

modelling (BIM) is required for all property development projects. For new productions and renovations, reconstructions and extensions (ROT), room investments and installations are generally the largest investments. You will learn the importance of coordination and integration.

Building, Planning and Design (HUPK)

Specialisation Building, Planning and Design provides specialised knowledge of planning for buildings and construction works. You expand your knowledge of design of constructions that use steel, wood and concrete. The specialisation concludes with a planning course, in which students plan, calculate, and draw the structure of a building or civil engineering construction.

Production / Construction Management and Economics (PBEO)

In the Production, Construction Management and Economics specialisation, students study courses in production, production management, logistics, leadership, and quality assurance for constructional and civil engineering constructions. You will have an assignment to plan various construction and infrastructure projects, taking into account various construction and production methods.