



# 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 15 (HT - Autumn term; VT - Spring term).*

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

### Programme objectives

This information applies to students beginning their first year in the academic year 2015-2016.

Changes to the programme contents may be made for years 2 and 3.

Always see KTH's website for the most recent programme syllabus.

The Bachelor of Science in Construction Engineering and design degree programme provides the student the necessary education to work within the construction sector in roles such as project management, production or administration.

The programme will provide the student with fundamental knowledge of the subject area and a good awareness of central components such as project management, production, and management and administration of buildings and construction works. In addition, the programme aims to raise the student's awareness of the effects of construction on society with regards to human needs and limitations, and about society's goals for resource sustainability, economy and environment.

In order to follow the increasingly rapid technical developments and the changes they bring, the student should have the ability to delve into new technical areas and already be well grounded in ongoing personal development as a "life-long learner", both within their main field as well as new subject areas.

## Knowledge and understanding

*Upon completion of the programme, the student shall:*

- Have the ability to apply basic knowledge from natural science fields such as mathematics and mechanics
- Be able to apply fundamental specialist knowledge within such areas as constructional engineering, structural engineering, production, and computer-based engineering tools such as CAD
- Be aware of Swedish construction and environmental legislation, including planning and construction regulations, construction standards, energy regulations, the Occupational Safety and Health Act, and types of procurements
- Know about the players in the construction industry and their working methods
- Demonstrate basic knowledge of industrial construction

## Skills and abilities

*Upon completion of the programme, the student shall:*

- Be able to understand the connection in planning between structural engineering, building services engineering, and architecture (understand the roles of the designer and architect)
- Be able to independently solve common technical problems within constructional engineering
- Be proficient in communicating verbally and in writing, in Swedish, as well as the ability to work effectively in projects

## Ability to make judgements and adopt a standpoint

*Upon completion of the programme, the student shall:*

- Be aware of how construction affects society with respect to human needs and limitations, and society's goals for resource sustainability, economy and environment

- Be aware of the impact of the work on people and the environment

## Extent and content of the programme

The program of 180 credits is located on the first level with a fall start. Nominal study period is 3 years and the language of instruction is in Swedish.

## Eligibility and selection

To be eligible for KTH courses at undergraduate/ graduate level basic eligibility is required, in according to the Higher Education Ordinance.

In addition the following specific entrance requirements for admission to the program: Mathematics D, Physics B, Chemistry A. A minimum grade for each subject of Pass or 3 is required.

For admission criteria see KTH's admission regulations.

### **Selection**

If the number of applicants should exceed the number of available places, a selection process will be conducted. The selection process is based on the grade and a total valuation of completed courses in the relevant education subject area.

For eligibility requirements and selection criteria, please refer to KTH regulations.

## Implementation of the education

### Structure of the education

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

For information about the structure of the academic year, examination and re-examination periods, visit KTH's website.

To provide insight for the student into the goals of the study programme as they relate to business life, cooperation between courses, between students in the same study year, and between students in different study years is emphasized. Several study visits are included, in a logical pedagogical order. In the last term, the study programme concludes with a degree project, most often performed for an external client from the industry sector.

For more details about the schedule for each term, see the Student Website.

## Study year 1

The first term begins with the “Technical Work, Methods and Tools” course. This course offers an introduction to construction engineering and a first glimpse of what it means to work as an engineer. You will study group dynamics, presentation techniques, and project-oriented work methods.

Two course modules also provide a good introduction to CAT-supported drafting techniques. In your first year, you will gain basic knowledge of building construction techniques, sustainable construction, building physics, materials science, and structural mechanics. You will study the various properties of construction materials and how these are affected by heat, moisture and air. You will also calculate heat and moisture transfer and energy requirements in buildings. The study of structural mechanics assist students in understanding the correlation between the effects of external and internal forces on material properties. You will also analyse the effects of various loads on beams.

Study year 1 covers both Mathematics 1 and 2. These courses are intended to cement your mathematical knowledge from previous studies, as well as build onto your knowledge of algebra and analysis. Other areas covered include linear systems of equations, matrices, determinants, derivatives and integrals. You will understand how engineers apply mathematics.

During the spring term, you will also study surveying techniques and mathematical statistics. This course includes methods for measuring and staking out, as well as how to handle the most common measurement equipment. Upon completion of the course, you should be able to interpret coordinates from drawings and use these to calculate data.

In addition, you will learn how GPS works, and how to use some existing calculation software.

## Study year 2

To work professionally within the construction industry, it is important to understand how the construction process works, the roles and working tasks of the various players, which planning and production aids exist, how procurement works, and the requirements from society. You should also be aware of legal contractual requirements and what applies in case of dispute. These topics are covered in the Building Process course.

You will also study environmental science and work science and applicable legislation, to gain an overall view on environmental efforts, environmental impact, and various green techniques for sustainable construction. You will also be able to prevent occupational injuries and actively participate in improving the work environment quality at your future work place. There is a project associated with these two courses, in which the project group searches for answers at a construction site.

In Economics and Organization, students learn about company economics, organisation and setting. Business ideas, company culture, marketing, and accounting are just a few of the topics highlighted.

Study year 2 also includes a fluid motion course that covers fluid mechanics in water and air. Topics include dimensioning methods, design methods for hydraulics, air flow and energy management in buildings, as well as measurement techniques and calculation methods. How do we construct lasting buildings? This is one of the topics you will learn in the Structural engineering course. You will

learn about general rules and common loads for load-bearing structures and how to design and dimension simple structures in concrete, wood and steel.

During the spring, you will also study Urban Planning, which touches on topics such as the process of housing and community planning with land development and planning for housing and premises, as well as the planning of roads, water supply and sewerage. The course includes a project, in which the group designs a housing area and its infrastructure using environmentally sustainable techniques.

Topics include the Swedish Planning and Building Act, the Environmental Code, detailed development plans, housing environments, housing planning, and water supply and sewage management.

In addition, you will take a course in geology and geotechnics where you will learn how ground conditions affect the choice of foundation methods. You will learn about rock and soil types in Sweden, their formation methods and technical properties. You will learn about the most common testing methods in the field and laboratory, as well as about various calculation models.

You will also study a course on Building Information Modelling (BIM), which will provide you knowledge of modern planning techniques and planning skills using CAD tools in 2D and 3D.

### Study year 3

During the last year, you will have an opportunity to immerse yourself in topic areas that are in demand from the industry. There are currently five in-depth specializations and course blocks offered, within these areas:

- Building, Planning and Design
- Production, Construction Management and Economics
- Construction Works
- Property Development and Installation Coordination
- Architecture for Construction Engineers

Current descriptions of specialisations are included in Appendix 2.

The degree programme concludes with a degree project, worth 15 credits.

## 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.

## Conditions for participation in the programme

### *Semester Registration /Course Registration*

A prerequisite for participation in studies at KTH is to the student for each semester doing a semester registration and course registration.

Before the semester 1; semester and course registration is done automatically in conjunction with enrollment in the semester.

Before the semester 2-6 should students make web registering by themselves in the personal menu by logging on to the website.

All of program students from second semester do a course application on [www.antagning.se](http://www.antagning.se), and course registration done in the personal menu.

### *Conditions for advancement*

At least 37.5 credits from the first year must be completed before beginning second year studies. For students who do not meet this requirement, individual study plans will be drawn up in consultation with a study adviser.

At least 90 credits from the first and second year must be completed before beginning third year studies. For students who do not meet this requirement, individual study plans will be drawn up in consultation with a study adviser.

## Recognition of previous academic studies

Students are able to apply to receive credit for the results of the course/courses at another college/university within the country or abroad.

For more information please refer to KTH's regulations in [www.kth.se](http://www.kth.se) and program's student guidance counselling.

## Studies abroad

There are opportunities within the program for student exchange under existing agreements.

For more information and recommendation on the appropriate semester for exchange refer to the program's international administrators.

# Degree project

The programme includes a degree project worth 15 credits. This corresponds to about 10 weeks of full-time studies. See also: Guidelines for Degree Project, School of Architecture and the Built Environment.

For the degree project, the following apply:

- To be allowed to start a degree project, a student must have accumulated at least 120 credits and have valid final grades for courses relevant to the topic of the degree project.
- The choice of project must be approved by the examiner before the project may begin.
- It will be based on knowledge learned during the study programme and should normally be performed during term 6.
- It must reflect the student's competence to work independently on theoretical and/or experimental work, including a written follow-up report and oral presentation.
- The supervisor will be appointed by the specialisation leader or examiner.
- The project will be performed by two students together.

Information regarding the grading scale on the degree project refer to the syllabus.

More information on the KTH common policy on the degree project for Bachelor of Science programmes can be found at KTH's regulations.

## Degree

### *Conditions for 180-credit degree*

Receiving a Bachelor of Science in Engineering in Constructional Engineering and Design requires passing grades in all courses included in the student's study plan. The student will follow the study plan, which consists of compulsory courses, elective courses for the chosen specialisation, free elective courses, and a degree project within the chosen specialisation.

Students will be awarded a "Bachelor of Science in Engineering" degree.

The text on the diploma will specify which study programme the student has completed.

A Bachelor of Science in Engineering is received after a completed study programme with courses totalling 180 credits. The programme is designed so that the student, when receiving their diploma, fulfils the national degree requirements, whereof:

- Mathematics and science coursework of at least 25 credits, and at least 90 credits in subjects central to Constructional Engineering and Design (including degree project work of 15 credits).

The degree programme shall provide the student with complementary technical knowledge within the programme in accordance with the national Degree Ordinance and the local goals of the study programme.

Courses with content that overlaps other course(s) in the programme may not be counted towards the 180 higher education credits which comprise the degree.

The application for degree is done in the personal menu on KTH's website.

There is more information about the degree on KTH's regulations in [www.kth.se](http://www.kth.se)

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
<a href="#">AF1710</a>	Building Technology 1, Constructional Engineering and Design	7.5 hp	First cycle
<a href="#">AF1711</a>	Building Technology 2, Building Physics and Materials	7.5 hp	First cycle
<a href="#">AF1717</a>	Technical Work, Methods and Tools	7.5 hp	First cycle
<a href="#">HF1004</a>	Mathematics and Statistics	7.5 hp	First cycle
<a href="#">HF1903</a>	Mathematics 1	7.5 hp	First cycle
<a href="#">HS1003</a>	Structural Mechanics 1	7.5 hp	First cycle
<a href="#">HS1004</a>	Structural Mechanics 2	7.5 hp	First cycle
<a href="#">HS1005</a>	Surveying and Mathematical Statistics	7.5 hp	First cycle

#### Optional courses

Code	Name	Credits	Edu. level
<a href="#">HF0009</a>	Introduction to Mathematics	1.5 fup	Pre-university level
<a href="#">HF0017</a>	Introduction to Computer Studies	1.5 fup	Pre-university level

## Year 2

### Mandatory courses (60.0 Credits)

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

## Year 3

### Mandatory courses (15.0 Credits)

Code	Name	Credits	Edu. level
<a href="#">HS1001</a>	Structure and Design <i>Mandatory for all students in TIBYH</i>	7.5 hp	First cycle
<a href="#">HS1013</a>	Building Services and Energy <i>Mandatory for all students in TIBYH</i>	7.5 hp	First cycle

## Supplementary information

HS1001 and HS1013 are mandatory for all students in TIBYH

# Architecture for Construction Engineers (ABYI)

Year 3

## Mandatory courses (15.0 Credits)

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

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1728</a>	The Sketch Process, Lightdesign and Acoustics	7.5 hp	First cycle
<a href="#">AF173X</a>	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
<a href="#">AF177X</a>	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
<a href="#">AF179X</a>	Degree Project in Constructional Engineering and Design, First Cycle	15.0 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">HS1020</a>	Moisture Related Damages	7.5 hp	First cycle
<a href="#">HS1735</a>	Project Building and Installations	7.5 hp	First cycle

# Construction (ANL)

Year 3

## Mandatory courses (15.0 Credits)

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

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1729</a>	Structural Design of a House Project and/or a Infra Structural Project	7.5 hp	First cycle
<a href="#">AF175X</a>	Degree Project in Structural Engineering, First Cycle	15.0 hp	First cycle
<a href="#">AF176X</a>	Degree Project in Facilities for Infrastructure, First Cycle	15.0 hp	First cycle
<a href="#">AF177X</a>	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
<a href="#">AF178X</a>	Degree Project in Civil Engineering Management, First Cycle	15.0 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">AH1907</a>	Installation .1 Road, Railways and Wastewater Networks	7.5 hp	First cycle
<a href="#">AH1908</a>	Installation 2. Construction, Management and Maintenance of Roads and Railways	7.5 hp	First cycle
<a href="#">HS1018</a>	Water Resources Engineering with GIS	7.5 hp	First cycle
<a href="#">HS1020</a>	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
<a href="#">AF1714</a>	Indoor Surveying <i>Mandatory for (abyi) och (fuis)</i>	7.5 hp	First cycle
<a href="#">AF1727</a>	Development of Residential Buildings. Renovation, Rebuilding and Extension <i>Mandatory for (fuis) och (pbeo)</i>	7.5 hp	First cycle

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1728</a>	The Sketch Process, Lightdesign and Acoustics	7.5 hp	First cycle
<a href="#">AF173X</a>	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
<a href="#">AF174X</a>	Degree Project in Building Services Engineering and Energy, First Cycle	15.0 hp	First cycle
<a href="#">AF177X</a>	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">AI1147</a>	Real Estate Valuation	7.5 hp	First cycle
<a href="#">HS1020</a>	Moisture Related Damages	7.5 hp	First cycle
<a href="#">HS1735</a>	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
<a href="#">HS1014</a>	Design of Civil Engineering Constructions <i>Mandatory for (anl) and (hupk)</i>	7.5 hp	First cycle
<a href="#">HS1021</a>	Steel- and Timber Structures <i>Mandatory for (hupk)</i>	7.5 hp	First cycle

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1024</a>	Structural Analysis with Finite Element Methods (FEM)	7.5 hp	First cycle
<a href="#">AF1729</a>	Structural Design of a House Project and/or a Infra Structural Project	7.5 hp	First cycle
<a href="#">AF175X</a>	Degree Project in Structural Engineering, First Cycle	15.0 hp	First cycle
<a href="#">AF176X</a>	Degree Project in Facilities for Infrastructure, First Cycle	15.0 hp	First cycle
<a href="#">AF177X</a>	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">HS1020</a>	Moisture Related Damages	7.5 hp	First cycle
<a href="#">HS1735</a>	Project Building and Installations	7.5 hp	First cycle

## Supplementary information

A newly established elective course is added to this direction as follows: Strukturanalys med finita elementmetoder (FEM)

# Production / Construction Management and Economics (PBEO)

Year 3

## Mandatory courses (15.0 Credits)

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

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF173X</a>	Degree Project in Constructional Engineering and Design with Business Economics, First Cycle	15.0 hp	First cycle
<a href="#">AF177X</a>	Degree Project in Building Technology, First Cycle	15.0 hp	First cycle
<a href="#">AF178X</a>	Degree Project in Civil Engineering Management, First Cycle	15.0 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">AH1907</a>	Installation .1 Road, Railways and Wastewater Networks	7.5 hp	First cycle
<a href="#">AH1908</a>	Installation 2. Construction, Management and Maintenance of Roads and Railways	7.5 hp	First cycle
<a href="#">HS1019</a>	Planning of a Construction Project	7.5 hp	First cycle
<a href="#">HS1020</a>	Moisture Related Damages	7.5 hp	First cycle
<a href="#">HS1735</a>	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.