



# 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 21 (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 2021-2022. 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:

such as housing and civil engineering design, house fabrication, civil engineering and/or property development/management.

. 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 to understand the connection between construction, installation and production's engineering with architecture in planning (understand the importance of information and cooperation)
- 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 an introductory course in land use planning, the construction process, constructional engineering for small buildings and landscaping. The course also provides an insight into various tools and methods that engineers use and apply in the field of constructional engineering. You will also read about group dynamics, presentation technology and what it is like to work according to a project.

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 housebuilding and civil engineering 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 technology, mathematical statistics and civil engineering technology. 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. The course also includes components in the field of civil engineering, including studies of rock material and

aggregate. 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. The course also includes calculating the stability of slopes and earth retaining structures using sheet piling.

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

Participation requires admission to courses within the programme and course registration.

For students starting education from the autumn semester 2018, previous promotion requirements have been replaced with course specific admission requirements. Admission requirements are specified in the course syllabus.

## 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:

- It may start when special admission requirements for the course are fulfilled.
- It may start 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](http://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
<a href="#">AF1734</a>	Structural mechanics 1	5.0 hp	First cycle
<a href="#">AF1735</a>	Structural mechanics 2 with load analysis	7.5 hp	First cycle
<a href="#">AF1737</a>	Building Technology 1	7.5 hp	First cycle
<a href="#">AF1739</a>	Surveying	7.5 hp	First cycle
<a href="#">AF1744</a>	Building Techniques, Heat and Moisture Transfer	7.5 hp	First cycle
<a href="#">AF1745</a>	Building Techniques, Detached Housing Project	10.0 hp	First cycle
<a href="#">HF1904</a>	Linear Algebra	5.0 hp	First cycle
<a href="#">HF1905</a>	Mathematical Analysis	5.0 hp	First cycle
<a href="#">HF1906</a>	Mathematical Statistics	5.0 hp	First cycle

## Optional courses

Code	Name	Credits	Edu. level
<a href="#">HF1009</a>	Introduction to Mathematics	1.5 hp	First cycle

## 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="#">AF1740</a>	Economics, calculation and organization	7.5 hp	First cycle
<a href="#">AF1746</a>	Structural Engineering 1	5.0 hp	First cycle
<a href="#">AF1747</a>	Structural Engineering 2	7.5 hp	First cycle
<a href="#">AF1748</a>	Building Information Modeling	5.0 hp	First cycle
<a href="#">AF1749</a>	Urban and Dwelling Planning	10.0 hp	First cycle
<a href="#">HS1007</a>	Fluid Mechanics	7.5 hp	First cycle
<a href="#">HS1029</a>	Geology and Soil Mechanics	7.5 hp	First cycle

# Architecture and Real Estate Development (ARFU)

Year 3

## Mandatory courses (37.5 Credits)

Code	Name	Credits	Edu. level
<a href="#">AF1751</a>	Building Permit and Real Estate Law	7.5 hp	First cycle
<a href="#">AF1752</a>	Renovation, Rebuilding and Extension 1	7.5 hp	First cycle
<a href="#">AF1753</a>	Renovation, Rebuilding and Extension 2	7.5 hp	First cycle
<a href="#">AF179X</a>	Degree Project in Constructional Engineering and Design, First Cycle	15.0 hp	First cycle

## Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1743</a>	Form, Space and Light	7.5 hp	First cycle
<a href="#">AF1750</a>	Building Logistics and Risk Management	7.5 hp	First cycle
<a href="#">AF2720</a>	BIM2, Design, Installation and Integrated Planning	7.5 hp	Second cycle
<a href="#">AI1108</a>	Investment Analysis	7.5 hp	First cycle
<a href="#">AI1147</a>	Real Estate Valuation	7.5 hp	First cycle
<a href="#">HS1013</a>	Building Services and Energy	7.5 hp	First cycle

## Supplementary information

AF1751, AF1752 and AF1753 are compulsory courses for the specialization Architecture and Real Estate Development.

# Structural Engineering (KONS)

Year 3

## Mandatory courses (30.0 Credits)

Code	Name	Credits	Edu. level
<a href="#">AF179X</a>	Degree Project in Constructional Engineering and Design, First Cycle	15.0 hp	First cycle
<a href="#">HS1014</a>	Design of Civil Engineering Constructions	7.5 hp	First cycle
<a href="#">HS1021</a>	Steel- and Timber Structures	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="#">AF1750</a>	Building Logistics and Risk Management	7.5 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="#">HS1020</a>	Moisture Related Damages	7.5 hp	First cycle

## Supplementary information

HS1021 and HS1014 are compulsory courses for the specialization Structural Engineering.

# Infrastructure and Building Production (PROD)

## Year 3

### Mandatory courses (30.0 Credits)

Code	Name	Credits	Edu. level
<a href="#">AF1750</a>	Building Logistics and Risk Management	7.5 hp	First cycle
<a href="#">AF179X</a>	Degree Project in Constructional Engineering and Design, First Cycle	15.0 hp	First cycle
<a href="#">HS1725</a>	Building Production and Leadership	7.5 hp	First cycle

### Conditionally elective courses

Code	Name	Credits	Edu. level
<a href="#">AF1718</a>	Building Services Engineering 1 within Construction and Civil Engineering	7.5 hp	First cycle
<a href="#">AF1719</a>	Building Services Engineering 2 within Construction and Civil Engineering	7.5 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="#">HS1013</a>	Building Services and Energy	7.5 hp	First cycle

### Supplementary information

AF1750 and HS1725 are compulsory courses for the specialization Infrastructure and Building Production.



# Appendix 2: Specialisations

## Degree Programme in Constructional Engineering and Design (TIBYH)

### Architecture and Real Estate Development (ARFU)

The specialization "Architecture and Real Estate Development" provides knowledge in planning and design of buildings with in-depth knowledge in local planning, design of construction technical details, BIM software and coordination of planned renovation measures to increase the life of a building.

### Structural Engineering (KONS)

The specialization "Structural Engineering" provides knowledge in the design of buildings and facilities with in-depth knowledge in dimensioning of building structures of the materials steel, wood and concrete. Within the specialization, it is possible to choose courses for infrastructure construction or building construction.

### Infrastructure and Building Production (PROD)

The specialization "Infrastructure and Building Production" provides in-depth knowledge in construction economics, production management, logistics and leadership. Within the specialization, you can choose courses in infrastructure or installation technology.