AF1711 Building Technology 2, Building Physics and Materials 7.5 credits

Byggteknik 2, byggfysik och materiallära

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

Establishment

The course syllabus is valid from autumn 2019.

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Students in year 1 of the Bachelor of Science in Engineering programmes Constructional Engineering and Design or Engineering and Economics specialising in Constructional Engineering and Design.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Upon completion of the course, students shall be able to:

- Describe the connection between the structures and building physics properties of materials
- Know how the building physics properties of materials change due to external effects (such as moisture)
- Describe the physical basics of thermal transport (conduction, radiation, convection)
- Calculate the thermal transport of individual materials with a determined thickness, and for a structure built from several layers with various materials
- Calculate the U values for composite layers and special layers (e.g. structural parts on ground)
- Calculate temperatures and the relative humidity of inner faces, outer faces and in the intersection of layers in construction elements with several layers
- Describe the risk points for condensation in a structure
- Explain a thermal bridge and its effects
- Calculate the effects and energy needs for transmission and ventilation for a building
- Calculate moisture in air and materials and moisture transport
- Describe the distribution of pressure in a building and the factors that affect it
- Know how to construct using principles of radon, frost and fire safety
- Be familiar with acoustic principles and know how to account for them in construction
- In laboratory work, determine a material's sorption isotherms, capillary action, and moisture movements

Course contents

- Lectures on construction materials
  Concrete, light-weight concrete, ceramic construction materials, wood and thermal isolation
  The structure, durability, humidification, drying-out, soundness, porosity, and density of materials and their connection to construction products
- Lectures and exercises on thermics
- Lectures on the calculation of power requirements and energy needs for transmission and ventilation
- Building envelope, ventilation, time constant, design outdoor temperature, and degree hoursLectures and exercises on moisture
- Humidity and material moisture; moisture transport phenomena: capillary, diffusion and convection; calculation methods

- Lectures on acoustics, fire, radon and frost in the underground
- Laboratory work: measurements of capillary absorption on one material, hygroscopicity in three materials, shrinkage and swelling in wood-material
- Computer exercises
- Heat balance calculation, fire and frost protection, moisture variation in materials. Computer exercises are performed in AutoCAD and Excel.
- Calculation exercises, run-throughs and opportunities for independent exercises with teacher assistance

Examination

- TEN2 - Examination, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 0.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Completion of obligatory assignments according to the course memo is required

Overall course grade is based on grading scale A-F

Other requirements for final grade

Requirements for final grade:
Passing grade on exam (TEN1; 2.0 cr), grading scale A-F
Passing grade on exam (TEN2; 5.0 cr), grading scale A-F
Passing grade on lab work (LAB1; 0.5 cr), grading scale P/F

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.