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.

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

Establishment

Course syllabus for AF1711 valid from Spring 2011

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge equivalent to AF1710 Building Technology 1, 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 structure and production of construction materials such as concrete, brick, insulation, etc.
- Give examples of construction products and uses of the construction materials above
- 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

Thermal conduction, radiation, convection and thermal capacity and calculation methods

- Lectures on the calculation of power requirements and energy needs for transmission and ventilation

Building envelope, ventilation, time constant, design outdoor temperature, and degree hours

- Lectures 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

Building technology, heat balance calculations, fire and frost protection. Computer exercises are performed in AutoCAD and Excel.

- Calculation exercises, run-throughs and opportunities for independent exercises with teacher assistance

Course literature

Burström, Per Gunnar, Byggnadsmaterial, Studentlitteratur

Sandin, Kenneth, Praktisk byggndsfysik, Studentlitteratur, Byggfysik – Övningsuppgifter, KTH Haninge, Byggteknik och design

Diverse kopierat material

Referenslitteratur: Sandin, Kenneth, Praktisk husbyggnadsteknik, Studentlitteratur.

Examination

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

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.