AF2507 Sustainable Buildings - Concept, Design, Construction and Operation 7.5 credits

Hållbara byggnader - design, bygg och drift

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

Establishment

Course syllabus for AF2507 valid from Autumn 2021

Grading scale

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

Education cycle

Second cycle

Main field of study

The Built Environment

Specific prerequisites

Documented knowledge in service and energy systems and building physics equivalent to at least 3·times 7,5 ECTS corresponding to the content in courses AF1002, AF1402 and AF2508.

Eng B/6 according to the Swedish upper secondary school system.

Language of instruction

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

Intended learning outcomes

Upon successfully completing this course, students should be able to:

Understand the principles of triple-bottom-line based sustainable building design and actively participate in the complex iterative and multidisciplinary process of conceptualizing and designing a high-performance building (low-emissions, low resource-consumption, small environmental footprint),

Choose and size building components, as well as energy and environmental systems suitable for different categories of high-performance buildings, and different climate zones, such as to achieve the smallest feasible life-time environmental impact,

Utilize a variety of tools and methodologies suitable for evaluating the resource efficiency and overall environmental performance (environmental footprint) of buildings in different stages of their life cycles,

Have a good understanding of key regulatory tools, including building codes, design guidelines, as well as relevant legislation governing the consumption of resources and emission of environmental pollutants by buildings.

Course contents

This course deals in detail with the concepts, methodologies/tools and processes required for designing, building and operating sustainable buildings, and evaluating their resource-efficiency (e.g. energy- and water-efficiency), as well as environmental and socio-economic performance in various stages of their operation and overall lifecycle. The sustainable performance of buildings is thus addressed in a holistic triple-bottom-line approach, based on environmental, economic and social/behavioural criteria relevant to different phases of the building lifecycle.

Bioclimatic and other aspects of high-performance building design (passive, zero-energy and positive energy buildings), as well as the utilization of renewable and locally available resources (energy, water) and technologies are discussed in detail.

Building systems and services (such as thermal comfort, indoor air quality, lighting etc.) are discussed in an integrated system perspective, as relevant to the sustainable performance of singular buildings, as well as building clusters, precincts and cities.

State-of-the-art modeling tools (energy-modeling, BIM, etc) are presented and used in designing/evaluating different types of high-performance buildings.

Lectures given by experts from a number of related disciplines (architecture, building physics, energy technology, building information management (BIM), environmental management, real-estate economy) are designed to offer a solid understanding of integrated

sustainable building design principles. Additional in-depth studies are carried out in the form of an assignment/project carried out in an area of specific interest to the student

Field trips include visits to a number of high-performance buildings and urban districts.

Examination

- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.0 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.

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

Other requirements for final grade

PRO1 - Project: 4,5 ECTS; Grade scale A-F

TEN1 - Written Exam: 3 ECTS; Grade scale A-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.