



Faculty of Health, Science and Technology  
Construction Engineering

## Syllabus

### Sustainable Building Technology

**Course Code:**

BYGC10

**Course Title:**

Sustainable Building Technology  
*Hållbart byggande*

**Credits:**

15

**Degree Level:**

Undergraduate level

**Progressive**

First cycle, has at least 60 credits in first-cycle

**Specialisation:**

course/s as entry requirements (G2F)

**Major Field of Study:**

BYA (Building Technology)

#### Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2022-02-01, and is valid from the Autumn semester 2022 at Karlstad University.

#### Prerequisites

90 ECTS credits completed in the Building and Construction Engineering programme, including the courses Sustainable Development for Engineering 7.5 ECTS credits, Thermal and Fluid Sciences for Building and Construction Engineers 7.5 ECTS credits, House Building Technology 7.5 ECTS credits, Building and Urban planning 5 ECTS credits, and Construction Management I, 7.5 ECTS credits, or equivalent

#### Learning Outcomes

The aim of the course is for students to develop the skills and knowledge required for ensuring sustainability in their future profession as construction engineers. This competence involves choosing materials and technical solutions with a view to sustainability and using various methods and tools to make the right choices. The focus is on the performance of buildings, but general perspectives on sustainable societal planning are discussed in relation to the project assignment.

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

- calculate moisture balance in a building construction and its variation in relation to the variation of impacting factors over time,
- determine the function of a construction with regard to thermal bridges, air tightness and design,
- calculate the energy needed to heat a home considering insulation standard, air tightness, ventilation system, passive solar heat gains, internal heat gains and heat capacity,
- give an account of the structure and function of different systems of ventilation and heating in homes,
- estimate climate impact and the primary energy consumption for various heating systems using marginal and mean value methods,
- perform life cycle cost analysis (LCC) in the choice of building envelope,
- perform climate assessment of the structure of a building and present suggestions for reducing the climate impact of the building,
- use systems for environmental assessment of construction materials and describe the criteria used in the process,
- use methods presented in the course to choose solutions that result in energy cost efficient houses with good internal environment and low environmental impact, and
- write a report meeting the requirements for transparency, traceability and repeatability.

## **Content**

The course is divided into two parts. The first part is theoretical and the second part includes a practical application in the form of a project.

The theory part deals with the different tools at our disposal for building a sustainable society in relation to the choice of construction material, energy system, building envelope, moisture safety, environmental impact, and energy consumption, as well as life cycle cost analysis.

The theory part includes lectures, seminars, and exercises, as well as reading assignments. The second part comprises a project completed in groups under supervision. Projects are supposed to include applications of the tools presented in the first part and discuss aspects of sustainability in societal planning. An individual specialisation assignment is also included.

The course comprises:

- developing the writing process with an emphasis on methods for comparison and evaluation
- evaluating constructions and materials with regard to moisture safety, energy consumption and environmental impact
- moisture safety in the design process
- calculating energy consumption in buildings
- assessing energy choices in terms of the environment
- life cycle cost analysis (LCC)
- sustainability issues in societal planning

## **Reading List**

See separate document.

## **Examination**

Assessment is based on individual written hand-in assignments and oral presentations. Assessment of the group project is based on group performance as well as on individual reports on each student's contribution to the group and project. All course components must

be completed satisfactorily before a course grade is awarded. Attendance at exercises and seminars is mandatory.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

### **Grades**

One of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 Pass, or Fail (U), is awarded in the examination of the course.

### **Quality Assurance**

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

### **Course Certificate**

A course certificate will be provided upon request.

### **Additional information**

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

The group project requires students to be present beyond scheduled hours.