



Faculty of Health, Science and Technology  
Construction Engineering

## Syllabus

### Sustainable Building Technology

<b>Course Code:</b>	BYGC10
<b>Course Title:</b>	Sustainable Building Technology <i>Hållbart byggande</i>
<b>Credits:</b>	15
<b>Degree Level:</b>	Undergraduate level
<b>Progressive Specialisation:</b>	First cycle, has at least 60 credits in first-cycle 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 2018-09-03, and is valid from the Spring semester 2019 at Karlstad University.

#### Prerequisites

At least 90 ECTS credits completed for the Building Technology programme, including the courses Sustainable Development for Engineering 7.5 ECTS cr, Introduction to Energy Systems 7.5 ECTS cr, Basic Thermal Fluid Sciences 7.5 ECTS cr, Housing Construction Technology 7.5 ECTS cr., Construction and Community Planning 5 ECTS cr, Building Construction I, 7.5 ECTS cr, or equivalent.

#### Learning Outcomes

The aim of the course is that students 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 energy and inner climate of a house.

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,
- 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,
- explain how environmental considerations can be integrated in the location of housing
- write a report meeting the requirements for transparency, traceability and repeatability.

### **Content**

The course is divided into two parts, theory and 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. The introductory methodological theme presents ways to report on evaluation and assessment made of alternatives in a scientific way. Other themes deal with the choice of location, construction material, energy system, building envelope and ventilation with regard to economy, indoor environment, moisture safety, and energy consumption.

Instruction is in the form of lectures, seminars and exercises related to individual readings. The concluding project is carried out in groups under supervision. Attendance at exercises and seminars is mandatory.

The course comprises:

- developing the writing process with an emphasis on methods for comparison and evaluation
- environmental aspects linked to location of housing
- evaluating constructions and materials with regard to moisture safety, energy consumption and environmental impact
- moisture safety in the design process
- heating and ventilation systems
- calculating energy consumption in buildings
- assessing energy choices in terms of the environment
- life cycle cost analysis (LCC).

### **Reading List**

See separate document.

### **Examination**

Assessment is based on individual 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.

### **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 and its modules.

### **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.