Faculty of Health, Science and Technology
Construction Engineering

Syllabus

Computer Aided Construction Design in a BIM Process

Course Code:	BYGB22
Course Title:	Computer Aided Construction Design in a BIM Process *Byggprojektering med datorstöd i BIM-process*
Credits:	20
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
BYA (Building Technology)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2022-10-13, and is valid from the Autumn semester 2023 at Karlstad University.

Prerequisites
Registered for the courses Sustainable Development for Engineering (7.5 ECTS credits), Introduction to Building Engineering (12.5 ECTS credits), House Building Technology, Building and Urban Planning, Engineering Design: Timber Structures, and Construction Management I, or enrollment in the study programme in Building and Construction Engineering (TGHBY), or equivalent

Learning Outcomes
The aim of the course is for students to acquire basic knowledge of and skills in computer-aided construction design for all the stages of a BIM process, that is a flow of digital information and communication in the building process.

Upon completion of the course, students should be able to:
- give an account of the design and application principles of a BIM-based work process and

its information flow,
- give an account of and apply industry standard documentation,
- demonstrate the ability to produce a selection of relevant documents for the different stages of the planning and design process with the aid of computer software and consistent with industry standard,
- demonstrate the ability to implement, plan, and evaluate a computer-aided design process,
- demonstrate the ability to problematise and identify the potentials and risks of a BIM-based process,
- continuously evaluate their results from a process perspective,
- demonstrate the ability to use relevant computer software in different stages of the design process and transfer information between different computer programs,
- demonstrate the ability to plan and design a small residential area in compliance with current norms pertaining to basic principles of sustainable development,
- demonstrate ability to plan and design a house in accordance with current building codes and human needs and consideration of architectural quality,
- design a climate shell for a building that meets the building code requirements on energy efficiency and moisture safety,
- use computer-based aids to establish energy balance for small houses with given data, and interpret and present the results,
- structure and give an account of accumulated load and dimensioning according to the building code for small timber buildings including drawings according to industry standards,
- demonstrate knowledge and skills in using computer-based aids for calculating accumulated load and dimensioning, and discuss and assess the validity of the results,
- use computer-based aids to make a cost estimate for a small building,
- draw up a simple quality, environment, and work environment plan in the design stage,
- present their design work with computer visualisations, and
- demonstrate the ability to offer constructive criticism on other people's work.

Content
The course comprises theoretical as well as practical components. The main part of the course consists of a construction project plan comprising:
-area planning
-construction planning
-building planning including heat and humidity calculation
-construction estimates for a small two-storey timber house
-cost estimate

The focus is on students' ability to carry out a major project process using computer-based aids.The use of computer-based aids involves:
-BIM as a work process
-information flows in the planning process
-handling drawings in the construction and design process
-construction planning in CAD
-drawing content, drawing structure, and supplementary descriptions
-dimensioning
-model and reference file management
-storage, plotting, and file management
-production of three-dimensional models and illustrations
-calculating accumulated load with computer aid
-calculating energy balance with computer aid
-calculating cost with computer aid
-import and export of files and information

The project is mandatory and carried out individually.

Instruction is in the form of lectures, computer exercises, seminars, supervision, and possibly field studies.

Reading List
See separate document.

Examination
Assessment is continuous and based on documentation of the project, which also includes self-evaluation of the students' own work process. Students are also required to offer constructive comments on the projects of others. Assessment is also based on mandatory seminars and oral and written presentations.

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 U (Fail) 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 courses BYGA11, BYGA12, BYGA13, and BYGB17 cannot be included in the same degree programme as BYGB22.