



Faculty of Health, Science and Technology  
Construction Engineering

## Syllabus

### Engineering Designs: Reinforced Concrete Structures

<b>Course Code:</b>	BYGC11
<b>Course Title:</b>	Engineering Designs: Reinforced Concrete Structures <i>Betongkonstruktion</i>
<b>Credits:</b>	7.5
<b>Degree Level:</b>	Undergraduate level
<b>Progressive Specialisation:</b>	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 2017-03-08, and is valid from the Autumn semester 2017 at Karlstad University.

#### Prerequisites

Steel Structures 7.5 ECTS cr. or Structural Mechanics - statically undetermined constructions, 2 ECTS cr, or equivalent

#### Learning Outcomes

The course is an elective in the third year of the Building and Construction Engineering programme. Students learn to design simple concrete structures.

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

- demonstrate basic knowledge of concrete structures
- design and dimension concrete structures

To earn a Pass grade (3) students should satisfactorily be able to:

- design single and double reinforced cross sections regarding bending moment and the combination of bending moment and longitudinal force
- check cross sections regarding capacity with respect to shear force
- calculate resistance in columns under centric pressure
- calculate stress in serviceability limit state I
- calculate moment in framework slabs.

In addition, students should be able to structure, perform, and document the design of a building according to common standards.

To earn a grade of distinction, 4 and 5, students should also be able to:

- design shearing force reinforcement

- design columns and walls with respect to pressure
- calculate stress in serviceability limit state II
- calculate moment in continuous framework slabs
- demonstrate knowledge of the calculations and checks required in the design of a structure and apply the knowledge.

### **Content**

The course comprises:

- concrete and reinforcement interaction, properties of materials
- non-dimensional quantities
- single and double reinforced sections exposed to moment or a combination of moment and longitudinal force
- capacity with respect to shear force
- design of columns and walls exposed to pressure
- serviceability limit states I and II
- moment in framework slabs
- information of T-girders, truncation of reinforcing bars, arranging reinforcement, reinforcement specification, presentation of concrete structures
- laboratory work including reinforcement, casting, testing, and calculation of crack and fracture moment.

Instruction is in the form of lectures, calculation exercises, and two mandatory group laboratory experiments. There is also a mandatory, individual design assignment.

### **Reading List**

See separate document.

### **Examination**

Assessment for the Pass grade is continuous. Grades are awarded on the basis of written exams, written lab report, and a written design assignment. Students who want to earn a grade of Distinction (4 and 5) sit an exam at the end of the course, and an opportunity to re-sit for a Pass grade is also provided. Attendance is mandatory at laboratory sessions and at the final assessment of the design assignment.

### **Grades**

One of the grades Pass with Distinction (5), Pass with Some Distinction (4), Pass (3), 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.