



Faculty of Health, Science and Technology  
Construction Engineering

## Syllabus

### Strength of Materials for Building Construction

<b>Course Code:</b>	BYGB10
<b>Course Title:</b>	Strength of Materials for Building Construction <i>Hållfasthetslära för byggingenjörer</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 2015-02-18, and is valid from the Autumn semester 2015 at Karlstad University.

#### Prerequisites

Structural Mechanics 7.5 ECTS cr., or TGHBY enrollment, or equivalent.

#### Learning Outcomes

The aim of the course is that students acquire the basic theoretical knowledge of strength of materials required for the applied construction courses in the programme. The students develop ability to think theoretically and to deal with basic theories, as well as written and oral presentation.

Upon completion of the course a Pass grade (3) is awarded to students who are able to:

- use general problem-solving methods and carry out dimensional analysis of the results,
  - give an account of the calculation principles used in the thematic course components,
  - give an account of the theoretical relationships applied in the thematic course components,
  - correctly carry out simple calculations based on given conditions in all the thematic course components,
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- in groups, perform simple laboratory tasks and discuss the phenomena studied and draw conclusions,
  - in groups, describe the performed laboratory task in a clearly written and structured report, adhering to the departmental standard model,
  - in groups and within a given time-span, orally present laboratory work to their fellow-students, clearly and coherently using relevant aids.

Upon completion of the course a grade of distinction (4 or 5) is awarded to students who, in addition to the above, are able to:

- carry out more complex calculations based on assumed conditions,
- apply course theory when calculating problems new to the students
- apply combinations of theories when making calculations,
- carry out an individual project and, to their fellow-students, orally and in writing explain the theoretical relationships in the chosen area, with reference to a real case.

### **Content**

The course comprises thematic components. Every theme includes a mandatory laboratory experiment performed in groups and presented orally and in writing. This is followed by lectures and calculation exercises. Every theme concludes with a written exam for the Pass grade level. The written exam for the distinction grade levels takes place at the end of the course. Students aspiring to a distinction grade are also given the opportunity to carry out a seminar assignment.

The weekly themes comprise the following components :

- Hooke's law: relation stress-strain in homogeneous and composite materials, ideal area, shrinkage and thermal stress.
- Bending stress: stress distribution in pure bending of homogeneous and composite materials, elastic section modulus, moment of inertia, normal bending, centre of mass calculation of composite materials, ideal moment of inertia, skew bending.
- Deflection: equation of elastic deflection curve, elementary case method.
- Shearing stress: distribution of shearing stress in cross-section, principal stress, Mohr's circle.
- Instability: lateral buckling, lateral instability and buckling.
- Displacement method for statically indeterminate beams.

### **Reading List**

See separate document.

### **Examination**

Assessment is continuous and based on lab reports, oral presentation and written exams. Each thematic component is concluded with a written exam at the Pass level. A final written exam is offered at the end of the course to students who aim for a grade of Distinction and for students who re-sit for a Pass grade, as is the opportunity to add a seminar assignment for the higher grade.

### **Grades**

One of the grades Fail, 3 (Pass), 4 (Pass with some distinction), or 5 (Pass with Distinction) 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's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.

Required course for the Building and Construction Engineering Programme