



FSD3403 Mechanics of Composite Materials and Structures

10.0 credits

Kompositmekanik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FSD3403 valid from Autumn 2017

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Ph.D.-students, practising engineers in industry. Fundamental knowledge in mechanics, solid mechanics, linear algebra och programming skills in MatLab.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The course aims to give the student theoretical and practical knowledge of composite materials. The main part of the course deals with theoretical principles which are then put into practice in homework, a design assignment and a computer exercise.

After the course the student is expected to

- Explain the mechanical behaviour of anisotropic materials and how they differ from classical construction materials
- Apply classical lamination theory to analyse the stiffness and strength of composite laminates
- Design a composite laminate with given requirements
- Be able to make calculations and estimates on the stiffness and strength of composite plates
- Be familiar with methods for more advanced tools of composites analysis and design including failure theories and their implementation, the effect of holes and cracks, fatigue, and models for the prediction of compressive failure mechanisms
- Describe potential problems and ways to analyse composite structures with FEM
- To formulate and solve a composites design problem and communicate the results in a written report.
- Be able to read and understand scientific articles in a chosen subject within mechanics of composite materials and explain the contents to someone else in an understandable way.
- Prepare a 45 minute lecture in a specialist topic and give a seminar to your peers in a way that they are able to learn something new within the topic.

Course contents

First 6 credits:

The first 6 credits are the same as the course SD2413, or some equivalent course(s).

Following 4 credits:

Depends on the interest of the student, but can contain for example, advanced failure criteria, FEM-analysis of composite materials and structures, studies of anisotropic plates and shells, fatigue of composite laminates or stress concentrations in composite laminates.

This part contains reading scientific articles within a chosen subject, synthesise the most important knowledge, prepare and give a 45 minute lecture that could be given either as a seminar to peers in the department or as a lecture in a composite mechanics course at M.Sc.-level.

Course literature

First 6 credits:

Foundations of Fibre Composites, Zenkert D. and Battley M., Dept. Aeronautical and Vehicle Engineering, Kungliga Tekniska Högskolan, Paper 96-10, 1996.

Following 4 credits:

To be decided depending on choice of subject but will contain a set of scientific articles, books, etc.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Written exam for the first part (same as SD2413), home-work problems, oral examination in seminar form.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.