SD2413 Fibre Composites - Analysis and Design 6.0 credits

Fiberkompositer- analys och design

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

Establishment

Course syllabus for SD2413 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Specific prerequisites

Base programme B, M, T. SD2411 Lightweight Structures and FEM and SD2414 Fibre composites - Materials and manufacturing are strongly recommended. Some experience with MatLab or programming in some other computer language is recommended.

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.

Course contents

Micromechanics, classical lamination theory, failure criteria including problem solving and a programming assignment based on these theories. The course continues with anisotropic plates, advanced methods for fatigue and fracture analysis and an overview of testing methods. Finite element modelling of composites is also covered. Compulsory elements of the course include, besides a written exam, a programming and design problem.

Course literature

Zenkert D. and Battley M., Foundations of Fibre Composites, FLYG, paper 96-10, 1996.

Hult, J. och Neumeister, J., Exempelsamling kompositmekanik, Skrift U52, Chalmers Tekniska Högskola.

Examination

- ÖVN1 - Assignment, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

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

Report from assignment (ÖVN; 3 university credits) and
Written exam (TEN; 3 university credits).

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.