FSD3406 Analysis of Advanved Composites Manufacturing 10.0 credits

Analys av kompositers tillverkning

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

Establishment

Course syllabus for FSD3406 valid from fall 2023

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Accepted to research studies in Aeronautical Engineering, Vehicle engineering or other program with similar background knowledge.

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 modelling of composites manufacturing. The main part of the course deals with theoretical principles which are put into practice in several assignments, both theoretical and experimental. The course also aims to provide theoretical deepening in order to reach the research front for a selected topic.
After the course the student is expected to

- Describe the most important process parameters and manufacturing processes using basic physical laws and constitutive equations
- Perform relevant simplifications of above given equations and thereby develop simplified models
- Implement developed models in suitable code (MATLAB or FEM) and perform simulations
- Analyse experimental results and make conclusions on the validity and limitations of developed models
- Use developed models for process optimisation (e.g. may be used to minimize energy consumption during processing)
- Be able to read and understand scientific articles in a chosen subject within process modelling for composites processing and explain the contents to someone else in an understandable way.
- Be able to utilise the material in scientific articles and implement this in own code or for own modelling purposes.

Course contents

The course focuses on the modelling of composite materials throughout its manufacturing processes with the aim to predict the quality of the manufactured components, reduce manufacturing time/costs etc. In more specific, the course discusses heat transfer modelling, material flow modelling, curing kinetics, shape distortion predictions and forming simulations. In the course, different kinds of models are derived and used, both for analytical modelling and as well as in numerical solutions. The validity of models based on fundamental physical laws, constitutive equations and phenomenological observations are discussed. Assumptions generally valid for composite materials are presented and used and towards the end of the course, all learning outcomes are used in an extended assignment mirroring the research front within that particular area.

Examination

- INL1 - Hand-in assignment, 6.0 credits, grading scale: P, F
- PRO1 - Project, 4.0 credits, grading scale: P, 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.

Individually performed assignments and final reporting.

Other requirements for final grade

Passed all examination parts (6+1)

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.