SD2706 Sailing for Performance 6.0 credits

Segling för prestanda

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

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

Establishment

Course syllabus for SD2706 valid from Spring 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Language of instruction

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

Intended learning outcomes

Various kinds of wind powered ships has been used for ages but in modern times sailing has been mostly reserved for recreational purposes in leisure boats. Recently however, wind assisted propulsion has become increasingly addressed for commercial purposes as a result of the need for renewable power in times of environmental awareness. New concepts are investigated and will likely be commercially implemented within short. The course addresses the mechanics of sailing in general applicable to all kinds of sailing vessels. The basic forces, moments and equilibriums are investigated and exploited to determine the performance of the vessel in various conditions.

After the course the student shall:

- know and be able to describe the fundamental concept of sailing
- be able to model the basic force/moment equilibriums of sailing
- be able to describe the various sources of drag of a hull
- be able to describe the behaviour of lifting foils
- implement the mechanical model and solve the equilibrium equations of a sailboat in a velocity prediction program (VPP)
- optimize the performance of a sailboat given a set of suitable constraints
- describe methods of deterministic weather routing, e.g. by dynamic programming
- know and be able to declare the characteristics, benefits and draw backs of different kinds of hulls
- know of state-of-the-art methods for VPP in yacht design
- be able to perform a rig design

Course contents

The course consists of theory, implementation of theory, exploration of the theory through evaluation, optimization of performance and decision making based on calculations. The theory is presented in a course binder and scientific papers. Lectures are used to discuss the theory, content of the papers and to assist in conceptual understanding. The models are implemented in computer code for effective evaluation of various sailboat designs. The implementation is then used in combination with external rules for iterative analysis for optimization of performance. Some guest lectures from experts in the field are planned.

Specific prerequisites

The course is aimed at students in the first or second year at a Masters program in engineering. Bachelor of engineering with working knowledge in Matlab, mechanics, algebra and calculus is required.

Course literature

Litterature will be handed out during the course.

Examination

- RAPP - Report, 6.0 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.

Other requirements for final grade

Final project with report and oral presentation.

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.