SG1220 Fluid Mechanics for Engineers 6.0 credits

Teknisk strömningsmekanik

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

Establishment

The course syllabus is valid from autumn term 2024 according to the decision of the Faculty Board: S-2024-0438. Decision date: 2024-04-15.

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed course SG1130 Mechanics I.

Language of instruction

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

Intended learning outcomes

After completing the course the student should be able to:

- apply the conservation laws for mass and amount of motion in various flow mechanical problems in order to analyze the power interaction between solid bodies and flowing or stationary fluids,
- identify and apply mathematical models for estimating flow mechanical quantities,
- conduct a comparative analysis between the results of a mathematical model and the corresponding empirical data

Course contents

Hydrostatics. The kinematics of currents. Streamline and particle path. Dimensional analysis. Frictionless incompressible flow. Bernoulli's equation. The control volume formulation of the continuity and momentum equation. Stream function for two-dimensional flow. Irrotational flow and velocity potential. Viscous flow: laminar and turbulent flow in channels and boundary layers, separation. Isentropic flow in stream tubes. Normal shock.

Laboratory exercises: Two compulsory laboratory exercises, which are carried out in groups of four technologists. Each laboratory session begins with a brief interrogation to check that all the group's members are prepared. The laboratory report can be completed at the laboratory session. In addition to the teaching, some demonstrations are carried out in the fluid mechanics laboratory by various flow phenomena.

Project assignment: Mandatory project assignment on the flow phenomenon around a two-dimensional wing profile, especially with regard to the determination of the lifting force. The labs are an integral part of this project assignment.

Examination

- PRO1 - Project, 2.2 credits, grading scale: P, F
- TENA - Examination, 3.8 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.

The examiner, in consultation with the KTH coordinator for disability (Funka), decides on any adapted examination for students with documented, permanent disability. The examiner may allow another examination form when re-examining individual students.

Other requirements for final grade

Project assignment including laboratory sessions (PRO1; 2,2 credits).
Oral exam (TEN1; 3,8 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.