SG1218 Fluid Mechanics 4.0 credits

Strömningsmekanik

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

Establishment

Course syllabus for SG1218 valid from Autumn 2018

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Basic courses in mathematics, mechanics and physics.

Language of instruction

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

Intended learning outcomes

- The student should be able to formulate mathematical models and make relevant approximations of fluid phenomena.
- The student should apply these models for simple cases and interpret the results.
- The student should gain some skill in carrying out experiments in fluids.

Course contents

The student should be able to

- Derive the Navier-Stokes equations and explain the meaning of its terms, including the stress and deformation rate tensors
- Compute the flow field for a number of so called exact solutions
- Derive the vorticity equation and give a physical explanation of its terms
- Use the concepts of stream function and apply the Bernoulli equation
- Discuss the principles of and derive the boundary layer approximation of the Navier-Stokes equations, and to give self similar solutions of these equations including simple thermal boundary layers.
- Describe the phenomena of separation of streamlines.
- Suggest methods for measuring the velocity in a fluid.

Disposition

Nine two-hour lectures the first three weeks. In the beginning of week four there is a theoretical test (swe. kontrollskrivning). The course also gives five two-hour exercises and an experimental lab. At the end of the course, students will do a project (group work) with poster presentation.

Course literature

Kundu & Cohen, Fluid Mechanics, Academic Press, 2015, föreläsningsanteckningar samt labb-pek.

Kundu & Cohen, Fluid Mechanics, Academic Press, 2008, lecture notes and lab-PM.

Examination

- PRO1 - Project, 1.5 credits, grading scale: P, F
- TEN1 - Exam, 0.0 credits, grading scale: P, F
- KON1 - Test, 2.0 credits, grading scale: P, F
- LAB1 - Laboration, 0.5 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.

KON1 - Test, 2,0 hp, grade scale: P, F

LAB1 - Lab, 0,5 hp, grade scale: P, F

PRO1 - Project, 1,5 hp, grade scale: P, F

TEN1 - Examination, 0 hp, grade scale: P, F

Other requirements for final grade

Requirements for final grade C-F

(KON1; 2,0 hp), examines theory and can give grade C-F.

(LAB1; 0,5 hp), performed lab with approved reporting.

(PRO1; 1,5 hp), performed project reporting by means of a poster presentation.

Requirements for final grade A-B (not mandatory)

(TEN1; 0 hp) Problem based examination, which examines skills in problem solving and application of mathematical methods.

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.