



SG2214 Fluid Mechanics 7.5 credits

Strömningsmekanik

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

Establishment

Course syllabus for SG2214 valid from Autumn 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Compulsory courses of the main programmes at F or T and for F SG2223 is recommended. Alternatively compulsory courses at B and M and in addition 5B1304 and 5C1921.

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 of fluid mechanical phenomena, and make relevant approximations.
- The student should be able to apply these models (numerically or theoretically) and interpret the result.
- The student should get a basic preparation for the future ability as a master of engineering to work with computational fluid mechanics in technical applications.

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
- describe the method of transferring from compressible to incompressible equations
- 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, velocity potential 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.
- describe simple phenomena in turbulence, as e.g. turbulent stresses.
- derive the Reynolds averaged equations
- suggest methods to measure the velocity in a flowing medium

Course literature

To be announced at course start. In 10/11: Kundu & Cohen, Fluid Mechanics, Academic Press, 2008.

Examination

- INL1 - Assignments, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 4.5 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

Homework assignment (INL1; 3 cr)

Exam (TEN1; 4,5 cr.)

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.