



FSG3135 Micro Fluid Flows 4.5 credits

Mikroströmningar

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 FSG3135 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Language of instruction

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

Intended learning outcomes

The purpose of the course is to introduce concepts and methods that are relevant for understanding the flow of liquids, and its importance for mixing and chemical reactions in geometries of microscopic dimensions. The emphasis is on the microscopic fluid mechanics that is relevant for chemical synthesis and analysis, as well as for micro systems technology.

Course contents

Examples of processes and applications, chemical synthesis and analysis. Low Reynolds number hydrodynamics, reversibility of low Re flow. Chaotic mixing, Liapunov exponents, Poincare maps. Surface tension, thermocapillary convection, wetting. Electrokinetics. Non-continuum effects. Micro fluidic devices.

Disposition

6 Lectures.

Typically one project/seminar per group of two students. In addition each project is assigned two 'opponents', that read the same material and prepare questions.

A short oral exam.

The course is given during the latter part of the spring term.

Specific prerequisites

Prerequisites are general courses in mathematics, basic physics etc. This course should be of interest to graduate and last year students in fluid mechanics, chemistry, biotechnology, micro systems technology etc, so special care is taken to make the material accessible for students with a quite varied background.

Course literature

Your own lecture notes, and copies of research papers. The lectures will cover scattered parts from the following books:

Micro Flows, G.E. Karniadakis, A. Beskok, Springer

Physicochemical Hydrodynamics, R.F. Probstein, Wiley

The kinematics of Mixing, J.M. Ottino, Cambridge Univ. Press

Elementary Fluid Dynamics, D.J. Acheson, Oxford, University Press

Examination

- PRO1 - Project work, 3.0 credits, grading scale: P, F
- TEN1 - Oral exam, 1.5 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.

PRO1 Project work 3,0 hp (P, F)

TEN1 Oral exam 1,5 hp (P, F)

Other requirements for final grade

Typically one project/seminar per group of two students.

In addition each project is assigned two 'opponents', that read the same material and prepare questions.

A short oral exam.

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.