LUNDS UNIVERSITET
Lunds Tekniska Högskola

*Course syllabus*

# Strömningslära
# Fluid Mechanics

## MMVN10, 7,5 credits, A (Second Cycle)

**Valid for:** 2023/24
**Faculty:** Faculty of Engineering, LTH
**Decided by:** PLED M
**Date of Decision:** 2023-04-11

## General Information

**Elective for:** F4, F4-bem, Pi4-bem
**Language of instruction:** The course will be given in Swedish

## Aim

The purposes of this course are to provide extended understanding of technical and fundamental relations and phenomena, and to provide a general survey of problem-solving methods, within the field of basic fluid mechanics.

## Learning outcomes

*Knowledge and understanding*
For a passing grade the student must

- be able to define shortly and/or clarify certain basic concepts, phenomena and measurement techniques in fluid mechanics
- have a comprehension of and be able to account for at some detail some basic and more advanced fluid relations
- have a comprehension of the laws of similarity, and their practical importance i scaling
- have a comprehension of the mechanisms of flow resistance and flow-induced forces considering technical aero- and hydrodynamic design

*Competences and skills*
For a passing grade the student must

- be able to assess reliability and accuracy of input data and calculated results
- be able to apply control volume analysis of the balances of mass and linear momentum, for stationary flow conditions

- be able to accomplish a complete dimensional analysis of a given dimensional problem
- be able to carry out elementary analysis of fluid drag and lift on immersed bodies and one- and two-dimensional compressible flow, and a detailed fluid analysis of simple and multiple-pipe systems, at stationary, one-phase, incompressible conditions
- be able to search for, compile, analyse and critically review information concerning a specific problem within fluid mechanics

*Judgement and approach*
For a passing grade the student must

- be able to demonstrate written communication skills that are well-structured, learning-oriented and illustrative concerning project report and other written examination
- be able to communicate verbally and in writing with the teachers of the course as well as with the students peers, on matters considering basic phenomena and problems in fluid mechanics

## Contents

Scope of fluid mechanics and fluid properties; viscosity; basic fluid statics; the Bernoulli equation; fluid kinematics; finite control volume analysis; basic differential analysis of fluid flow; similitude, dimensional analysis, and modelling; viscous flow in pipes; flow over immersed bodies; one-dimensional isentropic compressible flow through nozzles. In addition, in-depth studies are included in some sub-area of flow mechanics.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)
**Assessment:** Assessment of individual (written) home exercises, a final written examination, which consists of a theory part (without means of assistance) and an open-book problem-solving part, and written report and oral presentation of a project work. The course mark is determined the result from the written examination, the project report and (if any) bonus points from approved problem assignments. The graduation is determined from a special formula. The final grade is based 60% on the exam and 40% on the project assignment.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

**Parts**
**Code:** 0123. **Name:** Exam.
**Credits:** 4,5. **Grading scale:** TH. **Assessment:** Written exam
**Code:** 0223. **Name:** Project assignment.
**Credits:** 3. **Grading scale:** TH. **Assessment:** Project assignment

## Admission

**Admission requirements:**

- FMEA05 Engineering Mechanics - Statics and Particle Dynamics or FMEA15 Mechanics - Statics and Dynamics

**Assumed prior knowledge:** FMA430/FMAB30 Calculus in Several Variables and

FMFF01 Vector Analysis OR FMA435/FMAB35 Calculus in Several Variables.
**The number of participants is limited to:** No
**The course overlaps following course/s:** MMVF10, MMVF01, MMVF15

## Reading list

- Andrew L. Gerhart, John I. Hochstein and Philip M. Gerhart: Munson, Young, and Okiishi's Fundamentals of Fluid Mechanics - International Adaptation, 9th Edition. John Wiley & Sons, 2021, ISBN: 978-1-119-70326-6.

## Contact and other information

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