

Fluid Mechanics and Heat Transfer

Programme course

6 credits

Strömninglära och värmeöverföring

TMMI69

Valid from: 2017 Spring semester

Determined by

Board of Studies for Mechanical
Engineering and Design

Date determined

2017-01-25

Main field of study

Mechanical Engineering

Course level

First cycle

Advancement level

G1X

Course offered for

- Engineering Electronics
- Mechanical Engineering, B Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Calculus, Algebra

Intended learning outcomes

The course will provide basic knowledge of fluid mechanics and heat transfer, which is necessary to apply formulas and relationships about flows and heat exchange in technical constructions. Another objective of the course is to create understanding of fluid mechanics and heat transfer in technical applications. After the course the student should be able to:

- describe and define fundamental concepts and relations within fluid mechanics and heat transfer, for example conservation of mass principle, Bernoulli equation, linear momentum equation, with description of drag and heat transfer through conduction, convection and radiation.
- give an account of and analyse technical applications such as flow measurement, flow in pipes, fluid machinery and heat exchange.
- analyse and calculate engineering problems of the character treated during the course.
- analyse and explain phenomena of fluid mechanics and heat transfer.
- perform laboratory work, evaluate the results and write laboratory report.
- identify obviously unreasonable results.
- contribute to a durable development in the society by applying knowledge from the course to realize technical solutions that give an efficient use of energy under consideration of among other things environmental issues both national and international.

Course content

Science of motion: Fundamental relationships for flowing fluids, the continuity equation, Bernoulli's equation with applications, laminar and turbulent flow, flow measurement, flow in pipes, and pumps. Forces caused by fluid flows and flow with friction and related phenomena, both internal and external flow. Heat transfer: Basic theories for heat exchange through thermal conduction, convection and radiation. Thermal transmittance. Heat exchangers.

Teaching and working methods

The course is organized in lectures, seminars and laboratory work.

Examination

LAB1	Translation is not available	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Courses in Applied Thermodynamics and Fluid Mechanics, Engineering Mechanics, Fluid and Mechanical Engineering Systems and Energy Systems.

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Johan Renner

Examiner

Roland Gårdhagen

Course website and other links

<http://www.iei.liu.se/mvs/utbildning/grundkurser/tmmi69>

Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 108 h

Course literature

Additional literature

Books

Cengel, Yunus A., Turner, Robert H och Cimbala, John M., *Fundamentals of Thermal-Fluid Sciences*

Compendia

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.