

Fluid Mechanics and Heat Transfer

Programme course

6 credits

Strömninglära och värmeöverföring

TMMV11

Valid from: 2017 Spring semester

Determined by

Board of Studies for Mechanical
Engineering and Design

Date determined

2017-01-25

Main field of study

Energy and Environmental Engineering, Mechanical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- Energy-Environment-Management M Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
- Industrial Engineering and Management - International, M 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 and Thermodynamics.

Intended learning outcomes

The course will provide knowledge of fluid mechanics and heat transfer, to be able to analyze and apply formulas and relationships regarding flow and heat exchange in technical constructions, and further to create understanding of fluid mechanics and heat transfer in technical applications. The course should give knowledge of moist air and its psychrometric chart. After the course the student should be able to:

- describe and define fundamental concepts and relations within fluid mechanics and heat transfer, such as relations for flowing fluids and heat exchange.
- give an account of and analyse technical applications such as flow in pipes and heat exchangers.
- give an account of and apply fundamentals within moist air, and use the psychrometric chart.
- 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 och international.

Course content

The allotted course time is divided into three main sections:

1. Fluid Mechanics
2. Heat Transfer
3. Dry and Atmospheric air

Science of motion: Fundamental relationships for flowing fluids. Boundary layers. Impulse batches. Boundary layer separation. Flow around bodies. Flow in pipes and channels. Heat transfer. Basic theories for heat exchange. Thermal conduction, convection and radiation. Thermal transmittance. Technical applications of heat exchange, such as a heat exchanger. Moist air: fundamentals concepts and relations. The psychrometric chart and its use, for example determination of the dew-point temperature and mixing processes.

Teaching and working methods

The course is organized in lectures, seminars and laboratory work. The course is offered twice in 2016; Vt2 and Ht2.

Examination

LAB1	Laboratory work	1.5 credits	U, G
TEN1	Written examination	4.5 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/tmmv11>

Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

Course literature

Additional literature

Books

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

Storck, Karlsson, Andersson, Renner och Loyd, *Formelsamling i termo- och fluidodynamik*

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.