Computational Fluid Dynamics

Programme course

6 credits

Beräkningsmetoder i strömningslära

TMMV08

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Main field of study
Aeronautical Engineering, Mechanical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Energy-Environment-Management
- Mechanical Engineering, M Sc in Engineering
- Mathematics, Master's programme
- Mechanical Engineering, Master's programme

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
Numercial Methods, Algebra, Calculus, Energy Technology basic course, and preferably Heat Transfer. Familiarity with MATLAB (or equivalent) is also desirable.

Intended learning outcomes
The course aims to give a basic knowledge about simulation of fluid mechanical problems. After the course the student must be able to:

- Create models of flows and describe limitations of the model compared to the real case.
- Apply the finite volume model to discretize the governing equations of the flow.
- Implement numerical solvers (computer programs) for one- and two-dimensional flows.
- Use the implementations to analyse flow problems under different conditions.
- Analyse and value the results.

Course content
Basic fluid mechanics and its equations, Similarity, Problem formulation. Computational methods - an overview, the Finite volume method, Discretization, Boundary conditions, Transient problems, Turbulence and turbulence models.

Teaching and working methods
Teaching is in the form of lectures and computer sessions. The course includes a large amount of computer work. The examination consists of computer assignments, which are presented in reports.

Examination

PRA1	Project work. Written presentation.	6 credits	U, 3, 4, 5

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

Department
Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent
Johan Renner

Examiner
Jonas Lantz

Course website and other links
http://www.iei.liu.se/mvs/utbildning/avancerade-kurser/tmmv08?l=en

Education components
Preliminary scheduled hours: 60 h
Recommended self-study hours: 100 h

Course literature

Additional literature

Books

H. Versteeg / W. Malalasekera, (2007) *An Introduction to Computational Fluid Dynamics:The Finite Volume Method* 2nd Ed

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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.