



Faculty of Health, Science and Technology
Environmental and Energy Systems

Syllabus

Fluid mechanics

Course Code:	EMGA78
Course Title:	Fluid mechanics <i>Strömningslära</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:

KTA (Chemical Engineering)

MEI (Environmental and Energy Systems)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2019-02-22, and is valid from the Autumn semester 2019 at Karlstad University.

Prerequisites

Registration on Foundation Course in Mathematics, 7.5 ECTS credits, or equivalent

Learning Outcomes

The aim of the course is that students acquire basic knowledge of energy engineering methods, concepts, and problems. Students develop skills in solving fluid mechanics problems.

Upon completion of the course, students should be able to:

- use dynamic similarities and dimensional analysis in solving problems,
- explain the concepts of static, dynamic, and total pressure,
- describe different ways of measuring fluid pressure, flow, speed, and viscosity,

- use the basics of statics and fluid mechanics to calculate normal force, lift, and friction force,
- give an account of how the properties of fluids affect their flow,
- apply the momentum equation to flowing fluids,
- interpret Bernoulli's equation, decide if it is valid for a given flow case and use it in calculations,
- calculate friction pressure drop in pipes and complex pipe systems,
- give an account of the functions and principles of different hydraulic machines,
- calculate the dimensions of fans and pumps for different systems,
- give an account of laminar and turbulent flows and conversion criteria, and
- give an account of the "no slip" condition.

Content

The course is based on lectures and lessons. Laboratory sessions are offered.

The course comprises the following components:

- dimensional analysis
- viscosity
- the concept of pressure
- hydrostatics
- ideal and viscose fluids
- incompressibility
- the no slip condition
- momentum
- the continuity equation
- speed and flow measurements
- Bernoulli's equation
- laminar and turbulent flow
- pressure losses
- boundary layer theory
- pipe systems
- hydraulic machines
- pump systems
- fan systems
- system curve
- point of operation
- cavitation

Reading List

See separate document.

Examination

Assessment is based on an individual written exam.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For Engineering students, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), U (Fail) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion

of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

EMGA78 cannot be included in the same degree program as EMGA71, EMGA74, EMGA76, CKGB41, and parts of EMGA73.