Fluid Mechanics

Code: MK3ARARL05GX17-EN

ECTS Credit Points: 5

Evaluation: exam

Year, Semester: 2nd year, 2nd semester

Its prerequisite(s): Thermodynamics

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 3+2

Topics:

Introduce concepts, principles, laws, observations, and models of fluids at rest and in motion. Provide a basis for understanding fluid behaviour and for engineering design and control of fluid systems. Develop competence with mass, energy and momentum balances for determining resultant interactions of flows and engineered and natural systems. The topics of the course as follows: The topics of the course as follows: Status and status

indicators, basics of hydraulics, buoyancy, Flow description methods, motion forms of flows, Inviscid vortex theorems, Motion equation of ideal fluids, conservation of mass flow, Bernoulli's equation, Conservation linear and angular momentum, Real fluids, viscosity, boundary layer, Navier-Stokes's equation, Gas dynamics, stagnation and critical conditions, Hydraulic losses, friction, and head losses, Elastic liquids and water hammer, Fluid dynamic coefficients, Types of vortices and modelling methods, Types of fluid machines, volumetric pumps.

Literature:

Compulsory:

- Lakatos Á. Basics of heat transfer and fluid mechanics. 2014, Terc Kft.
- David A. Chin Fluid Mechanics for Engineers in SI Units ISBN: 1292161043

Schedule

1st week Registration week	
2nd week: **Lecture:** Status and status indicators, basics of hydraulics, buoyancy. **Practice:** Pressure calculations. Buoyant force calculation.	**3rd week:** **Lecture:** Flow description methods, motion forms of flows, Inviscid vortex theorems. **Practice:** Static pressure calculations. Determination of water levels
4th week: **Lecture**: Motion equation of ideal fluids, conservation of mass flow, Bernoulli's equation. **Practice:** Applications of Bernoulli's equation for ideal fluids.	**5th week:** **Lecture:** Conservation linear and angular momentum. **Practice:** Application of the conservation theorems
6th week: **Lecture:** Real fluids, viscosity, boundary layer, Navier-Stokes's equation. **Practice:** Solving problems in the theme of the lecture	**7th week:** **Lecture:** Gas dynamics, stagnation and critical conditions. **Practice:** Mach cone calculation.
8th week: 1st drawing week	
9th week: **Lecture:** Hydraulic losses, friction, and head losses. **Practice:** Friction loss calculations.	**10th week:** **Lecture:** Elastic liquids and water hammer. **Practice:** Applications of Bernoulli's equation for real fluids.
11th week:	**12th week:**

Lecture: Fluid dynamic coefficients. Drag and lift forces. **Practice:** Calculations of fluid dynamic coefficients and wind loads. **13th week:** **Lecture**: Types of vortices and modelling methods. **Practice:** Applications of Bernoulli's equation for real fluids.	**Lecture:** Types of fluid machines, volumetric pumps. **Practice:** Volumetric pump efficiency calculations. **14th week:** **Lecture:** Examples of flow simulations. **Practice:** Applications of Bernoulli's equation for real fluids.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance on the lectures is recommended, but not compulsory.

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Student cannot make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, to be discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course with them to each practice. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class.

During the semester there is a mid-term test in the 15th week. Students have to sit for the tests.

B, for grade:

The course ends with exam grade. Based on the average of the test results 30% + the exam grade from the theory 70% the mid-semester grade is calculated as an average of them.

The minimum requirement for the mid-term, end-term tests and for the exam is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following:

0-50 % = fail (1); 51-60 % = pass (2); 61-74 % = satisfactory (3); 75-89 % = good (4); 90-100 % = excellent (5)