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 basis for understanding fluid behavior 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. Develop basis for correlating experimental data, designing tests, and using scale models of fluid flows. Learn nature of rotation, circulation, resistance (viscous, turbulent),boundary layers, and separation with applications to drag and lift on objects. Learn methods for computing headlosses and flows in simple pipes and channels. Classification of Fluid Machines; Energy Transfer in Fluid Machines, in Turbomachines; Impulse and Reaction machines. Gas Turbines and Propulsion systems. Centrifugal Compressor, Compressor characteristics. Axial Flow Compressors, Velocity diagrams, Compressor characteristics. Steam Turbines. Introduction, Flow through nozzles, Stagnation properties, sonic properties and isentropic expansion through nozzles.

Literature:

Compulsory:

- Lakatos Á. Basics of heat transfer and fluid mechanics. 2014, Terc Kft.
- Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, (2009) Fundamentals of Fluid Mechanics, John Wiley and Sons, ISBN 978-0470262849, 776 pages
- Robert W. Fox, Alan T. McDonald, Robert W Fox, (1998) John Wiley and Sons, ISBN 978-0471124641, 762 pages
- Shashi Menon (2004) Piping Calculations Manual, ISBN 978-0071440905 666 pages
- Paul Hanlon (2001), Compressor Handbook, McGraw-Hill Professional, ISBN 978-0070260054, 720 pages
- Tony Giampaolo (2006) Gas Turbine Handbook: Principles and Practice, Fairmont Press, ISBN 978-0849390562, 437 pages

Schedule

1st week Registration week	
2nd week: Introduce concepts, principles, laws, observations, and models of fluids at rest and in motion Lecture: Provide basis for understanding fluid behavior and for engineering design and control of fluid systems. Practice: Solving problems in the theme of the lecture	3rd week: Lecture: Develop competence with mass balances for determining resultant interactions of flows and engineered and natural systems. Practice: Solving problems in the theme of the lecture
4th week: Lecture: Develop competence with energy balances for determining resultant interactions of flows and engineered and natural systems. Practice: Solving problems in the theme of the lecture	5th week: Lecture: Develop competence with momentum balances for determining resultant interactions of flows and engineered and natural systems. Practice: Solving problems in the theme of the lecture
6th week:	7th week:

Lecture: Develop basis for correlating experimental data, designing tests, and using scale models of fluid flows. **Practice:** Solving problems in the theme of the lecture	**Lecture, practice:** Solving problems in the theme of the lecture
8th week: 1st drawing week	
9th week: **Lecture:** Learn nature of rotation, circulation, resistance (viscous, turbulent),boundary layers, and separation with applications to drag and lift on objects. **Practice:** Solving problems in the theme of the lecture	**10th week:** **Lecture:** Learn methods for computing headlosses and flows in simple pipes and channels. **Practice:** Solving problems in the theme of the lecture
11th week: **Lecture:** Classification of Fluid Machines; Energy Transfer in Fluid Machines, in Turbomachines; Impulse and Reaction machines. **Practice:** Solving problems in the theme of the lecture.	**12th week:** **Lecture**: Gas Turbines and Propulsion systems. Centrifugal Compressor, Compressor characteristics. **Practice:** Solving problems in the theme of the lecture
13th week: **Lecture:** Axial Flow Compressors, Velocity diagrams, Compressor characteristics. Steam Turbines. **Practice:** Solving problems in the theme of the lecture	**14th week:** **Lecture:** Introduction, Flow through nozzles, Stagnation properties, sonic properties and isentropic expansion through nozzles. **Practice:** Solving problems in the theme of the lecture
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 can't 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 are two tests: the mid-term test is in the 8th week and the end-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 x 0.3 + the exam grade from the theory x 076 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 table:

Score	Grade
0-50	fail (1)
51-60	pass (2)
61-74	satisfactory (3)
75-89	good (4)

90-100	excellent (5)