Syllabus

AKM 204E- FLUID MECHANICS

2016-2017 Fall

Instructor	**:**	Hakan Öksüzoğlu
Student meeting hours	**:**	See http://web.itu.edu.tr/hoksuzoglu/ for up to date hours
Course hours	**:**	Monday 8:30-10:30 and Wednesday 8:30-9:30 (D361A)

Course Description

General topics, Hydrostatics, Kinematics, Conservation equations in integral form, Linear momentum theorem, Bernoulli equation and applications, Navier-Stokes equations, Dimensionless numbers, Similarity, Flow in pipes, Laminar and turbulent flows, Friction in pipes, Losses in pipes, Turbomachinery.

Textbook

Y.A. Çengel , J.M. Cimbala, **Fluid Mechanics Fundamentals and Applications**, 3rd edition, McGraw-Hill, 2013 (Translation: T. Engin, Palme Yayıncılık, 2015).

Other references

1- F. M. White, **Fluid Mechanics**, 4th Edition, 1999
(Translation: K. Kırkköprü, E. Ayder, Literatür Yayınevi, 2004).
2- B.R. Munson, D.F. Young and T. H. Okiishi, 2006, **Fundamentals of Fluid Mechanics**, 5th Edition, J. Wiley and Sons (Translation: N. Yücel, N. Dinler, H. Türkoğlu, Z. Altaç,
3- P. J. Pritchard, Fox and McDonald's **Introduction to Fluid Mechanics**, 8th Edition, 2011 (Translation: A. Pınarbaşı, Palme Yayıncılık, 2015).
4- V.L. Streeter, E.B. Wylie, **Fluid Mechanics**, McGraw Hill, 1983.
5- J.H. Shames, **Mechanics of Fluids**, Mc Graw Hill, 1992.

Aim of the course

1. Introduce the fundamental concepts of fluid mechanics
2. Describe the general equations and principles of fluid mechanics.
3. Gain ability to formulate and solve fluid dynamic problems

Abilities supported by the course :

1. Knowing the distinctions and similarities between liquids and gases.
2. Solving problems related to shear stresses in fluids
3. Ability to apply hydrostatic rules to daily problems
4. Measuring/calculating velocity profiles in a flow
5. Learning how to measure velocity, volumetric flow rate and pressure
6. Ability to form dimensionless groups
7. Analyzing pipe flows, calculating pressure drop along a pipe
8. Ability to distinguish flows based on their compressibility, steadiness, viscous behavior, etc.
9. Calculating forces that act on objects
10. Pump and turbine characteristics

Weekly schedule:

Week	**Topics**
1	Introduction and Basic Concepts,
2	Properties of Fluids
3	Pressure and Fluid Statics, Hydrostatics
4	Pressure and Fluid Statics, Linear Acceleration , Rotation
5	Fluid Kinematics
6	Reynolds Transport Theorem: Continuity and Momentum Equation
7	Reynolds Transport Theorem: Energy and Bernoulli Equations
8	Continuation **(Midterm 1)**
9	Linear Momentum Analysis
10	Internal Flows, Laminar and Turbulent Flows
11	Internal Flows, Major-Minor Losses, Moody diagram
12	Dimensional Analysis and Modelling
13	External Flow, Drag and Lift **(Midterm 2)**
14	Turbomachinery and Applications

Grading:

Midterms	**:**	2	% 20 + % 20
Quiz	**:**	2	% 5 + % 5
Homework	**:**	2	% 5 + % 5
Final exam	**:**	1	% 40

All announcements will be made on the following website:
http://www.ninova.itu.edu.tr
In order to be able to take the final exam:

- You should attend at least **70% of the classes and achieve at least 35/100** as an average of the midterm exams.