



Department of Physics

Course Code	Course Number	Course Name	Credit Hours	Lecture	Lab	Tut	Prerequisites
PHY	404(307-313)	Fluid Mechanics	3	3	0	1	MAT 203

Instructor	
Office	
Phone	
Office Hours	

Course Materials

Textbook:

Title	
Authors	
Publisher	
Edition/Year	

Extra Useful Resources:

- 1- Introduction to Fluid Mechanics. Fox, McDonald & Pritchard, 6th Edition, Wiley, 2004.
- 2- Fluid Mechanics, FM White McGraw-Hill, 1994
- 3- Physics for Scientists and Engineers, 6-ed, J. Serway, Thomson Brooks/ Cole, 2004, Ch.14.
- 4- Fluid Mechanics: A brief introduction, 3-rd ed., D.F. Young, B.R. Munson and T.H. Okiiski, J. Wily, 2004, Ch. 3-6.
- 5- Fluid Mechanics, Fundamental and Applications, 2-nd ed., Y.A. Cengel and J.M. Cimbala, McGraw Hill, 2010.)

Course Objectives:

- To show students how a variety of mathematical methods can be applied to the study of fluid flow.
- To convey an understanding of physical principles of fluid flow.

Other Requirements:

Exams: There will be three exams (mid term 1, mid term 2, and final). Examinations include short answers, and problems. These will be similar in type and content to class discussions. They are designed to test your comprehension of the course.





Classroom Participation: You are expected to participate in the classroom discussion by answering questions by asking good questions, raising issues, and making observations. No comment is considered “bad” as long as it makes a constructive class contribution. The instructor believes that a good learning environment is a safe environment—one in which all feel free to question and discuss. A sense of humor is always welcome!

Penalty For Dishonesty: Each student is expected to do his own work on all of the course material. Each person is expected to contribute equally on the class project and each team is expected to do their own work (not collaborate with others outside the team), otherwise each person involved will be subject to the University Dishonesty Policy.

Attendance: Attendance will be taken at the beginning of the class period. If you are late for a class, it is your responsibility to advise me at the end of the class that you were present. Failure to do so on the day in question will result in you being marked absent for that class. Mobile is not allowed to be used in class at all. Therefore, please keep it off during class time.

Grading:

Midterm 1: 20% Date: end of the 6th week
Midterm 2: 20% Date: end of the 12th week
Quiz, Research and Homework: 20%
Final Exam: 40% Date: end of the semester

Course Contents

Week	Topics to be covered	Hours
2	Fluid Mechanics Basics: Flow, Pressure, Properties of fluids, Viscosity.	8
2	Statics: Hydrostatic pressure, Manometer – pressure measurement. Hydrostatic forces on submerged surfaces.	8
4	Kinematics: particle paths and streamlines, material derivatives, continuity equation, incompressibility and stream-function, analysis of motion relative to a point (in -2D), irrotational flow, velocity potential, complex potential.	16
3	Momentum and energy in inviscid flow: body forces and stresses, Euler’s momentum equation, hydrostatics, Brenoulli’s theorem and its applications, Kelvin’s circulation theorem.	12
2	Potential flow: uniform stream, line-source, dipole, line-vortex, modeling of flow round cylinders.	8
1	Linear water waves: particle paths, phase and group velocity.	4

