KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al Imam Mohammad Ibn Saud Islamic University
College of Science
Department of Physics

المملكة العربية السعودية
وزارة التعليم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الفيزياء

SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Language*
PHY	**404**	**Fluid Mechanics**	**3**	**2**	**0**	**2**	**5**	**PHY 303**	**8**	**English**

A. Course Description

This course covers the basic concepts and principles of modern fluid mechanics. It examines the fundamental aspects of fluid motion including important fluid properties, regimes of flow, pressure variations in fluids at rest and in motion, methods of flow description and analysis. The course consists of examples and text involving everyday situations to reinforce the concept that fluid mechanics is an important part of our world as well as enabling students to develop problem solving skills.

B. Course Outcomes

At the end of this course the student will be able to**:**

1. Understand the fundamental a fluid mechanics fundamentals, including concepts of mass and momentum conservation.
2. Apply the Bernoulli equation to solve problems in fluid mechanics.
3. Apply control volume analysis to problems in fluid mechanics.
4. Use potential flow theory to solve problems in fluid mechanics.
5. Gain a knowledge of laminar and turbulent boundary layer fundamentals.

C. References

Required Textbook

Young D.F., Munson B.R., Okiishi T.H. and Huebsch W.W., ***Introduction to Fluid Mechanics,*** SI Version, 5th Edition, Wiley (2011).

Other references

- Robert W.F., Alan T.M, and Pritchard P.J., ***Introduction*** to fluid mechanics, 6th Edition, Wiley (2004).
- Prieve D.C., ***A Course in Fluid Mechanics with Vector Field Theory,*** Web Draf (2000).
- Chorin A., and Marsden J.E., ***A Mathematical Introduction to Fluid Mechanics,*** 4th Edition, Springer-Verlag Publishing Company (2000).

Course Website: http://www.imamm.org/

D. Topics Outline

1. ***Fluid Mechanics Basics:*** *Flow, pressure, properties of fluids, viscosity (*Contact hours*: 8).*
2. ***Statics:*** *Hydostatic pressure, Manometer–pressure measurement, hydrostatic forces on submerged surfaces (*Contact hours*: 8).*
3. ***Kinematics:*** *Particle paths and streamlines, material derivatives, continuinity equation, incompressibility and stream-function, analysis of motion relative to a point (in -2D), irrotational flow, velocity potential, complex potential (*Contact hours*: 16).*
4. ***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 (*Contact hours*: 12).*

5. ***Potential Flow:*** *Uniform stream, line-source, dipole, line-vortex, modeling of flow round cylinders (*Contact hours*: 8).*
6. ***Linear Water Waves:*** *Particle paths, phase and group velocity (*Contact hours*: 8).*

E. Office Hours

Office hours give students the opportinuity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam**: 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	**Midterm 2:** 20 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3