The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Fluid Mechanics II	0904462	

2019 Course Catalog Description

Review of basic definitions, system and control volume, Foundations of flow analysis, differential from of the basic laws, general viscous flow, boundary layer theory, Navier–Stokes equations, Blasius equation, Irrotational flow, stream function, vorticity and rotationality, Incompressible inviscid frictionless flow, Introduction to Aerodynamics, compressible flow, adiabatic and isentropic flow, Normal shock waves, Nozzles.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	

Text Books

	Text book 1	Supplemental material
Title	Engineering Fluid Mechanics	Handouts
Author(s)	Elger, D. F., Williams, B. C, Crowe, C. T., and Roberson, J.A.	
Publisher, Year, Edition	John Wiley and Sons., 2016, 11th edition, (SI units)	

References

Books	1.Frank M. White (1999) Fluid Mechanics, (4th Edition). McGraw- Hill. 2.Bruce R. Munson, Donald F. Young and Theodore H. Okiishi (1994) Fundamentals of Fluid Mechanics, (2nd Edition). John Wiley and Sons.
Journals	-
Internet links	National Committee on Fluid Mechanics Films http://www.mit.edu/hml/ncfmf.html

Prerequisites

Prerequisites by topic	Numerical analysis
Prerequisites by course	Fluid Mechanics (I) 0904361.
Co-requisites by course	-
Prerequisite for	-

Topics Covered

Week	Topics	Chapter in Text	Sections
1, 2	Acceleration of a system of fluid particles, vorticity and rotation. Control volume approach and Differential form of Continuity equation.	Chapters 4&5	4.1, 4.2, 4.6-4.8; 5.3, 5.4 & 5.5
3	Differential form of Momentum and angular-momentum equations	Chapter 6	6.1, 6.4, 6.5 & 6.6
4,5	Differential form of Energy Equation in system of particles of Flowing fluids and pressure gradients, and study systems of pipes	Chapter 7 and 10	7.2, 7.6; 10.6, 10.7 & 10.10
6, 7	Boundary layer equations	Chapter 9	9.1 – 9.6
8-10	Drag and Lift	Chapter 11	11.1 – 11.11
11-14	Compressible fluid flow	Chapter 12, 13	12.1-12.5 & 13.3
15	Turbomachinery and open channels* *If time allows	Chapter 14 and 15	14.1 – 14.9 & 15.1-15.6

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes

1	1. Study flow kinematics concepts-streamlines, vorticity and rotation 2. Study the conservation of mass, momentum and energy principles using control volume approach and differential form 3. Introduction to boundary layer theory 4. Introduction to aerodynamics and study the important parameters as drag and lift forces
2	5. Study the compressible flow and the related phenomena such as the shock waves and design application 6. Introduction to the turbomachinery and the study of mechanical devices such as pumps and turbines* 7. Study flow in open channels and the related phenomena such as the hydraulic jump* *If time allows

Evaluation

Assessment Tools	Expected Due Date	Weight
Assignments		25 %
Midterm Exam		25 %
Final Exam		50 %

Contribution of Course to Meet the Professional Components

The course contributes to building fundamental concepts of real fluid flow dynamics and motion analysis and compressible fluid flow, turbomachinery, drag and Lift and flow networks piping systems.

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	X	X					

Relationship to Mechanical Engineering Program Objectives (MEPOs)

MEPO1	MEPO2	MEPO3	MEPO4	MEPO5

ABET Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated by ABET Committee, 2021