



**JORDAN UNIVERSITY OF SCIENCE AND
TECHNOLOGY
INDUSTRIAL ENGINEERING DEPARTMENT**



Course Number and Name	IE 214: Fluid and Thermal Sciences
Course Description	The course covers fluid properties, flow classifications, fluid statics, conservation of mass equations, conservation of momentum equations, and conservation of energy equations. The course also covers properties of pure substances, P-V-T phase diagrams, property tables, first and second law of thermodynamics, one-dimensional steady-state conduction, free convection, and radiation heat transfer.
Credits and contact hours	3 h
Pre- or Co-requisites	Chem. 102 – General Chemistry II
Required/ Elective	Required

Text Book(s)
1- <u>Fundamentals of Thermal-Fluid Sciences. Y.A. Cengel, R.H. Turner, J.M Cimballa. 3rd Ed. Mc Graw Hill; 2008</u>

References	
Books	<ol style="list-style-type: none"> <u>1. Thermodynamics An Engineering Approach. Y.A. Cengel, M. A. Boles. 4th Ed. Mc Graw Hill; 2002</u> <u>2. Introduction to Fluid Mechanics. R.W. Fox, A.T. McDonald, P.J. Pritchard. 6th Ed. John Wiley & Sons, Inc. ; 2004</u> <u>3. Introduction to Heat Transfer. F.P. Incropera, D.P. DeWitt. 4th Ed. John Wiley & Sons, Inc. ; 2002</u>
Journals and Internet links	Refer to the library catalogue to use any other related materials/textbook(s). Books and other material wherever listed may be subject to change. Book lists relating to 'Textbooks' and “References” are available at the University Library.

		Evaluation
Assessment Tool	Expected Due Date	Weight
First Exam.	Date will be posted/ According to the University schedule	25 %
Second Exam.	Date will be posted/ According to the University schedule	25 %
Final Exam.	According to the university final examination schedule	40 %
Tentative	Homework; Quiz; Class activities	10 %

Objectives and Outcomes	
Objectives	Outcomes
1. Introduction and familiarization with the concepts of thermodynamic; Understand and analyze property diagrams and property tables; Studying the basic laws of thermodynamics and their applications	Capability to demonstrate knowledge of professional code of ethics via exams and classroom activities as individual and in a group. Compute and solve engineering problems related to the various topics covered in this course. Illustrate the manner in which knowledge of heat transfer may be used with the first law of thermodynamics.
2. Defining fluid properties and flow classifications; Studying the principles of hydrostatic and its applications.	Solve fluid statics problems for practical situations. Quantify and understand the basic laws governing the fluid motion.
3. Develop an understanding for the fundamental concepts and principles of heat transfer processes.	Demonstrate how thermal circuits can be used to model heat flow. Explain the concept of heat transfer by radiation; it is relevance to industrial heating and cooling. Compute radiative exchange between two surfaces.

Topics Covered	
Week	Topics
1-5	Part I –Thermodynamics; Introduction; Properties of pure substances; Closed and open systems; P-V-T phase diagrams; Property tables; First and second law of thermodynamics.
6-10	Part II–Heat Transfer; One-dimensional steady-state conduction; Free convection, and radiation heat transfer; The plane wall; Thermal resistance; The composite wall; Radial systems.
11-14	Part III –Fluid Mechanics; Fluid properties; Flow classifications; Fluid statics, Basic laws for a system; Conservation of mass; Momentum equation; Rate of work done by a control volume and control volume equation.