The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Heat Transfer I	0904441	

2019 Course Catalog Description

Introduction to modes of heat transfer, one-dimensional steady state conduction, unsteady state conduction, lumped heat capacity system, introduction to convection, flow and thermal boundary layers. Laminar and turbulent boundary layers, convection in internal and external flows, empirical relations for forced convection heat transfer, natural convection systems, condensation and boiling, introduction to thermal radiation.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	

Text Books

	Text book 1	Text book 2
Title	Fundamentals of Heat and Mass Transfer	(Handouts)
Author(s)	Incropera F., Dewitt D., Bergman T. and Lavine A.	-
Publisher, Year, Edition	John Wiley & Sons, 2007, 7th Edition	-

References

Books	1.Hollman, J. P. Heat Transfer, 10th Edition. McGraw-Hill. 2.Cengel Y. and Ghagar Afshin J., Heat and Mass Transfer, Fundamentals and Applications, 4th Edition, McGraw-Hill.
Journals	International Journal of Heat and Mass Transfer, www.elsevier.com
Internet links	http://nptel.ac.in/courses/112104121/

Prerequisites

Prerequisites by topic	-
Prerequisites by course	Fluid Mechanics 0904361 + Thermodynamics I 0904341
Co-requisites by course	-
Prerequisite for	-

Topics Covered

Week	Topics	Chapter in Text	Sections
1	Introduction: conduction, convection and thermal radiation	Chapter 1	
2	Conduction heat transfer	Chapter 2	
3	One-dimensional steady state conduction: Plane wall, radial systems, conduction with thermal energy generation and heat transfer from extended surfaces	Chapter 3	
4	Transient conduction: Lumped capacitance method	Chapter 5	
5	Convection heat transfer	Chapter 6	
6-7	External flow: Flat Plate, cylinders and spheres and flow across bank of tubes	Chapter 7	
8	Internal flow: Flat plates, cylinders and spheres	Chapter 8	
9	Free convection*	Chapter 9	
10	Boiling and condensation*	Chapter 10	
11-12	Heat exchangers	Chapter 11	

13-14	Thermal radiation*	Chapter 12	
15	Radiation Exchange between Surfaces*	Chapter 13	
*	Selected topics may be covered depends on time		

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
1	1. Perform analysis for steady state conduction in composite walls, cylinders, spheres and fins side by side. 2. Perform analysis for unsteady state conduction using lumped capacitance method. 3. Perform analysis for convection heat transfer in internal and external flow and convection with phase change. 4. Introduce the basic principles of thermal radiation. 5. Perform analysis on heat exchangers.

Evaluation

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

Contribution of Course to Meet the Professional Components

The course contributes to building the fundamental basic concepts of heat transfer and lay out basic principles of heat systems design.

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	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