



ChE 345: Heat Transfer

3 credit hour, 3 contact hour lecture, 3 credit hour Eng.

Instructor

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Textbooks & References

A. Textbook

	Textbook 1
Title	Heat and Mass Transfer
Author(s)	Çengel, Y. and Ghajar, A.
Publisher	McGraw-Hill, New York
Year	2015
Edition	5 th ed

B. References

1. Holman, J. P. Heat Transfer, 9th ed., McGraw –Hill, New York, 2010.
2. Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, David P. DeWitt, Fundamentals of Heat and Mass Transfer, 8th ed., Wiley, New York, 2018.
3. Carslaw , H.S., and Jaeger, J.C., Conduction of Heat in Solids, 2nd ed., Oxford University Press, New York , 1959.

Specific Course Information

A. Course Catalog:

Basic concepts and mechanisms of heat transfer. Heat conduction equation in various coordinate systems. Steady heat conduction. Transient heat conduction (Lumped system analysis). Fundamentals of convection. External and internal forced convection. Natural convection. Heat Exchangers.

B. Prerequisites or co-requisites

Prerequisites: ChE 244 (Fluid Mechanics)

C. Required/Elective or Selected Elective

Required

Objectives and Outcomes*

1. Identify and explain the basic mechanisms and modes of heat transfer [1]
2. Solve steady-state and transient one-dimensional heat conduction problems [1]
3. Classify and solve forced and free convection heat transfer problems [1]
4. Analyze and design double pipe, shell and tube, and cross-flow heat exchangers [1,2]

Contribution of Course to Meeting the Professional Component

Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
80	20					

Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
Y	Y	-	-	-	-

Topics Covered

1. Introduction and basic concepts
2. Heat conduction equation
3. Steady heat conduction
4. Transient heat conduction
5. Fundamentals of convection
6. External forced convection
7. Internal forced convection
8. Natural convection
9. Heat Exchangers

Evaluation

Assessment Tool	Expected Due Date	Weight
Homework and Quizzes	One week after homework problems are assigned	10 %
First Exam	According to the department schedule	25 %
Second Exam	According to the department schedule	25 %
Final Exam	According to the University final examination schedule	40 %

* Number in brackets refer to the student outcomes