NEW JERSEY INSTITUTE OF TECHNOLOGY – OTTO H. YORK DEPARTMENT OF CHEMICAL, BIOLOGICAL, AND PHARMACEUTICAL ENGINEERING

CHE 370 - Heat and Mass Transfer

Fall 2017

Instructor:	Dr. Alexandre Ermoline
Instructor Contact:	alexandre.ermoline@njit.edu
Office Hours:	By appointment
Class Meetings:	W from 5:45 PM to 9:35 PM Central King Building 217
Teaching Assistant:	Qian Lei
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Required Textbook:	Heat and Mass Transfer: Fundamentals and Applications, by Yunus Cengel and Afshin Ghajar, published by McGraw-Hill Education, New York, NY. ISBN - 13: 978-0073398181, ISBN-10: 0073398187. 5th edition, 2015.
Recommended Textbook:	Transport Phenomena, by R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot. ISBN-13: 978-0470115398 ISBN-10: 0470115394 , Revised 2nd Edition
Course Description:	The principles of heat and mass transfer in chemical engineering systems are covered. Steady and unsteady heat transfer is examined, with emphasis on the heat exchanger design. Mass transfer by steady and unsteady molecular diffusion, and turbulent convective mass transfer is studied.
Course Prerequisite:	CHE 240, CHE 260, MATH 222
Required Software:	Latest versions of Matlab, MS Office, Adobe Reader (all can be downloaded from NJIT IST webpage). Student Mall labs and ChE department PC lab have most of the software. Please, see Highlander Pipeline for Matlab tutorial and example programs.
Specific Course Objectives:	1. To develop the students' skills in applying differential equations for describing steady and transient heat and mass transfer problems. 2. To develop the students' skills in applying engineering design approaches for heat and mass transfer components and systems 3. To develop the students' skills in modeling and dimensionless analysis for heat and mass transfer problems in different geometries 4. To provide the students with fundamental theoretical concepts and practical analysis skills associated with convective heat and mass transfer

5. To provide the students with fundamental theoretical concepts and practical analysis skills associated with radiation heat transfer
6. To develop students' skills in solving practical heat transfer problems using thermal resistance networks
7. To develop students' skills in working with contemporary heat and mass transfer related research literature and develop their own, application driven engineering solutions working as a team.

Course outcomes (ABET)

a) an ability to apply knowledge of mathematics, science and engineering
c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d) an ability to function on multi-disciplinary teams
e) an ability to identify, formulate, and solve engineering problems
f) an understanding of professional and ethical responsibility
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
i) a recognition of the need for, and an ability to engage in life-long learning
j) a knowledge of contemporary issues
k) an ability to use the techniques, skills and modern engineering tools necessary for chemical engineering practice

Grading :

Homework	15%
Quizzes	10%
Project	10%
Test 1	20%
Test 2	20%
Final Exam	25%
Total	= 100 %

Letter Grades (Tentative – Subject to change): A 90 – 100% ; B+ 84 – 89% ; B 78 -83% C+ 72 – 77% ; C 66 – 71% ; D 60 – 65% F 0 – 64%

Course Policy:

Homework will be assigned through Moodle: http://moodle.njit.edu – Please, check this site and your e-mail often. Most of the homework, problem solutions, lecture handouts, and some of the quizzes will be on this site.

Quizzes will be either posted on Moodle or given occasionally at the beginning or end of the class. If you miss the class, you will miss the quiz that day. There will be no makeup quiz! Close book and close notes!

Project - work in groups (you form). A Peer & Self Evaluation will be done at the conclusion of the project that will impact your grade; more details later.

All exams are Open Textbook unless otherwise specified.

Attendance will be taken. Students are expected to attend all classes and on time. Experience shows that students who do not regularly attend class typically perform poorly in the course. In addition, examples are worked out during the lectures. These examples may not be posted online. Students are responsible for all material covered in class.

The use of telecommunication devices (for any reason including texting and use as a calculator) is not allowed during class hours.

A letter grade is based on the weighted average score, a table of average score-letter grade categories. The scale converting numerical to letter grades may be changed.

If a student has questions about the grade he/she has received on an exam, homework, or group activity he/she must talk to the instructor (or the teaching assistant where appropriate) no later than a week after the graded activity has been returned to students. No grade change will be made after the one week period.

Academic Integrity

All Students should be aware that the Department of Chemical, Biological, and Pharmaceutical Engineering takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

Below is a TENTATIVE class session schedule. This schedule is subject to change at any time. Please be aware of any changes that are announced in class by either contacting a classmate or else by contacting me via e-mail.

CHE 370, Spring 2017, TENTATIVE SCHEDULE

Wk Start	Class Material
Sep 6	Chapter 1. Introduction and Basic Concepts
Sep 13	Chapter 2. Heat Conduction Equations
Sep 20	Chapter 2. Heat Conduction Equations Chapter 3. Steady Heat Conduction
Sep 27	Chapter 3. Steady Heat Conduction
Oct 4	Chapter 4. Transient Heat Conduction. **Test 1**
Oct 11	Chapter 4. Transient Heat Conduction
Oct 18	Chapter 5. Numerical methods. Forming groups. Assigning Projects.
Oct 25	Chapter 6. Fundamentals of Convection
Nov 1	Chapter 7. External Forced Convection
Nov 8	Chapter 8. Internal Forced Convection **Test 2**
Nov 15	Chapter 8. Internal Forced Convection Chapter 11. Heat Exchangers
Nov 22	Chapter 11. Heat Exchangers
Nov 29	Chapter 12. Fundamentals of Thermal Radiation
Dec 6	Chapter 14. Mass Transfer
Dec 13	Chapter 14. Mass Transfer. Course Review
TBA	**Final Exam**