

**ROWAN UNIVERSITY**  
**DEPARTMENT of CHEMICAL ENGINEERING**

**Course**

CHE 06311, Heat Transfer

**Time**Tue 9:25-10:40 AM (ROW 304);  
Thur 9:25-11:20 AM (LIB 126)**Instructor**Dr. C. Stewart Slater  
Professor  
Office: Rowan Hall 336, Office hours as posted  
256-5310/5312, slater@rowan.edu**Course Description**

This course describes the modes of heat transfer: conduction, convection (forced and natural) and radiation. It presents steady and unsteady-state analysis of heat transfer, types of heat exchangers and heat transfer analysis and design.

**Pre-requisites:** Principles of Chemical Processes II (C-), Math for Engineering Analysis I (D-), Fluid Mechanics I (D-)

**Text**

REQUIRED – "Introduction to Heat Transfer" 2007, 5<sup>th</sup> Ed., Incropera, DeWitt, Bergman, Lavine, John Wiley & Sons, New York, 2007.

Hand-outs, and selected reading provided by Dr. Slater

**Objectives**

- To recognize the relevant modes of heat transfer that occur in industrial, chemical, environmental, and natural processes
- To express rates of heat transfer via different mechanisms using the appropriate mathematical expressions
- To apply conservation of energy requirements to determine rates of energy transfer and temperature distributions in various systems
- To apply the method of resistance analysis in solving heat transfer problems
- To calculate individual heat transfer coefficients inside pipes and outside bodies using correlations or material and energy balances.
- To calculate overall heat transfer coefficients from individual heat transfer coefficients or material and energy balances
- To preliminarily design shell and tube heat exchangers

**Content**

<u>Week</u>	<u>Month - Day</u>	<u>Reading – (Incropera et al, Ch)</u>	<u>Topic</u>
1	9-1 & 3	1	Introduction to Heat Transfer
2	9-8 & 10	2, 3	Introduction to Conduction
3	9-15 & 17	3	Conduction (Steady State) in One Dimension
4	9-22 & 24	3, 5	Conduction (con't), Conduction (Unsteady State)
5	9-29 & 10-1	5	Conduction (con't)
			Exam I
6	10-6 & 8	6, 7	Introduction to Convection, Convection/External Flow

7	10-13 & 15	7	Convection/External Flow
8	10-20 & 22	8	Convection / Internal Flow
9	10-27 & 29	8	Convection / Internal Flow
			Exam II
10	11-3 & 5	9	Free Convection
11	11-10 & 12	11	Heat Exchangers
	<i>(No class 11-12 CSS @ AIChE Meeting)</i>		
12	11-17 & 19		Lab Prep
13	11-24 & 26		Turkey Heat Transfer Lab
	<i>(Turkey on 11-26)</i>		
14	12-1 & 3	11	Heat Exchangers
15	12-8 & 10	TBD	Additional Topics (TBD)
16	12-?		Exam III
	<i>(specified final exam time TBA during Final Exam week 12-15 to 12-19)</i>		

*Topics/Exam times may shift due to time constraints and at the discretion of the instructor*

### **Grading Policy**

3 Exams: 85% (27.5%, 27.5%, 30%)

Homeworks, other assignments, professionalism: 15% ( $\sqrt{+}$ ,  $\sqrt{}$ ,  $\sqrt{-}$ , 0)

HW's done on team basis. One homework grade will be assigned for the team for the given assignment. At the end of the semester, homework total points will be distributed among team members using the Felder team peer evaluation system. This provides a way to give an evaluation of individual team members based on their level of contribution to the team.

Exam III is held in Final exam period and will include mostly questions from the last the last third of course along with material from earlier chapters. Therefore the exam is cumulative since you need information from the previous sections to solve the problems.

Final course grades may be decreased further based on unprofessional conduct as mentioned below at the discretion of the instructor.

### **Responsibilities**

To succeed in this class, you should come to class prepared, ask questions on points that you do not understand, and attempt all homework problems. Bring the text book and a calculator to class, since we will be doing problems in class. In this class, if you have not worked diligently on the homework assignments, don't follow what is covered in class, and do not read the book (including the examples/exercises that are in the book), the tests will be difficult. You will need to follow the material presented in class, take good notes and review the notes after class. Doing only one third of the homework problems and not paying attention in class while your teammates are diligent is a recipe for disaster in this course. I will lecture on material (that covered in the book and some that is not), make myself available for questions both in and out of class, attempt to answer all serious questions, and administer fair but demanding exams.

If you have a documented disability that may have an impact upon your work in this class, please contact me. Students must provide documentation of their disability to the Academic Success Center in order to receive official University services and accommodations. The Academic Success Center can be reached at 856-256-4234. The Center is located on the 3rd floor of Savitz Hall. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations.

### **Policies**

1. You are responsible for all material covered in class whether you are in class or not. Some material will be drawn from other sources and some topics from the text may be presented differently in class.
2. Late work of any kind will not be graded, you have multiple team members – one must be able to hand in the work for the group on time.
3. Collaboration in study teams for homework is acceptable and encouraged, but all tests must be done independently.
4. If you feel that a test problem has been graded improperly (except for miscalculation of points), you must resubmit the problem within 24 hours along with a written appeal and explanation. Upon receipt of this formal appeal, I will regrade the problem. This means that your score may go up or down.
5. Academic dishonesty of any kind will result in failure for the course. Academic dishonesty includes, but is not limited to, copying on an exam, submitting work performed by another as your own, tampering with or in any way altering another persons work without their knowledge and consent, and misrepresenting your contribution to a group project.
6. Professional conduct is required in class at all times. Examples of unprofessional conduct include coming to class late, doing work for another class or activity while in this class, using a cell phone, PDA or other device to talk, text, play games, view internet sites or perform other functions, disrupting your neighbor, etc. Students are not permitted to use a laptop in class unless otherwise instructed to do so.
7. Students are expected to conduct themselves in an acceptable manner at all times. Students who violate public law or the rights of others and interfere with the educational process will be referred to the proper authorities.
8. Course final grade will be reduced for unprofessional conduct in class, failure to follow proper safety procedures, disruptive activity or other behavior as deemed not appropriate.