

Chemical Engineering Lab I - ChE 396, Fall 2017

Prerequisites: CHE 370, ENG 352. Corequisite: MATH 225A.

Class hours: Monday, 2:30-4:40 PM, Thursday, 10:00 AM-12:55 PM (B007 & 206, Tiernan)

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Course Description

The topical goals of this course are fluid flow, heat transfer, and process safety. Each student group will be assigned experiments that address these goals. Six (6) experiments are available this term as listed below. Each group will perform four of them (2 heat + 2 fluid).

Because of the large number of students in this section this term, you will work in groups of 4-5. Know that every experiment can be safely executed by as few as 1 student. The Manual, Manual Instruction, and Supplementary Materials for all experiments are available on Moodle.

Room 206 Tiernan

1. Packed Towers (PT)

Room B-7 Tiernan

2. Incompressible Fluid Flow (IFF)
3. Compressible Fluid Flow (CFF)
4. Continuous Heat Transfer #1 (CHT1)
5. Continuous Heat Transfer #2 (CHT2)
6. Transient Heat Transfer (THT)

Textbook

There is no text book for this experimental course. These experiments are based on concepts covered in most unit operations, reactor engineering, and process control texts. The following references are useful:

- 1) Geankoplis, Transport Processes and Separation Process Principles, Prentice-Hall.
- 2) McCabe, Smith, and Harriot, Unit Operations of Chemical Engineering, McGraw-Hill.
- 3) Foust, et al, Principles of Unit Operations, Wiley.
- 4) Perry's Chemical Engineers Handbook.

Assignments

[25%] Scholarly Paper for the first experiment

The scholarly paper is the embodiment of engineering and scientific research. Hence, it is concise, intense, and demanding. Theoretical relationships must be linked closely to results, results linked to discussion, and discussion to conclusions. An intensified form of the formal laboratory report, the scholarly paper requires you to think critically about the true nature of your experiment as an expression of the chemical engineering paradigm. For details, please see the Manual Introduction on Moodle.

[25%] Oral Presentations (PPT) on the second experiment

You will be limited to ~ 15 minutes presentation time, including ~ 2 minutes for Q&A. For details, please see the Manual Introduction on Moodle. The performance of your group will be evaluated by other groups (Peer Review).

[25%] Industrial Executive Memo for the third experiment

An Industrial Executive Memo is similar to Scholarly Paper but written in a more concise way. For details, please see the Manual Introduction on Moodle.

[25%] Oral Presentations (PPT) on the fourth experiment

You will be limited to ~ 15 minutes presentation time, including ~ 2 minutes for Q&A. For details, please see the Manual Introduction on Moodle. This will be graded by the instructor.

[5%] Extra credit

You may have chance to achieve 2.5 % as your extra credit during each Oral Presentations (PPT) if you contribute to the Q&A session. This credit is limited to your contributions on other groups.

No makeup experiment since you have enough chances to perform them (see class schedule).

There are two half-session for the whole semester. For each half, you will do evaluation for yourself and your group members, which will direct to an Adjust Factor on your grade. The self and peer evaluation form is available on Moodle.

Late Paper (Scholarly Paper and Industrial Executive Memo) Submissions: paper will lose 2.5 % for every day late. Papers will not be accepted more than 1 week late.

Paper Formatting: All papers should be typed, double-spaced, 12 pt standard font (Times, Helvetica, Arial, etc), 1” margins

Grading

Final grade will depend on all assignments and adjustment mentioned above.

Final Total	Grade
≥ 90	A
84-89+	B+
72-83+	B
< 72	C+

Academic Integrity

Students are expected to follow the University Code on Academic Integrity. Plagiarism will not be tolerated. For details, see: <https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

Class Schedule

Available Experiments

IFF (B-7) - Incompressible Fluid Flow In Pipes PT (206) -- Packed Towers
 CFF (B-7) - Compressible Fluid Flow in Pipes CHT #1 (B-7) - Continuous Heat Transfer #1
 THT (B-7) - Transient Heat Transfer CHT #2 (B-7) - Continuous Heat Transfer #2

Reporting formats: Exp. 1 - Scholarly paper Exp. 2 - Oral Presentation (PPT)
 Exp. 3 - Industrial Memo Exp. 4 - Oral Presentation (PPT)

Date	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
9/7 (R)	Course Introduction - Mandatory Lab Safety Lecture - room 411 Tiernan							
9/11 (M)	Onsite overview of experimental setup - room B007&206 Tiernan							
9/14 (R)	IFF (p)	CHT#1 (p)	THT (p)	CFF (p)	PT (p)	CFF (p)	CHT#2 (p)	THT (p)
9/18 (M)	IFF (e)	CHT#1 (e)	THT (e)	CFF (e)	PT (e)	CFF (c)	CHT#2 (e)	THT (c)
9/21 (R)	IFF (c)	CHT#1 (c)	THT (c)	CFF (c)	PT (c)	CFF (e)	CHT#2 (c)	THT (e)
9/25 (M)	IFF (e)	CHT#1 (e)	THT (e)	CFF (e)	PT (e)	CFF (c)	CHT#2 (e)	THT (c)
9/28 (R)	IFF (c)	CHT#1 (c)	THT (c)	CFF (c)	PT (c)	CFF (e)	CHT#2 (c)	THT (e)
10/2 (M)	IFF (rev)	CHT#1 (rev)	THT (rev)	CFF (rev)	PT (rev)	CFF (rev)	CHT#2 (rev)	THT (rev)
10/5 (R)	Scholarly Paper (first draft) due							
10/9 (M)	CHT#2 (p)	CFF (p)	IFF (p)	CHT#1 (p)	THT (p)	CHT#1 (p)	IFF (p)	PT (p)
10/12 (R)	CHT#2 (e)	CFF (e)	IFF (c)	CHT#1 (c)	THT (e)	CHT#1 (e)	IFF (e)	PT (e)
10/16 (M)	CHT#2 (c)	CFF (c)	IFF (e)	CHT#1 (e)	THT (c)	CHT#1 (c)	IFF (c)	PT (c)
10/19 (R)	CHT#2 (e)	CFF (e)	IFF (c)	CHT#1 (c)	THT (e)	CHT#1 (e)	IFF (e)	PT (e)
10/23 (M)	CHT#2 (c)	CFF (c)	IFF (e)	CHT#1 (e)	THT (c)	CHT#1 (c)	IFF (c)	PT (c)
10/26 (R)	CHT#2 (rev)	CFF (rev)	IFF (rev)	CHT#1 (rev)	THT (rev)	CHT#1 (rev)	IFF (rev)	PT (rev)
10/30 (M)	Oral Presentations (PPT) - location TBA, Scholarly Paper (final draft) due							
11/2 (R)	PT (p)	THT (p)	CHT#2 (p)	IFF (p)	CFF (p)	PT (p)	THT (p)	CHT#1 (p)
11/6 (M)	PT (c)	THT (c)	CHT#2 (e)	IFF (e)	CFF (e)	PT (e)	THT (e)	CHT#1 (e)
11/9 (R)	PT (e)	THT (e)	CHT#2 (c)	IFF (c)	CFF (c)	PT (c)	THT (c)	CHT#1 (c)
11/13 (M)	PT (c)	THT (c)	CHT#2 (e)	IFF (e)	CFF (e)	PT (e)	THT (e)	CHT#1 (e)
11/16 (R)	PT (e)	THT (e)	CHT#2 (c)	IFF (c)	CFF (c)	PT (c)	THT (c)	CHT#1 (c)
11/20 (M)	PT (rev)	THT (rev)	CHT#2 (rev)	IFF (rev)	CFF (rev)	PT (rev)	THT (rev)	CHT#1 (rev)
11/21 (T)	Industrial Memos (first drafts) due							
11/27 (M)	THT (e)	IFF (e)	PT (e)	CHT#2 (e)	CHT#2 (c)	THT (e)	PT (c)	CFF (e)
11/30 (R)	THT (c)	IFF (c)	PT (c)	CHT#2 (c)	CHT#2 (e)	THT (c)	PT (e)	CFF (c)
12/4 (M)	THT (e)	IFF (e)	PT (e)	CHT#2 (e)	CHT#2 (c)	THT (e)	PT (c)	CFF (e)
12/7 (R)	THT (c)	IFF (c)	PT (c)	CHT#2 (c)	CHT#2 (e)	THT (c)	PT (e)	CFF (c)
12/11 (M)	THT (rev)	IFF (rev)	PT (rev)	CHT#2 (rev)	CHT#2 (rev)	THT (rev)	PT (rev)	CFF (rev)
12/11 (M)	Industrial Memos (final drafts) due							
TBA	Oral Presentations (PPT) - location TBA - during Final Exam period							
c = calculations / writing; p = planning period e = experiments								
rev = mandatory instructor review of experimental data and calculations								