Fall 2019

CHE 495-003: Chemical Engineering Lab I

Robert Barat

MEMORANDUM

To:	ChE 495-001, 003 Sections	*From:*	Prof. Robert Barat
Date:	September 2019	*Re:*	Introduction (v. 1)

Pre-requisite Courses:

ChE 370 (Heat & Mass Transfer), Eng 352 (Technical Writing),
Math 225A (Survey of Probability & Statistics for ChEs)

Class Meetings:

Section 001: Mondays, Thursdays 9:15-11:20 AM
Section 003: Tuesdays, Thursdays 1-3:05 PM

Attendance is Mandatory! If you need to miss class, let me know in advance if you can. Make sure your group knows in advance of your absence, if you can. Always meet in basement lab first for announcements and any short lectures before proceeding to experiments. Attendance will not be taken, but professional behavior is expected!

Instructor Information:

Office Hours: Mon, Tues 4-5:30 PM Available other times – find me or stop by.
Office Location: 374 Tiernan Hall
Office Phone: (973) 596-5605 Fax: (973) 596-8436
Email (preferred contact mode): barat@njit.edu

Teaching Assistant: TBA Note that the instructor grades all student work. The TA only assists during lab classes, as needed.

Course Requirements and Grading:

Four experiments will be assigned to each group. All reports and presentations are to be group efforts and submissions. Submitted reports should be hardcopy. Electronic submissions are allowed only with permission of the instructor.

- Industrial Memo 25 %
- Oral presentation (PPT - peers) 25 %
- Scholarly paper 25 %
- Oral presentation (PPT - management) 25 %

NOTE: Draft written reports (Industrial Memo, Scholarly Paper - due after experiment is completed (see schedule). These will be returned with comments and a draft grade. Final drafts are due 1 week after return. This policy will be enforced. There are no graded "first drafts" of PPT slides for the Oral presentations, but you're encouraged to show drafts to the instructor for helpful comments.

Groups:

Determined 1st class; 3 students per group. Rotating group leader - Self-policing (PROFESSIONAL CONDUCT EXPECTED!) Peer & Self Evaluations done after

Experiments 1 and 2, and again after Experiments 3 and 4. Results will impact individual final course grades! So take your group responsibilities seriously.

***Canvas* Site:** http://canvas.njit.edu --- Please check this site and your email often (at least once a day). Practice problems will be posted, as well as HW and test solutions, group projects, some in-class work, and useful memos.

Math Solver: You must have access to and know how to use one math solver software package. Examples include *Polymath, Maple, Matlab, Mathcad,* and *Mathematica.*

Polymath is available on dep't PCs in 411 Tiernan, as is the **license** info for program download onto your laptop. Three podcasts (Algebraic Equations, ODE's, Regressions) are available in the Media Gallery of the course *Canvas* site to help you learn *Polymath*, if you choose to use it.

Lab Manual:

Laboratory Manual for ChE 495 – Fall 2019 --- available on *Canvas* site in 2 parts:
→ Introduction → Experiments

Safety Lecture:

A mandatory lab safety lecture by Mr. Yetman will be provided immediately after the course introduction on the first class meeting. Attendance will be taken.

Information Literacy Lecture:

A mandatory Information Literacy lecture provided by the NJIT Library staff will be scheduled during one class period. Attendance taken. See Master Schedule.

Policy on Integrity: Professional behavior is expected at all times in this course.

- Every student expected to his/her fair share of the work load within the group
- Safety-conscious behavior in the labs is required at all times
- Use of data and/or reports not your own, unless instructor-authorized, is prohibited
- Submission/completion of work in a timely manner is expected
- If you use *Polymath,* you will follow the license guidelines – no commercial use.

Specific goals (Learning Attributes) for the course:

a. Students will be able to:

1. Operate fluid flow applications (pipe flow, packed tower), and collect quality data, including pressure drops
2. Operate heat exchangers (transient, steady state), and collect quality data, including fluid stream temperatures
3. Analyze data, and apply appropriate theoretical models in fluid flow and heat transfer
4. Plan an experiment and take enough data to get meaningful results

5. Handle their data ethically and correctly, and appreciate the dynamic between data and models
6. Present their results critically, and draw useful conclusions
7. Present their results using quality plots and tables that reveal key relationships
8. Analyze audiences and tailor their reporting for optimal communication
9. Report their data and analyses consistent with the assigned reporting structure

b. This course explicitly addresses the following ABET student outcomes: 1, 2, 3, 4, 6

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
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

MASTER SCHEDLULE --- CHE 495-001 --- FALL 2019

Date	Group 1	Group 2	Group 3	Group 4	Group 5
5-Sep	Course Introduction & Mandatory Safety Lecture -- room 411 Tiernan				
9-Sep	Planning Session (all groups)				
12-Sep	IFF (exp)	PT #2 (exp)	CHT #1 (exp)	CHT #2 (exp)	THT (exp)
16-Sep	IFF	PT #2	CHT #1	CHT #2	THT
19-Sep	IFF	PT #2	CHT #1	CHT #2	THT
23-Sep	IFF	PT #2	CHT #1	CHT #2	THT
26-Sep	IFF (rev)	PT #2 (rev)	CHT #1 (rev)	CHT #2 (rev)	THT (rev)
30-Sep	Scholarly Paper (first drafts) due				
3-Oct	Planning Session (all groups)				
7-Oct	CHT #2 (exp)	CHT #1 (exp)	PT #2 (exp)	IFF (exp)	CFF (exp)
10-Oct	CHT #2	CHT #1	PT #2	IFF	CFF
14-Oct	CHT #2	CHT #1	PT #2	IFF	CFF
17-Oct	CHT #2	CHT #1	PT #2	IFF	CFF
21-Oct	CHT #2 (rev)	CHT #1 (rev)	PT #2 (rev)	IFF (rev)	CFF (rev)
24-Oct	Oral Presentations (PPT - peer audience) - location TBA				
28-Oct	Information Literacy - lecture by NJIT Library Staff - room 411 Tiernan -- Mandatory attendance				
31-Oct	Planning Session (all groups)				
4-Nov	PT #2 (exp)	CFF (exp)	CHT #2 (exp)	THT (exp)	CHT #1 (exp)
7-Nov	PT #2	CFF	CHT #2	THT	CHT #1
11-Nov	PT #2	CFF	CHT #2	THT	CHT #1
14-Nov	PT #2	CFF	CHT #2	THT	CHT #1
18-Nov	PT #2 (rev)	CFF (rev)	CHT #2 (rev)	THT (rev)	CHT #1 (rev)
21-Nov	Added Review Session (all groups)				
25-Nov	Planning Session (Exp. #4) - all groups! Industrial Memo - Experiment #3 (first drafts) due				
26-Nov	CHT #1 (exp)	CHT #2 (exp)	IFF (exp)	PT #2 (exp)	PT #1 (exp)
2-Dec	CHT #1	CHT #2	IFF	PT #2	PT #1
5-Dec	CHT #1	CHT #2	IFF	PT #2	PT #1
9-Dec	CHT #1	CHT #2	IFF	PT #2	PT #1
TBA	Review sessions (make appointments with instructor)				
TBA	1st Draft (PPT to Management) slides due for review by instructor -- make independent app't -- Prentation not allowed w/o prior calc & slide review by instructor				
TBA	ChE 495 "Final Exam" --- Oral Presentations (PPT to Management - based on Exp. #4) --- Time/Location TBA				

ChE 495-001 | **Fall 2019** | **Class Meetings** MR 9:15-11:20 AM

VERSION 1

4 Assignments:

two heat transfer

two fluid flow (packed tower, pipe flow)

Available Experiments:

IFF (B-7) - Incompressible Fluid Flow In Pipes

CFF (B-7) - Compressible Fluid Flow in Pipes

PT#1 (206) -- Packed Towers #1

PT#2 (B-7) -- Packed Towers #2

CHT #1 (B-7) - Continuous Heat Transfer #1

CHT #2 (B-7) - Continuous Heat Transfer #2

CHT #3 (311) - Continuous Heat Transfer #3

THT (B-7) - Transient Heat Transfer

Reporting format:

- Exp. 1 — Industrial Memo
- Exp. 2 — Oral Presentation (PPT-peers)
- Exp. 3 — Scholarly paper
- Exp. 4 — Oral Presentation (PPT - Management - Proposal)

"Final Exam" — **Oral Presentation (PPT-management) (based on Exp. 4)**

calc = attendence mandatory (either in ChE lab or computer room)

Planning session (ENTIRE group, mandatory): Study apparatus, make schematic, study manual Consult with instructor, set up data sheets

rev = review data and calculations with instructor - MANDATORY

MASTER SCHEDLULE --- CHE 495-003 --- FALL 2019

Date	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
3-Sep	Course Introduction & Mandatory Safety Lecture -- room 411 Tiernan							
5-Sep	Planning Session (all groups)							
10-Sep	IFF (exp)	PT #2 (exp)	CHT #1 (exp)	CHT #2 (exp)	THT (exp)	CFF (exp)	CHT #3 (exp)	PT #1 (exp)
12-Sep	IFF	PT #2	CHT #1	CHT #2	THT	CFF	CHT #3	PT #1
17-Sep	IFF	PT #2	CHT #1	CHT #2	THT	CFF	CHT #3	PT #1
19-Sep	IFF	PT #2	CHT #1	CHT #2	THT	CFF	CHT #3	PT #1
24-Sep	IFF (rev)	PT #2 (rev)	CHT #1 (rev)	CHT #2 (rev)	THT (rev)	CFF (rev)	CHT #3 (rev)	PT #1 (rev)
26-Sep	Scholarly Paper (first drafts) due							
1-Oct	Planning Session (all groups)							
3-Oct	CHT #2 (exp)	CHT #1 (exp)	PT #2 (exp)	IFF (exp)	CFF (exp)	THT (exp)	PT #1 (exp)	CHT #3 (exp)
8-Oct	CHT #2	CHT #1	PT #2	IFF	CFF	THT	PT #1	CHT #3
10-Oct	CHT #2	CHT #1	PT #2	IFF	CFF	THT	PT #1	CHT #3
15-Oct	CHT #2	CHT #1	PT #2	IFF	CFF	THT	PT #1	CHT #3
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5-Nov	PT #1	CFF	CHT #3	THT	CHT #1	PT #2	CHT #2	IFF
7-Nov	PT #1	CFF	CHT #3	THT	CHT #1	PT #2	CHT #2	IFF
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3-Dec	CHT #1	CHT #2	IFF	PT #2	PT #1	CHT #3	CFF	THT
5-Dec	CHT #1	CHT #2	IFF	PT #2	PT #1	CHT #3	CFF	THT
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