

155:416 Process Engineering Lab II
Spring 2018, 4 credits

Instructors

Dr. Alex Bertuccio, Chemical Engineering
Office: Engineering Building C164
Office Hours: Wednesdays 11:00 AM – 1:00 PM and Thursdays 3:00 PM – 5:00 PM or by appointment

Email: alex.bertuccio@rutgers.edu
Phone: 848 – 445 – 3669

Dr. Henrik Pedersen, Chemical Engineering
Office: Engineering Building B202
Office Hours: By appointment

Email: hpederse@rutgers.edu
Phone: 848 – 445 – 4795

Teaching Assistants

Jonathan Colon
Monika Kazancioglu

Email: jonathan.colon@rutgers.edu
Email: mk1106@scarletmail.rutgers.edu

Class Meeting Schedule

155:416

Tuesdays (Sections 01 & 02)
Tuesdays (Section 01)
Thursdays (Section 02)

SEC - 117
Process Eng. Lab
Process Eng. Lab

Lab Manual

155:415/416 Process Engineering I, II Laboratory Manual by Henrik Pedersen

Sakai

<https://sakai.rutgers.edu>; select “PROCESS ENGRG | 01 S18”

Prerequisites

Transport phenomena I & II, Analysis I & II, Thermodynamics I & II, Separations Processes and Kinetics

Course Description

This is a senior level course designed for students to: (1) get a hands-on experience with pieces of equipment that have been discussed in previous courses; (2) learn how to design experiments and analyze data; (3) develop oral and written communication as an individual and in a group; and (4) learn to work in a group and share responsibilities.

Before students enter the lab they will have a meeting with the professor(s), teaching and learning assistants where groups of 4 – 6 students will explain their experimental plan for obtaining data and using that data to calculate relevant coefficients. Afterwards students will have three weeks to carry out their experimental design and submit a report discussing the determined values and explaining how the group reached their conclusions. At the conclusion of the experiment students will each give an individual oral presentation to classmates clearly explaining the apparatus used and the coefficients obtained. This cycle will occur twice during the semester.

Class sessions will be used to help students learn how to analyze data, write technically, and verbally explain chemical engineering principles. Students will need to come prepared to class as a fair portion of class will be for students to work in groups.

Learning Objectives: By the end of this course, student will be able to:

1. Design and conduct experiments to obtain values related to previous coursework
2. Effectively analyze data and apply appropriate statistical tests
3. Write technical, concise lab reports

4. Give an individual oral presentation, whereby the student can clearly explain the material being presented
5. Learn how to be a part of a team and gain an understanding of the benefits and challenges of working in a group
6. Practice appropriate safety techniques in the lab

Grades

A	90 – 100
B+	85 – 89.5
B	80 – 84.5
C+	75 – 79.5
C	70 – 74.5
D	65 – 69.5
F	< 65

Final Grade Breakdown:

Category	Contribution to Final Grade
1. Individual Lab Report [First Lab Report]	25%
2. Team Lab Report [Second Lab Report]	20%
3. Group Design Project	20%
4. Individual Oral Presentation	15%
5. Homework	20%

Please note that grades are **NOT CURVED**. Your final grade is the total number of points earned from the graded work listed above.

Descriptions of Graded work:

1. Individual Lab Report [Due March 5, 2018 by 8 PM on Sakai]:

For the first experiment of the semester, you will have a pre-lab meeting with your entire group during the second week of the semester. During the pre-lab meeting the group will explain the objectives to be completed while working in lab and members will demonstrate an understanding of the theory applied to their specific experiment. Over the course of the three weeks in lab, groups will operate equipment and collect data. Outside the lab, you will be working by yourself to analyze your data, create your own figures, and write your own report. This report will have a **limit of 10 pages**, not including the appendix. The individual lab report is a great opportunity to polish your writing skills before graduation. A sample rubric is available on Sakai.

You will still complete a CATME survey at the conclusion of the experiment for working with your group. The multiplier extracted from the survey will only be applied to **15%** of your lab report grade. The multiplier is used to account for individual contributions to help the group prepare for the pre-lab meeting and to keep the group on task in the lab. Most of your grade for Experiment 1, **85%** of it, will come from your individual submitted lab report. If you need to consult with groupmates to understand the meaning of data or compare conclusions you may do so, but make sure all the work submitted is your own work.

2. Team Lab Report [Due April 23, 2018 by 8 PM on Sakai]:

As with the previous experiments there will be a pre-lab meeting associated with this experiment, where the group will articulate objectives to be completed in lab. The group's performance during the pre-lab meeting will contribute **7.5%** to the final lab report grade. Groups will have three weeks in lab to complete the experiment and afterwards a group presentation will be given the week of April 16. The group presentation will contribute **7.5%** to the final lab report grade and **85%** will come from the lab report. A CATME survey will be administered after the report is completed for members to express their opinions on each individual member's contributions. The multiplier obtained post-survey will be used to adjust everyone's grade. The product between the multiplier and the lab report grade will be the adjusted grade (e.g. if the multiplier is 0.8 and the lab report

grade was 100, then the adjusted individual's grade is $0.8 \times 100 = 80$). Labs must be submitted electronically on Sakai. Reports will be graded based on how well results are explained, grammar, thoroughness, and appropriate statistical analyses performed. A sample rubric is available on Sakai.

Note: A multiplier of 1 means that the member did an even amount of work compared to the rest of the group members and should receive 100% of the grade. A multiplier of 0.8 means that the individual did 20% less work than the rest of the groupmates and should therefore receive 80% of the grade.

3. Group Design Project:

There will be up to 28 teams consisting of 4 to 6 people per group. Students will form their own groups and a few minutes allocated during the first class for teams to be created. A team will be recognized once a group philosophy has been signed and submitted both physically and electronically. The group philosophy for the design project will also count as a homework assignment. There will be details on Sakai for what the group philosophy should consist of, note it will be slightly different than previous group philosophy requirements.

This semester groups will be creating a pump that will be evaluated based on its weight, creativity, efficacy (i.e. how fast can the pump transfer water), and cost. Each group will: submit a pump that will be tested for performance, a report (more details of this will be provided later during the semester), and provide a business-oriented pitch. There will be several homework assignments associated with this project to ensure that progress is being made. Lab will be opened occasionally during the semester (on Mondays or Fridays) for groups to work specifically on the pump. There are several weeks during regular lab time that groups can also enter the lab to work on their pump.

4. Oral Presentations:

Each student will give one individual oral presentation this semester. Four sections of students will be formed (each will roughly consist of 30 students). This presentation will be worth 15% of the final grade and will be 7 minutes long followed by 1 – 3 minutes of questions. It will take place during the middle of the semester (between Feb. 19 and Mar. 2). This oral presentation is to be given about Experiment 1 and will be graded on content, clarity, delivery, timing and flow. The slides must be made by you. Any figures displaying your data need to be made by you. A rubric that elaborates on these criteria will be supplied two weeks before presentations begin.

5. Pre-Class Assignments:

Homework is typically assigned before every class session and sometimes assigned as a post-class assignment to provide practice for the material discussed in class. Both pre- and post-class assignments are **due Monday, the day before class, by 8:00 PM** on Sakai unless otherwise mentioned. Late homework will not receive credit unless there is an emergency or illness. In such instances verification (in the form of an email or a letter) is required and the homework assignment(s) in question will be dropped from final grade calculations. Each homework assignment is graded primarily on effort. If a reasonable amount of effort was applied to the assignment you will receive full credit (usually 5 – 15 points depending on the assignment) and if it is significantly lacking effort 0 points will be awarded. All homework is to be completed as individuals. However, you are encouraged to consult your peers in addition to the instructor for help.

Course Policies:

Accommodations for Learning: If a student has a documented disability (or disabilities) that require special accommodation(s), the student should contact disability resources (dsoffice@echo.rutgers.edu) and privately provide me with documentation about the disability by the second week of class.

Religious holidays: If you celebrate a holiday that conflicts with class or prevents you from completing an assignment please let me know by the end of the second week of class. I will do my best to accommodate your needs.

Attendance: Attendance to all class sessions is required, because there are frequent discussions and activities

that will aid in learning the course material. However, I realize that there are situations that preclude you from attending class. If there is an urgent matter either personal or professionally that arises, please let me know as soon as possible so I can plan accordingly, and you can make up the work in a timely manner.

Participation: Participation is not graded, but strongly encouraged. You will spend about half the class time talking with your peers about the material in class. Additionally, participation will be taken into consideration if you are on the border between two letter grades.

Late work: Is generally not accepted unless there are unexpected family or medical emergencies. If you must submit work late because of an emergency, please notify me about the situation as soon as possible and submit the work when the situation is resolved.

Academic Integrity and other Expectations: Every student is expected to adhere to the regulations outlined in the Student Code of Conduct (in particular the section on academic integrity). To quickly and simply paraphrase, you are responsible for the integrity of your submitted work. Cheating, plagiarism, and/or fabrication will be reported according to procedures outlined in the Student Code of Conduct.

Mobile Devices: They are allowed to be brought to class, but it is strongly encouraged to not use them during class. Please keep your phones on silent or airplane mode while class is in session. Studies have shown that students learn better when they are not distracted with electronics.

Class Schedule: January 16 – April 30, 2018

All preparatory readings, videos, etc. for pre-class assignments can be found on Sakai.

Week	Dates	Tuesday (Class)	Tuesday (Lab)	Thursday (Lab)
1	1/16 – 1/19	Syllabus	Orientation to Equipment	Orientation to Equipment
2	1/22 – 1/26	Statistics Part 1	Pre-Lab Meetings	Pre- Lab Meetings
3	1/29 – 2/2	No Class Career Fair	Lab	Lab
4	2/5 – 2/9	Statistics Part 2	Lab	Lab
5	2/12 – 2/16	Emulsions and Application to Industry	Lab	Lab
6	2/19 – 2/23	Oral Presentations	Oral Presentations	Oral Presentations
7	2/26 – 3/2	Oral Presentations	Oral Presentations	Oral Presentations
8	3/5 – 3/9	Case Study 1	Pre-Lab Meetings	Pre-Lab Meetings
9	3/12 – 3/16	Spring Break	Spring Break	Spring Break
10	3/19 – 3/23	Guest Speaker*/Case Study	Lab	Lab
11	3/26 – 3/30	Merck Guest Speaker	Lab	Lab
12	4/2 – 4/6	Guest Speaker*	Lab	Lab
13	4/9 – 4/13	Pharmaceutical Unit Operations Part 1	Pumps	Pumps
14	4/16 – 4/20	Pharmaceutical Unit Operations Part 2	Group Presentations	Group Presentations
15	4/23 – 4/26	SWAY	Pump Presentations	Pump Presentations

*** The dates and times of the guest speakers are still To Be Determined.**