

Spring 2024

## CHE 496-002: Chemical Engineering Lab II

Irina Molodetsky

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## ChE 496 Chemical Engineering Laboratory II

Credits and contact hours

0-6-3 (0 lecture hr/wk-6 hr/wk-3 course credits)

Tuesday, Thursday: 1:00 pm-3:50 pm;

Tiernan Hall: 411, B7, 311

<https://njit.webex.com/meet/molodetsnjit.edu>

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### Textbook

R. Barat and I. Molodetsky “Manual for ChE 496 Chemical Engineering Laboratory II” Otto H. York Department of Chemical and Materials Engineering, Newark, NJ 07102. The last version of the manual is uploaded to the Canvas page of the course <http://canvas.njit.edu>

### Specific course information

#### a. Description:

In this second course in chemical engineering capstone laboratory, experiments are conducted in the areas of mass transfer, separations, reaction engineering, and process dynamics and control. Bench and pilot-scale equipment is used. Oral and written reports are prepared by the students.

**b. Prerequisites:** ChE 349, 360, 380, 396, Chem 339, Math 225A

**Co-requisites:** ChE 460, 489

**c. Required, Elective, or Selective Elective – Required**

### Specific goals for the course

#### a. The student will be able to:

1. Plan the experiment and discuss the applicable experimental techniques prior to experimental work
2. Perform Hazards Assessment and Risk Control of the laboratory experiment
3. Work effectively in a team, assume various responsibilities, create supportive and collaborative environment for each team member
4. Successfully apply theoretical models (steady or unsteady) appropriate to simulate the experiment performed
5. Develop and conduct an experiment involving process safety issues and active feedback control, and collect good quality data
6. Ethically and correctly handle, analyze and interpret data, leading to conclusions and suggestions on further work
7. Report the data and analyses in a manner consistent with the assigned reporting structure

**b.** This course specifically addresses the following students outcomes: 1,3,5,6,7

## Topics

- Continuous Stirred Tank Reactor (CSTR) – reaction, dynamics
- Non-Catalytic Batch Reactor (NCBR) – reaction, dynamics, safety
- Tubular Flow Reactor (TFR) – reaction
- Catalytic Batch Reactor (CBR) – reaction, dynamics, safety, control
- Semi-Batch Reactor (SBR) – reaction, dynamics
- Continuous Distillation (CD) – separation, dynamics, control
- Batch Distillation (BD) – separation
- Reactive Absorption (RABS) – separation
- Packed Column Absorption (PCA) – separation, dynamics, control, safety

## Course Structure

- Laboratory experiments are completed in teams. Personal effectiveness and competencies are assessed during the planning sessions, team discussions and using CATME tool. Instructor may overwrite a CATME coefficient.
- Each team will conduct four experiments.
- Each experiment requires preparation (Pre-Experiment Plan and Risk Assessment)
- NOTE: manuals are the guidance. In this course YOU design the experiment (DoE)
- Two laboratory experiments require a written report, format: scholarly paper formats, following CME guidance.
  - Draft version (annotated) to be submitted on Canvas
  - The final version is to be submitted on Canvas no later than 1-week after feedback from the instructor. Rubrics are on Canvas
- Two laboratory experiments will be presented to your peers and invited graduate students (team presentation; ppt format). Grading Rubrics for Oral Presentation are on Canvas
- One of the experiments requires literature review. Reference sources should be discussed with the instructor or approved by instructor.
- Team discussions of the experimental data with the instructor are mandatory and contribute to the grading of each experiment (see Rubrics).
- The laboratory experiments include modeling and prediction components. Completion of these components requires a math software package (for example, Polymath, Matlab or Python) available for all students

## Communication

- This course will use the NJIT Canvas site accessed by <http://canvas.njit.edu> for all communications regarding changes in the schedule, status of the experiments, score rubrics, files and documents.
- All online communications are done on webex <https://njit.webex.com/meet/molodetsnjit.edu> unless other address is specified
- Additional online individual or team discussions will be scheduled on Canvas and require you to sign up to a specific slot.

- If circumstances require online communication with the entire class, it will be done through **Webex** hosted by the instructor

## Grading

- Grading rubrics help you in assessment of your professionalism. If my expectations in the rubrics are unclear for you – it is YOUR responsibility to discuss them with me BEFORE your first submission.
- The number of points awarded to a student for a specific experiment is a composite of the preparation (10%), team discussion (10%) and completion of the project, including written submission or oral presentation. A CATME coefficient is calculated for each experiment. Instructor reserves the rights to overwrite CATME coefficient.

Above 90 A  
 Above 85 B+  
 Above 80 B  
 Above 75 C+  
 Above 70 C  
 Above 60 D  
 Below 60 F

## Professional Behavior

- You are expected to follow the laboratory safety standards.
- Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at [dos@njit.edu](mailto:dos@njit.edu)”

[www.njit.edu/academics/pdf/academic-integrity-code.pdf](http://www.njit.edu/academics/pdf/academic-integrity-code.pdf)

## Accommodations due to a disability

If you need accommodations due to a disability, please, contact Marsha Williams-Nicholas, Associate Director of Disability Support Services, in Kupfrian 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.