

Fall 2024

## CHE 342- 001: Thermodynamics II

Nellone Reid

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# ChE 342: Chemical Engineering Thermodynamics II

## Fall 2024

**Instructor:** Dr. Nellone Reid, Senior University Lecturer

**Office:** 364 Tiernan Hall, Phone: 973-596-2995, E-mail: nellone.e.reid@njit.edu

**Zoom Link:** [Nellone Reid's Personal Room](#)

**TA:**

**TA Email:**

**Class Hours:** Monday/Wednesday: 1:00 PM – 2:20 PM; Faculty Memorial Hall 106

**Office Hours:** Tuesday/Thursday: 2:30 PM – 3:30 PM

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability –and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. [I will not tolerate disrespectful language or behavior.]

To Report ANY Incidents In or Outside the Classroom, Please Contact:

<https://www.njit.edu/dos/reporting>

## Course Description and Requirements

This course will cover heat engines, refrigeration, thermodynamics of mixtures, phase equilibrium and chemical-reaction equilibrium. Solid knowledge of chemical engineering thermodynamics including these topics is necessary to succeed in more advanced chemical engineering courses. In particular, the current course is a pre-requisite for ChE 349 Kinetics and Reactor Design and ChE 360 Separation Processes I.

**Pre-Requisites:** ChE 230, Math 211 (or Math 213), Chem 236

## Course Objectives

- Use the laws of thermodynamics to analyze basic power and refrigeration cycles
- Apply both fundamental and practical knowledge of thermodynamics to the design of basic power and cooling cycles
- Apply concepts of thermodynamic to solutions
- Determine equilibrium compositions of chemical reaction products and two-phase liquid/vapor mixtures.

## Learning Materials

**Textbook** Required: Introduction to Chemical Engineering Thermodynamics, Seventh Edition, J.M. Smith, H.C. Van Ness and M.M. Abbott, McGraw-Hill (2005). ISBN: 0-07-310445-0 Additional: Fundamentals of Chemical Engineering Thermodynamics, Kevin D. Dahm, Donald P. Visco (2014). ISBN: 1111580707

**Other Learning Material:** Lecture notes will be posted on Canvas. Reading lecture notes will be necessary but not sufficient for preparation for quizzes and exams. Therefore reading the textbook before each class will be necessary.

**Calculator:** A high-end calculator (TI-83, TI-84 or TI-84SE) is required for solving exam problems. 

**Software:** Use of Matlab, Python or other computational software is strongly recommended for working on homework assignments.

## Tentative Course Outline

Week	Date	Lecture Topic	
1	4-Sep	Heat Engines	
	9-Sep	Review	
2	11-Sep	Refrigeration	
	16-Sep	Review	
3	18-Sep	PH Diagram	
	23-Sep	Quiz 1 - Review	
4	25-Sep	Liquefaction	
	30-Sep	Review	
5	2-Oct	<i>Exam 1 Review</i>	
	7-Oct		<i>Exam 1</i>
6	9-Oct	Vapor-Liquid Equilibrium (VLE)	
	14-Oct	Review	
7	16-Oct	Vapor-Liquid Equilibrium (VLE)	
	19-Oct	Solution Thermodynamics	
8	21-Oct	Review	
	23-Oct	Models for VLE	
9	28-Oct	Review	
	30-Oct	Models for VLE	
10	4-Nov	Review	
	6-Nov	Properties of Mixtures	
11	11-Nov	Quiz 2 - Review	
	13-Nov	Exam 2 - Review	
12	18-Nov		<i>Exam 2</i>
	20-Nov	Chemical Reaction Equilibria	
13	25-Nov	Chemical Reaction Equilibria	
	27-Nov	Friday Classes Meet	
14	2-Dec	Review	
	4-Dec	Quiz 3 - Chemical Reaction Equilibria	
15	9-Dec	Review	
	11-Dec	Last Day of Classes; Final Exam Review	

## Assessment and Grading

Homework/Quizzes	20%
Exams	45%
Term Project	10%
Final Exam	25%
	100%

**A = > 90; B+ = 89.99 – 85; B = 84.99 – 75; C = 74.99 – 65; D = 64.99 – 60; F = < 59.99**

## Policies

**NJIT Honor Code:** The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of the Dean of Students.

**Special Accommodations:** If you need accommodations due to a disability please contact:

**Marsha Williams-Nicholas** ([marsha.williamsnicholas@njit.edu](mailto:marsha.williamsnicholas@njit.edu); 973-596-5417), Associate Director, Office of Accessibility Resources and Services or **Lily Hershkowitz** ([lily.hershkowitz@njit.edu](mailto:lily.hershkowitz@njit.edu); 973-596-2994), Accessibility Resources and Services Manager, Office of Accessibility Resources and Services

## Lectures

- Attendance is strongly recommended. Attendance sheet has to be signed at the beginning of each class. The examples discussed in the class are not necessarily from the main textbook and therefore missing a class will have consequences for preparation to quizzes and exams.
- The classes start at the designated time above, and the students must be in class by that time. Being late to class may have consequences for the grade, since many of the classes will start from quizzes.
- Electronic devices other than calculators (laptops, tablets, cell-phones etc.) are not permitted during the classes. No audio or video recording is allowed.
- Cellphones should be turned off during both lectures and exams and not allowed under any circumstances.
- Laptops will be permitted only if necessary for class activities.

## Course materials, office hours and correspondence

- The course Canvas page is the main platform for delivering information about the course. All relevant course materials and assignments will be posted on Canvas, so a student should check it regularly.
- The students should upload a professional-looking head shot for their Canvas profile.
- The students are strongly encouraged to attend Office Hours held bi-weekly. Long questions, which require derivations will be discussed only during the Office Hours and will not be answered by email.
- Questions regarding grades can be discussed only during the Office Hours.
- E-mail and Canvas correspondence is intended only for quick questions. Questions which require a detailed discussion should be discussed in person during the Office Hours.
- To assure quick response to your emails, please add “ChE342” in the subject of your emails.

## Exams and Grades

- A letter grade is based on the final score, calculated using an Excel spreadsheet in accordance with the Tables given in this syllabus. The assigned letter grade is final and cannot be negotiated.
- A student can dispute the exam scores within a week after the announcement of the score. Exam scores can be disputed during the official Office Hours, not during class time or via email.
- The graded exams must be returned within a week to be saved for the department course assessment initiative.
- Students will get 0 for not showing to quizzes, exams, or any other course activity. If students miss an exam due to extreme circumstances (such as a medical problem), they need to notify the instructor via

email before the beginning of the exam, and bring proof of the circumstance to the Dean of Student's office. Only in this case of official approval from the Dean of Student's office, may a makeup be given at the discretion of the instructor.

- A student must show as many details when solving a problem during an exam or a quiz. Not showing the work will cause losing points even if the final answer is correct.
- Partial credits can be given for solving the exams problems.
- No partial credit will be given if there is not enough details to follow.
- The final answer should be always evaluated with respect to its reasonability. No partial credit will be given if the final answer is wrong and unreasonable, and it is not stated.
- There will be no partial credits for the questions/problems quizzes.
- Student handwriting must be legible in order to receive points.
- A student coming to dispute a grade has to bring completed homework sheets. No discussion of grades will be held without completed homework.