



蘇州大學  
Soochow University

## PHY 337 Thermodynamics

Summer 2024

**Course Credits:** 4

**Contact Hours:** 56 hours

**Instructor:** TBA

**Email:** TBA

### **COURSE OBJECTIVES**

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This course provides a comprehensive exploration of thermodynamics, covering fundamental principles, thermodynamic cycles, and special topics like phase transitions and critical phenomena. Through theoretical discussions and practical examples, students develop problem-solving skills and apply thermodynamic concepts to real-world challenges in engineering and science.

Upon Completion of this Course, students will be able to:

1. Understand the concepts of equilibrium and state variables essential.
2. Grasp the fundamental principles governing energy transfer and transformation in physical systems.
3. Explore potentials like chemical potential, crucial for analyzing thermodynamic processes and phase equilibria.
4. Learn about phase equilibria and the rules governing the coexistence of phases in thermodynamic systems.
5. Study microstates, entropy, and ensemble theory, enabling an understanding of thermodynamic behavior in various ensembles.

### **PREREQUISITES**

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N/A

### **GRADING**

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Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



ITEM	POINTS
Quizzes	15 Points
Assignments	30 Points
Midterm	15 Points
Project	20 Points
Final Exam	20 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

## COURSE MATERIALS

### **Required Texts:**

Antonio Saggion • Rossella Faraldo • Matteo Pierno, *Thermodynamics: Fundamental Principles and Applications*, 1<sup>st</sup> Edition, Springer, 2019.

### **Recommended (Optional) Texts or Other Materials:**

None

## COURSE TOPICS

MODULE	TASKS
Module 1	<b>Topics:</b> Topic 1: Thermodynamic State Topic 2: The First Principle of Thermodynamics Topic 3: The Second Principle of Thermodynamics Topic 4: State Functions <b>Assessments:</b> Quiz#1 Assignment#1



Module 2	<b>Topics:</b> Topic 5: The Fundamental Relation and the Thermodynamic Potentials Topic 6: The Gibbs Potential and Isothermal and Isobaric Processes Topic 7: Systems at Constant Entropy Topic 8: The Volume and Pressure Dependence of Entropy <b>Assessments:</b> Quiz#2 Assignment#2
Module 3	<b>Topics:</b> Topic 9: General Properties of Gaseous Systems Topic 10: Phases Equilibrium Topic 11: Continuity of States Topic 12: Van der Waals Equation <b>Assessments:</b> Midterm Project
Module 4	<b>Topics:</b> Topic 13: The Law of Corresponding States Topic 14: Stability of Equilibrium States Topic 15: Thermodynamic Potentials for Linear Dielectrics Topic 16: Entropy Production and the Chemical Affinity <b>Assessments:</b> Quiz#3 Project due
Module 5	<b>Topics:</b> Topic 17: Configurations of Minimal Entropy Production Topic 18: Stability of Stationary States and the Principles of Le Chatelier and of Le Chatelier–Braun Topic 19: Mechanical Equilibrium Topic 20: Introduction to the Role of Information in Physics <b>Assessments:</b> Assignment#3 Final Exam

## ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow



University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

### **LEARNING REQUIREMENTS**

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

### **TECHNOLOGY POLICY**

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

### **ACADEMIC INTEGRITY POLICY**

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.



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## **DISABILITY ACCOMMODATION**

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Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.