

Syllabus

Instructor	<i>Sheng-Chiang (John) Lee</i>	Textbooks
Office/Contact	SEB 244; 478-301-2599 Lee_SC@Mercer.Edu	1. <i>Fundamental of Physics</i> , by David Halliday, Robert Resnick, and Jearl Walkers, 7 th Edition 2. <i>Thermal Physics</i> , by Charles Kittel and Herbert Kroemer, 2 nd Edition
Office Hour	MWF 1~2:30pm or by appointment	
Pre-Requisite	PHY 162, MAT 293 and MAT 330	

Course Description:

As an entry-level course of Thermal Physics/ Statistical Mechanics for undergraduate students, this course explores the classical and quantum statistics and their connections with Thermodynamics. Through the study of various thermodynamic properties of a system (e.g. entropy, chemical potential, Gibbs free energy, etc.), students will be exposed to the broad applications of Thermal Physics in various scientific topics, including ideal gases, magnetic systems, photons (radiation), chemical reactions, the Greenhouse effect, etc. Though it is a core course for physics majors, it may also be of interest to students majoring in chemistry and engineering.

Objectives:

After taking this course, you should be able to

- Understand the laws of thermodynamics
- Understand the limitation and validity of the ideal gas model
- Appreciate the quantum nature of Statistical Mechanics and be able to distinguish between Fermi-Dirac and Bose-Einstein statistics.
- Qualitatively and quantitatively understand various thermodynamic properties and the relations among them.
- Be able to manipulate thermodynamic properties discussed in the class to some extent and solve simple problems.

Tentative Coverage:

A brief overview of thermodynamics from HRW

Ch1 States of a Model System

Ch2 Entropy and Temperature

===== 1st Exam =====

Ch3 Boltzmann Distribution and Helmholtz Free Energy

Ch4 Thermal Radiation and Planck Distribution

Ch5 Chemical Potential and Gibbs Distribution

===== 2nd Exam =====

Ch6 Ideal Gas

Ch8 Heat and Work

===== 3rd Exam =====

Ch9 Gibbs Free Energy and Chemical Reactions

Ch10 Phase Transformations

===== Accumulative Final Exam =====

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Grading Methods:

Grading Scale:

Score:	90+	85~89	80~84	75~79	70~74	60~69	59-
Grade:	A	B+	B	C+	C	D	F

Grading Components:

	Homework	Exams (3 tests + 1 comprehensive final)
Weight	30%	3 × Tests (15%) + 1 × Final (25%) = 70%

Homework:

The textbook provides a minimal set of problems that you should exercise to master the concepts covered in the chapter (see page *ix*). Though you are recommended to do them all, you only need to choose **TWO** problems among them for each chapter as your homework assignments. They are due in one week after finish a chapter. Late homework will suffer 5% penalty per day, and will NOT be accepted after another week unless students are legitimately excused.

Special Note: Since *Mathematica*® is now available in the physics department, you are welcome to use it for your homework. It makes typing equations and documenting your work much easier. It may also help you visualize your results and advance your appreciation of physics. However, you should NOT use *Mathematica*® to help you solve equations/differential equations, perform vector analyses, and so on, unless permitted by the instructor. YOU should have the ability to perform analytical calculations by hands.

Tests/Final:

There will be three midterm tests and one comprehensive final exam. Tentative coverage of each exam is listed above. All exams are open-book. You may bring your textbook to the test as a reference of equations. **NO** notebook is allowed.

Class Evaluation

In an ongoing effort to improve the quality of instruction, each student enrolled in this course is required to complete an end-of-semester course evaluation, to be administered through ***BlackBoard*** during the last week of the semester. Students failing to submit the evaluation by 12/19 will be assigned the grade of “Incomplete,” which will automatically turn into an “F” if the evaluation is not submitted by the midterm of the very next semester.

Important Dates:

Last Day for Course Withdrawal: 10/29!!!!

Final Exam: 12/19, 9am ~ 12am

Class Policies:

Attendance Policy: Attendance is not mandatory. However, students with more than an occasional absence usually perform poorly in the class.

Special Note: To prevent the spread of H1N1 (Swine Flu) or Seasonal Flu virus, if students have influenza-like symptoms, it is recommended to remain at home until at least 24 hours after you

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are free of fever (100°F or 37.8°C), or signs of a fever without the use of fever-reducing medications. Do not physically visit Student Health Center for it may help further spread the virus. The preferred method of making contact is via phone or e-mail.

Class Etiquette: You are expected to conduct yourself in a respectful manner to your fellow classmates and the instructor. The instructor may ask you to leave the classroom/lab if your behavior is disturbing to the instructor or other students.

Honor Code: You are bound by the Mercer honor code. The College's academic misconduct policy will be followed. All work, for which a grade is received, must be the **original** work of the **student** without aid or assistance of another party, or any printed and or electronic data/information. Academic misconduct cases will be referred to the honor council and the student will automatically receive a grade of incomplete (IC) pending a ruling by the honor council.

Cell Phone and Pager Usage: Out of courtesy for all those participating in the learning experience, all cell phones and pagers must be **kept in your pocket/backpack with power/ringer off** before entering any classroom, lab, or formal academic or performance event. Warning will be given for the first-time violation. One semester credit will be taken for each following violation up to three times. If a student keeps violating the policy, one may be asked to leave the room by the instructor.

Documented Disability Statement: Students with a documented disability should inform the instructor at the close of the first class meeting. The instructor will refer you to the office of Student Support Services (SSS) for consultation regarding evaluation, documentation of your disability, and recommendations for accommodation, if needed. Students will receive from SSS the *Faculty Accommodation Form*. On this form SSS will identify reasonable accommodations for this class. The form must be given to the course instructor for signature and then returned to SSS.

To take full advantage of disability services, it is recommended that students contact the Office of Student Support Services, immediately. The office is located on the third floor of the Connell Student Center.