

Syllabus

Instructor	<i>Sheng-Chiang (John) Lee</i>	Textbooks
Office/Contact	SEB 206; 478-301-2599 Lee_SC@Mercer.Edu	1. <i>Fundamental of Physics</i> , by David Halliday, Robert Resnick, and Jearl Walkers, 9 th Edition 2. <i>Thermal Physics</i> , by Charles Kittel and Herbert Kroemer, 2 nd Edition
Office Hour	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 macroscopic thermal phenomena and quantum statistics and their relation with each other. 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 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, biology, or 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 review of thermodynamics from HRW (Ch18~20)

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 =====

PHY 330 Thermal Physics

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	Peer Instruction	Exams (3 tests + 1 comprehensive final)
Weight	30%	5%	3 × Tests (15%) + 1 × Final (20%) = 65%

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 **MUST** choose **Three** problems among them from each chapter as your homework assignments. They are due in one week after finishing 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 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. Students should have the ability to perform analytical calculations by hands.

Peer Instruction:

Close to the end of the semester, each student will prepare an optional topic from the textbook and teach the class. The peer instructor should present the material in an organized manner and ready to take questions from the class at any time. The grade will be based on the student's understanding and preparedness of the material, the clarity of presentation, and how the questions are handled.

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 the CLA standard survey on student perception of the course at the end of the semester. To supplement the CLA survey, each student is also asked to complete two other surveys that allow free written responses for more elaborative feedback. The CLA standard survey is administered by the University's **CoursEval** system and the two written evaluations are administered through **BlackBoard** during the last week of the semester. Students should complete these evaluations preferably by 12/05 and no later than 12/09.

PHY 330 Thermal Physics

Important Dates:

Last Day for Course Withdrawal: 10/28/2016...

Final Exam: 12/16, 7pm ~ 10pm

Class Policies:

Attendance Policy: Attendance is not mandatory for lectures. However, students are solely responsible for learning the materials covered and the announcements made in the missed classes.

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 Laptop Usage: Out of courtesy for all those participating in the learning experience, all cell phones must be **kept in your pocket/backpack with power/ringer off** before entering any classroom, lab, or formal academic or performance event.

Laptops may be used in class to assist individual's learning (e.g. to access on-line supplemental materials, to view provided class presentation and take note, etc.). However, using laptops for activities unrelated to the class is prohibited.

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.

No cell phones/laptops are allowed during exam times.

Documented Disability Statement: *Students with a documented disability should inform the instructor at the close of the first class meeting or as soon as possible. If you are not registered with Disability Services, the instructor will refer you to the Student Support Services office for consultation regarding documentation of your disability and eligibility for accommodations under the ADA/504. In order to receive accommodations, eligible students must provide each instructor with a Faculty Accommodation Form from Disability Services. Students must return the completed and signed form to the Disability Services office on the 3rd floor of the Connell Student Center. Students with a documented disability who do not wish to use accommodations are strongly encouraged to register with Disability Services and complete a Faculty Accommodation Form each semester. For further information please contact Disability Services at 301-2778 or visit the website at <http://studentaffairs.mercer.edu/disabilityservices/>.*