

# Statistical Mechanics [PHY 330] Spring 2007 Syllabus

## Instructor

Douglas Young

## Instructor Contact Information

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## Instructor Office Hours

MTW 2:00-3:00, or by appointment/arrangement

## Required Texts

### **Fundamentals of Physics,**

by David Halliday, Robert Resnick, and Jearl Walker, *6<sup>th</sup> edition* (2001)  
ISBN: 0-471-33235-6

### **Classical and Statistical Thermodynamics,**

by Ashley Carter  
ISBN: 0-13-779208-5

## Meeting Rooms and Times

TR 9:25-10:40 WSC 101

## Prerequisites

### **Multivariable Calculus [MAT 293 ]**

Students are expected to be able to:

- calculate and apply partial derivatives.
- calculate and apply multiple integrals.
- use vector calculus.

### **Introduction to Differential Equations [MAT 330 ]**

Students are expected to:

- be familiar with the mathematical terms used in the study of ordinary differential equations (ODEs).
- be able to create and solve ordinary differential equations.

### **Modern Physics I [PHY 305 ]**

Students are expected to:

- be familiar with, and able to discuss, the quantum theory of matter, its consequences, and its applications.
- be able to solve elementary problems involving the use of Schrödinger's equation.

## Course Objectives

At the end of this course, students will:

- be able to discuss the principles of thermodynamics, kinetic theory, and statistical mechanics, as well as the relation each topic has to the other.
- be able to solve problems, both qualitative and quantitative, requiring the use of the principles of thermodynamics, kinetic theory, and statistical mechanics.

## Topics Covered

Definition of temperature, definition of heat, thermodynamic systems, equations of state, laws of thermodynamics with applications, kinetic theory of gases, entropy, thermodynamic potentials, classical and quantum statistics, information theory.

## Grading Scale

100	-	90	=	A	(4.0)
89	-	85	=	B+	(3.5)
84	-	80	=	B	(3.0)
79	-	75	=	C+	(2.5)
74	-	70	=	C	(2.0)
69	-	60	=	D	(1.0)
		$\leq 59$	=	F	(0.0)

## Grading

### Weighting

- Homework/Class Participation 20 %
  - Reading Quizzes 15 %
  - Tests 70 %
- 3 Tests  $\implies$  23 % for highest test grade and 21 % for all others

### Homework/Participation

Homework will be graded on a 5 point/problem basis. Five points will be awarded for a problem with a correct, well-worked out solution. Four points will be awarded for a problem with minor errors or with the correct solution but worked out in a sloppy (hard to read) fashion. One to Three points will be awarded for problems that are incomplete, with the value depending on the how much progress the student has made toward a solution.

Homework problems are due at the beginning of the next class period after they are assigned, unless told otherwise by the instructor.

Students may also present their solutions to the class during the class period that the solutions are due. Students may volunteer to present their solution to certain problems. By volunteering, the student may receive up to three points of additional credit for their presentation of the problem, with the amount depending on the quality of the presentation. It is possible to obtain “extra-credit” by doing well on an assignment and providing an exceptional presentation of the solution to the problem. With this extra-credit, it is possible for students to have a homework average that is over 100. In figuring the final grade, homework averages over 100 grade will be scored as a 100. However, students with homework averages over 100 grade may have their final grades increased by 2 points if it puts the student in the next letter grade bracket. Students should avail themselves of this opportunity early in the semester, since the course material will grow progressively more difficult as the semester unfolds.

Suggestions for making a homework presentation “exceptional”:

- Explicit Error Checking: Does the solution make sense? If so, why? If not, why not?
- Relating solution to material covered previously in class, or to material covered in another class.

## Reading Quizzes

Short quizzes over assigned readings from the textbooks will be given periodically. Assigned reading will be announced in class prior to the quiz. These quizzes will be graded on a standard 100 point grading scale. Around 15 reading quizzes may be given during the semester, so each quiz should represent less than 2.0% of the total grade. This means that doing poorly on one quiz will not harm a student's grade, but doing poorly on the bulk of the quizzes will. Quizzes will take between 10 to 20 minutes of class time. The lowest three reading quizzes will be dropped.

Suggestions to help studying for the reading quizzes:

- Read through the material at least twice, with some period of time (more than 2 hours) between readings.
- Highlight the main sentence in each paragraph of the reading assignment, or outline the reading assignment using the main sentence in each paragraph of the reading.

## Class Policies

- The instructor reserves the right to modify this syllabus as deemed necessary any time during the semester. Emendations to the syllabus will be discussed and negotiated with students during a class period. A revised syllabus which supercedes the original document will then be handed out in class period shortly after the discussion/negotiation class period.
- Attendance in this class is extremely important. Students are responsible for all information discussed in class. Be forewarned that students with more than an occasional absence risk doing poorly. If a student knows in advance that a class will be missed, it is expected that the student will discuss this with the instructor.
- Dates for tests and reading quizzes will be announced at least one class period ahead of time
- Questions about points awarded on test and quiz problems should be brought up as soon as these materials are handed back to students. All grades are final four weeks after tests and quizzes have been handed back to the class. If a student is not present in class when materials are returned, the student is responsible for arranging a time to collect the work from the instructor.
- Homework is due at the beginning of the next class period after they are assigned. Late homework may be accepted at the discretion of the instructor, with some penalty assigned for each instance by the instructor. If the student does not attend class, or is late to class, on the day the homework is due, homework will not be accepted for credit. In other words, come to class even if you do not have the homework finished.
- Cell Phone and Pager Usage: Out of courtesy for all those enrolled in class, all cell phones and pagers must be turned off before entering any classroom, lab, or formal academic or performance event.

- Students are expected to treat each other courteously.
- Makeup tests will be administered for excused absences only, and must be made up within one week of the date when the test or quiz was administered to the class. If a student knows in advance that a test or quiz will be missed, it is expected that the student will discuss a makeup time beforehand.
- The College of Liberal Art's academic policy will be followed. The Mercer University Honor Code binds all students. Any student caught cheating will be brought before the Honor Council. Students are encouraged to discuss the problems together, but all work submitted for a grade should be the sole product of the student that submitted the work.
- The College of Liberal Arts academic policy will be followed. The Mercer University Honor Code binds all students. Any student caught cheating will be brought before the Honor Council. Students are encouraged to discuss homework problems together, but all work submitted for a grade should be the sole product of the student that submitted the work.
- 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://www.mercer.edu/stu\\_support/swd.htm](http://www.mercer.edu/stu_support/swd.htm)