PHYS 353      Foundations of Physics II      Spring 2013

Class times: MW, 10-10:50am and Th, 10-11:30am

Location: WIL 110

Instructor: Miriam Deutsch    Office: 275 WIL    Tel: 6-5973    Email: miriamd@uoregon.edu
Office hours: Monday 11am-12:30pm, Thursday 2-3:30pm, or by appointment.
Note: I will not be holding office hours during the week of April 15, as well as on May 9.

TA: Eryn Cook    Office: 250 WIL    Tel: 6-5863    Email: ecook2@uoregon.edu
Office hours: Tuesday 12-1pm, Wednesday 1-2pm, or by appointment.

Attendance policy: Attendance is not required, nevertheless recommended. Lectures will cover materials which are mostly in the textbook and follow the order of chapters in the book, but will address different approaches to solving problems, expand on examples in the text and solve problems not necessarily from your book.

Course texts: The required text is *An Introduction to Thermal Physics* by D. Schroeder. This is the same textbook you used in PHYS 352 in Winter Term.

Course outline: This term will focus on Part III in the textbook, which addresses the fundamentals of statistical mechanics. We will cover Chapters 6 and 7 rather thoroughly, as they lay down all the necessary foundations of statistical mechanics. We will begin with the introduction of Boltzmann statistics, used for classical systems. Together with introducing fundamental concepts such as the partition function and the Maxwell distribution, we will also work through practical examples of how these concepts are implemented when analyzing atomic excitation spectra or magnetization of materials. We will then move on to Chapter 7, which addresses quantum statistics. Here we will introduce new terminology – that of Bosons and Fermions – two fundamentally different properties which are used to describe the behavior of quantum particles. We will see that ensembles of Bosons and Fermions exhibit strikingly different statistics, resulting from their fundamentally different quantum properties. These behaviors and statistics are used to describe a great portion of the world around us – from the properties of solids to the glow emitted from hot objects. We will address these phenomena, using relevant examples and demonstrations whenever practical. The midterm exam will mostly cover materials in Chapter 6, as well as some material from Chapter 7. If time permits we will cover one topic from Chapter 8 – the weakly interacting dilute gas. This will serve as an example of using statistical mechanics to describe non-ideal, interacting systems. We will need to introduce a powerful and rather general approximation method which will help us obtain a much needed correction to the ideal gas law.

Homework: Homework will be assigned weekly and will be collected the following week.

Completed assignments should be placed ONLY in the labeled submission box in the basement of Willamette Hall (not far from the teaching labs.) I will not be collecting your homework in class. Assignments may not be submitted by email or Blackboard unless you are instructed to do so.

Solutions to the homework problems will also be provided through Blackboard. It is important you review them, as they might hold additional information to what we do in class. You should always make an effort to submit your assignments on time. Homework submitted up to 24 hours late will not be graded and will receive 20% credit. Assignments submitted later than that will not be graded and will be recorded as missed (i.e. will receive a score of 0 points.) Special circumstances and
emergencies may be accommodated on a case-by-case basis. In such cases you should contact me as 
soon as possible to discuss your specific needs. Do not assume you will receive a deadline extension 
without discussing the matter first with me. Tests may only be taken during the scheduled time 
and date, and will not be available to make up or take at alternate dates.

**Students leaving before the end of term for REU:** You will **not** be able to take the final exam 
before you leave for your summer research program. You should plan on taking the exam at the 
same time and day it will be given here. If you know you will need to leave for your REU before 
the end of term, you will need to contact your host and request that arrangements be made for 
someone to proctor the exam. I require the contact information of that person, **two weeks before 
you leave here**, in addition to documented proof of the program’s start date. Your contact person 
for this purpose may be your hosting professor, a graduate student in your host’s group, REU 
program administrator at the hosting institution, or any other administrator directly affiliated 
with your hosting department. Once I’ve verified that all proper arrangements have been made 
for you to take the final exam at the remote location, I will email it directly to the contact person 
the day before the exam is scheduled. After taking the exam your proctor will scan it into a PDF 
file and email it to me immediately. In addition, the exam should be placed in an envelope and 
mailed to my Physics Dep’t mailing address via standard mail. This is the only acceptable 
arrangement for taking the final exam, with no exceptions, and it is only available for students 
who have been accepted to REUs (or equivalent summer research programs) with non-flexible 
starting dates, at other institutions.

**Course web site:** [http://blackboard.uoregon.edu/](http://blackboard.uoregon.edu/) I will post homework assignments, course 
announcements and handouts. Solutions to homework problems will also be posted here. All posted 
materials may be found in appropriately named folders (e.g. “HW Assignments”). Announcements 
will appear on the main course page. You will need to check Blackboard regularly for updates.

**Exams and grade determination:** Exam and grade breakdown are as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Scheduled for</th>
<th>% Weight of final grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam</td>
<td>May 9, in class</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>June 11, 10:15am, in class</td>
<td>35%</td>
</tr>
<tr>
<td>Homework</td>
<td>Weekly</td>
<td>40%</td>
</tr>
</tbody>
</table>

Your final grade in the course will be determined as follows:

<table>
<thead>
<tr>
<th>Final score (%)</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>86-100</td>
<td>A</td>
</tr>
<tr>
<td>71-85</td>
<td>B</td>
</tr>
<tr>
<td>56-70</td>
<td>C</td>
</tr>
<tr>
<td>45-55</td>
<td>D</td>
</tr>
<tr>
<td>Below 45</td>
<td>F</td>
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The broad number ranges will allow room for +/- grades. For example, a final average score of 90% 
may be a final grade of either A- or A, depending on the actual distribution of grades. If I find it 
necessary, I will curve the grades. Midterm grade distributions will be posted on Blackboard.
Note: The highest grade of any standard curve will be A. I reserve the grade of A+ only to special cases, when a student’s performance is clearly above the norm. In statistics such cases are known as outliers. Hence an average score of 95%, for example does not guarantee you a final grade of A+.

Tip for doing well in this class: DO ALL YOUR HOMEWORK. There are two reasons doing your homework will help you succeed. The first is simple – homework assignments count for 40% of your final grade. The better you do on them the higher your final grade will be. The second lies in my tendency to regularly borrow from homework problems when I write my exams. Many of the homework exercises will address core problems in statistical mechanics. Practicing those will help you stay on track and avoid major surprises on the exams.

Students with Disabilities: If any aspects of the program hinder you from fully participating in this course, please notify me as soon as you become aware of them. You may also contact the Accessible Education Center in 164 Oregon Hall, Tel: 346-1155.