Physics for Scientists & Engineers III
Syllabus

Winter 2015

Course: PHY 112
Instructor: Dr. N. Christensen
Email: neil.christensen.qft@ilstu.edu
Phone: (309)438-5502
Office: MLT 312D
Office Hours: MWF 2:00-3:00 or by appointment
WebAssign: https://www.webassign.net
Course key: ilstu 8908 0359
Lecture: MWF 1:00-1:50 in MLT 309
Lab: R 1:00-3:50
  Computer Labs in MLT 309
  Experimental Labs in MLT 217

Required Materials:
WebAssign access with included textbook.

Homework:
On WebAssign
Due at the beginning of class period as scheduled or communicated in class.

Exams:
2 Midterms and 1 Final, All are comprehensive.

WebAssign
Both the textbook and all homework will be done on WebAssign. You will need access to WebAssign immediately. Many of you already have “lifetime” access. When you go to the WebAssign website to register, you will click on the button that says “I have a class key” and enter “ilstu 8908 0359”. This will give you access to the course materials and assignments.

Doing homework online has certain benefits to the student. The homework software will give immediate feedback. This will include whether the question was answered correctly. In some cases, it will also give guidance for what you may have done wrong. Additionally, you will have multiple attempts to answer the problem, each time with different numerical values. Working on the homework until mastery is achieved is one of the best ways to prepare for the exams.

Your textbook will be accessible on WebAssign. You do not need to purchase a separate print copy of your textbook. An electronic version comes with WebAssign. (If you are registering for WebAssign for the first time, you need to select the option to include the textbook.)

Last modified 1/11/15
Grading

Your grade will be based on exams, homework and laboratories in the following proportions:

- 60% Exams (20% for each of MT I, MT II and Final)
- 20% Homework
- 20% Labs

Your letter grade will be determined according to the following percentages of the total possible scores:

- 90% A
- 80% B
- 70% C
- 60% D

You are required to complete all assignments and laboratories and to attend all exams. Only extremely good and documented excuses will be allowed for missing exams. You must discuss this with the instructor as soon as possible.

Homework

A combination of continuously reading the textbook for understanding and doing a lot of homework problems is the best way to master the material in this course and therefore do well on the exams. You will have one homework assignments per week plus one review homework assignment per exam. Each will be due at the beginning of the class period when the next chapter begins or at the beginning of the exam. The majority of the problems will be based on material we have already covered in class. There may also be a small number of “prelecture exploration” problems that help you start thinking about the material before it is covered in class. Furthermore, there may be a small number of problems from previous chapters to help you keep up on the cumulative material and do well on the exams.

Discussing homework problems with other students is ok, even good if you are stumped. But, remember that it is up to you to make sure you master each problem so that you will do well on the exams (you can not get help on the exams). You can do each problem multiple times. Only your best score (before the due date) is used for your grade. So, if you don’t feel confident in a problem, do it again with new numerical values. There is nothing to lose in doing the homework problems multiple times.

Exams

All the exams will be comprehensive. The first exam will cover Chapters 19-22. The second exam will mainly cover Chapters 39-42 with a small number of questions from Chapters 19-22. The final exam will mainly cover Chapters 43-46 with a smaller number of questions from Chapters 19-22 and 39-42. There may also be some questions based on the laboratories.

Academic Integrity

Although it is ok to discuss certain aspects of this course with other students, the final work on all assignments and exams must be your own. Homework and laboratories can be done in groups according to class policies but the final homework input and submission using WebAssign and the final lab report must be the work of the student claiming credit for it. Additionally, exams must be done by the student alone and with no help from anyone other than the instructor. Any violations will be dealt with according to university policy.

Last modified 1/11/15
### Tentative Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday 1:00-1:50</th>
<th>Tuesday 1:00-1:50</th>
<th>Wednesday 1:00-1:50</th>
<th>Thursday 1:00-3:50</th>
<th>Friday 1:00-1:50</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week 1</strong></td>
<td>Jan. 12-16</td>
<td></td>
<td>Ch. 19 Sec. 1</td>
<td>MI 1 Introduction</td>
<td>Ch. 19 Secs. 4,5</td>
</tr>
<tr>
<td><strong>Week 2</strong></td>
<td>Jan. 19-23</td>
<td></td>
<td>Ch. 20 Secs. 1,2</td>
<td>MI 2 Functions &amp; Lists</td>
<td>Ch. 20 Secs. 5,6</td>
</tr>
<tr>
<td><strong>Week 3</strong></td>
<td>Jan. 26-30</td>
<td></td>
<td>Ch. 21 Secs. 1,2</td>
<td>MI 3 Plotting</td>
<td>Ch. 21 Sec. 5</td>
</tr>
<tr>
<td><strong>Week 4</strong></td>
<td>Feb. 2-6</td>
<td></td>
<td>Ch. 22 Secs. 1,2</td>
<td>MI 4 Programming 1</td>
<td>Ch. 22 Secs. 6,7,8</td>
</tr>
<tr>
<td><strong>Week 5</strong></td>
<td>Feb. 9-13</td>
<td>Flex/Review</td>
<td>Flex/Review</td>
<td>Exam 1: Chs. 19-22</td>
<td>Review</td>
</tr>
<tr>
<td><strong>Week 6</strong></td>
<td>Feb. 16-20</td>
<td></td>
<td>Ch. 39 Secs. 1,2,3,4</td>
<td>MI 5 Programming 2</td>
<td>Ch. 39 Secs. 7,8</td>
</tr>
<tr>
<td><strong>Week 7</strong></td>
<td>Feb. 23-Feb. 27</td>
<td></td>
<td>Ch. 40 Secs. 1,2</td>
<td>EL &amp; CL 1: RT Distributions &amp; Δ</td>
<td>Ch. 40 Secs. 6,7,8</td>
</tr>
<tr>
<td><strong>Week 8</strong></td>
<td>Mar. 2-6</td>
<td></td>
<td>Ch. 41 Secs. 1,2</td>
<td>CL 2: Damped V Euler's Method</td>
<td>Ch. 41 Secs. 5,6,7</td>
</tr>
<tr>
<td>Mar. 9-13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Spring Break</td>
</tr>
<tr>
<td><strong>Week 9</strong></td>
<td>Mar. 16-20</td>
<td></td>
<td>Ch. 42 Secs. 1,2,3,4</td>
<td>EL 2: Damped V C&lt;sub&gt;V&lt;/sub&gt;/C&lt;sub&gt;P&lt;/sub&gt;: Piston</td>
<td>Ch. 42 Secs. 7,8,9,10</td>
</tr>
<tr>
<td><strong>Week 10</strong></td>
<td>Mar. 23-27</td>
<td>Flex/Review</td>
<td>Flex/Review</td>
<td>Exam 2 Chs. 19-22, 39-42</td>
<td>Review</td>
</tr>
<tr>
<td><strong>Week 11</strong></td>
<td>Mar. 30-Apr. 3</td>
<td></td>
<td>Ch. 43 Secs. 1,2,3</td>
<td>CL 3: DS Photon Monte Carlo</td>
<td>CH. 43 Secs. 6,7,8</td>
</tr>
<tr>
<td><strong>Week 12</strong></td>
<td>Apr. 6-10</td>
<td></td>
<td>Ch. 44 Secs. 1,2,3</td>
<td>EL 3 Double Slit Photon</td>
<td>Ch. 44 Secs. 6,7,8</td>
</tr>
<tr>
<td><strong>Week 13</strong></td>
<td>Apr. 13-17</td>
<td></td>
<td>Ch. 45 Secs. 1,2,3</td>
<td>CL 4: Radial $\psi_H$ Finite Diff. Method</td>
<td>Ch. 46 Secs. 1,2,3</td>
</tr>
<tr>
<td><strong>Week 14</strong></td>
<td>Apr. 20-24</td>
<td></td>
<td>Ch. 46 Secs. 4,5,6</td>
<td>EL 4: Radial $\psi_H$ H Spectra</td>
<td>Ch. 46 Secs. 10,11,12</td>
</tr>
<tr>
<td><strong>Week 15</strong></td>
<td>Apr. 27-May 1</td>
<td>Flex/Review</td>
<td>Flex/Review</td>
<td>CL 5: Full $\psi_H$ ??? Method</td>
<td>Flex/Review</td>
</tr>
<tr>
<td>May 4-May 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Finals Week Chs. 19-22, 39-46</td>
</tr>
</tbody>
</table>

All dates are tentative. The Flex/Review dates are first used to complete material not already finished. Once all material for the unit is finished, flex days will be used to review for the exams.

Last modified 1/11/15
Homework will usually be due on the day when the next chapter is started. The final HW will be due the class following the completion of the material, probably Apr. 27. MI, CL and EL stand for Mathematica introduction laboratory, computational laboratory and experimental laboratory, respectively.

Labs

Laboratories

The first five laboratories will give an introduction to Mathematica. They are designed to teach the student, and help the student become comfortable with, the following Mathematica topics: functions, lists, plotting and basic programming techniques. These skills will be important to complete the later laboratories, so students are required to attend these laboratories, which will take place in MLT 309. If not finished by the end of lab time, the student may finish at home and pass off the lab to the TA during the week before the next laboratory. The format for these laboratories consists of a Mathematica notebook containing instructional text that must be read followed by a set of embedded “assignments” which must be completed to the satisfaction of the instructor or TA. The student’s score for these labs will be equal to the fraction of the embedded assignments that are completed. There will be no lab reports for these labs. They can be found at the website: http://www.physics.byu.edu/courses/computational/230. We will be doing Labs 1, 2, 3, 6 and 7.

The rest of the laboratories will have both a computational and an experimental aspect. Typically, the computational lab will be completed first followed by the related experimental lab the following week. The computational part of the lab will be completed in MLT 309 and will deal with a computational physics method related to the experiment. If not completed during lab time, the student may complete it on their own at home and pass it off to the TA during the week. The experimental part of the lab will typically be completed in MLT 217 and will involve a measurement related to the computational project. The experimental lab must be completed during class. If assigned, a combined lab report will then be written that covers both the computational and experimental aspects of the project. It is also required that the student attend these labs and only very good excuses will be accepted for missing these labs. Late laboratory reports will be docked 10% per late calendar day (whether we meet or not). Details on grading lab reports will be given at the first experimental laboratory where a lab report will be required. Lab reports will be given a separate score from the lab.

Disability

Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns at 350 Fell Hall, (309)438-5853, on the web at DisabilityConcerns.IllinoisState.edu.

Counseling

Life at college can get very complicated. Students sometimes feel overwhelmed, lost, experience anxiety or depression, struggle with relationship difficulties or diminished self-esteem. However, many of these issues can be effectively addressed with a little help. Student Counseling Services (SCS) helps students cope with difficult emotions and life stressors. Student Counseling Services is staffed by experienced, professional psychologists and counselors, who are attuned to the needs of college students. The services are FREE and completely confidential. Find out more at Counseling.IllinoisState.edu or by calling (309) 438-3655.

Last modified 1/11/15