Physics 2400 - University Physics IV - Waves and Modern Physics

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Office Hours: Monday, Wednesday, Friday: 2:00 - 3:00 (or anytime I am in my office)
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Course Description

This introductory survey of modern physics is a grand sweep of 20th century physics encompassing the study of special relativity, waves, the wave/particle duality of light, the Bohr atom, deBroglie waves, and an introduction to quantum mechanics. Quantum mechanics provides the foundation and explanatory framework of much of modern physics. We study some of the history of and the motivation for quantum theory, and investigate ways in which classical laws of physics must be modified - or even replaced - in order to account for the behavior of atoms and subatomic particles. Atomic structure, molecular structure and particle physics are explored as application areas of quantum mechanics.

Course Objectives

The principal objectives for this course are for you to learn the fundamental concepts, principles, and theories of modern physics and to develop the ability to solve problems. Compared with your previous physics courses, you may find that concepts have a greater emphasis here. Lectures are structured to help you understand the conceptual basis of modern physics and examples are designed to re-enforce those concepts.

Textbooks

Serway, Moses and Moyer, Modern Physics, 3rd edition

Supplementary Text book: (for review of Waves)

R. D. Knight, Physics for scientist and engineers with Modern Physics, 5th edition

Effort and Course Grade

Modern physics is conceptually challenging - even some Nobel Prize winning physicists have complained of their lack of intuition when studying special relativity and quantum mechanics. You, too, are likely to find much of the material in this course to be conceptually difficult and to require at least two hours of study outside of class for each hour spent in class.

Your grade for the course will be based on your performance on graded homework, surprise quiz, on the midterm exam, and on the final exam. The weight attributed to each segment of the course follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Graded Homework</td>
<td>35%</td>
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<tr>
<td>Quiz</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm exam</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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For each of the four components of the course you will be given a numerical score. The guidelines for interpreting these scores are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>A</td>
<td>85-100</td>
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<tr>
<td>AB</td>
<td>80-84</td>
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<tr>
<td>B</td>
<td>70-79</td>
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<td>BC</td>
<td>65-69</td>
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<td>C</td>
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<td>CD</td>
<td>55-59</td>
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<tr>
<td>D</td>
<td>50-54</td>
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<tr>
<td>F</td>
<td>0-49</td>
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</tbody>
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Letter grades for the course will be based on the above scheme.

**Graded Homework**

The due dates for submitting the homework assignments are one week from the date of assignment. No late submission will be accepted.

Your problem solutions must include the detailed steps (not just the final answer):

(a) a diagram, where appropriate,
(b) symbolic identification of the given and unknown quantities,
(c) identification of the definition, concept, or law used to solve the problem,
(d) algebraic solution of the problem
(e) numerical solution of the problem, where appropriate.

Important- correct final answer without the required steps will not be awarded full marks.

Your work must be neat and well organized.

Some organizational tips:

- Write your name in capital letters, so that you will be credited for your homework
- If you use lined paper, use alternate lines. Otherwise, the work is too cramped and difficult to read.
- Write on one side of the paper only.
- Start each problem on a new sheet of paper. This allows you to easily amend your work and to not get stuck with the need to squeeze lots of material into a small space. Allow for margins at the top, bottom and sides of the page. This allows the grader to make comments without writing over your work.
- Number your pages and staple your work together prior to submission. Ask the department secretaries to use a stapler if needed. Your work must be stapled and not dog-eared, taped, paper-clipped.
- Many students find engineering paper ideally suited to the task; you may wish to give this a try.

Working in groups is a valuable way to learn physics, but the work you submit for grading must be your own.

**Hour Exams and Final Exam**

Exams are scheduled as follows:

- **Surprise quiz-** (will be announced in the day it will be given)
- **Midterm Exam** - Monday, March 13, 1:00 - 2:00 p.m.
- **Final Exam** - Monday, April 24, 2:00 - 4:00 p.m.

Two to three easy surprise quiz (10 minutes each) will be given in the whole term. You are advised to attend all the lectures. The midterm exam will be fifty-five minutes long (proper time). An unexcused absence from any exam, quiz, will result in a grade of zero. Exams will consist of both conceptual questions and problems. Partial credit will be awarded on all exams, so you should strive to solve problems in a neat and organized fashion with all the
steps. The formula sheet appended to this document along with the table of physical constants found in the front of the textbook will be provided - no other formula sheet or table is allowed. There will be no scaling, redemption, or any other manipulation of exam scores.

Help from the TA

If you're having difficulty and desire extra help beyond that provided by your instructor, you can meet the TA (Mr. V. Tilvi) for this course during his office hours (noon to 1 p.m. on Monday and Wednesday, office: B-025A, Fisher Hall Basement). Don’t expect him to do your homework assignment for you as he is instructed not to help you with the homework problems.

Excused Absences

Events beyond your control may cause you to miss a class, homework due date, or an exam. Examples of such events include a documented illness and a family crisis. In such cases, it's best to inform the Dean of Students of your problem. The Dean will then inform all your instructors that you face a situation that requires you to miss class, and you are granted an excused absence. It's then your responsibility to contact each of your instructors after you recover from your illness or return to campus.

In the event of a missed exam due to an excused absence, you are required to take a make-up exam. If a homework due date is missed as a result of an excused absence, the due date will be extended. If the final exam is missed as a result of an excused absence, you will be awarded the letter grade of I (incomplete) and must take the PH2400 final exam at the end of any one of the next three semesters that you're in residence.

Drop Dates

Drop date with no grade: January 27, 2006
Drop date with W grade: March 3, 2006

Late drop: If after the drop date circumstances beyond your control prevent you from completing the course, you may be a candidate for a late drop. The process does not begin with a course instructor but rather with the Dean of Students, to whom you confide the details of your situation.

MTU ADA Statement

MTU complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA). If you have a disability and need a reasonable accommodation for equal access to education or services at MTU, please call Dr. Gloria Melton, Associate Dean of Students, at 2212. For other concerns about discrimination, you may contact your advisor, department head, or the Affirmative Action Office at 3310.