Physics 311 - Mechanics

Wittenberg University
Fall 2009
Jeremiah Williams

http://userpages.wittenberg.edu/jwilliams/courses/Ph311/index.html

Contact Information:

Office: 311 Kuss Science Center
Phone: 327-7825
e-mail: jwilliams@wittenberg.edu
web: http://userpages.wittenberg.edu/jwilliams

Office Hours: MWF 10:15–11:15 AM and by appointment

Class Schedule:

Class Meetings: MWF 9:10 – 10:10 AM Sci 313
Final: Monday, December 14, 2008 8:00 – 11:00 AM

Primary Text:


• A book of integral tables will be useful. I recommend the Mathematical Handbook of Formulas and Tables in the Schaum’s Outline Series. It is compact, portable and contains much of what you will need in your undergraduate studies.

Course Description

Wittenberg Catalog Course Description: Analytical study of the dynamics of particles, rigid bodies, and vibrating systems. Lagrangian and Hamiltonian techniques are included. Prerequisites: Physics 220 and 218. Mathematics 212 and 215 recommended.

I assume that you have already taken the introductory physics sequence and have a basic understanding of differential and integral calculus. I also assume a basic knowledge of vectors and vector algebra. Additional mathematical concepts will be introduced or reviewed as necessary.

This is a difficult subject, but it is very important in the field of physics. In addition to being one of the broadest and most successful theories that has been developed in the field of physics, classical mechanics provides a basis for numerous areas of physics including: thermodynamics, quantum mechanics and relativity. As such, there is a substantial amount of material to be covered this semester. What this means for you is that the pace of this course will be rapid and that it is imperative for you to keep up to date with the material. It also means that YOU must let me know if the pace is too fast (or slow).

The schedule will be determined and adapted to best fit your needs and interests.

Feedback: If you have concerns about the course or ideas about how to make it better, please let us know immediately, either in person or by e-mail. We are very happy to implement suggestions, and there has been great success with student suggestions in the past.
Course Policies:

Attendance: Class participation and attendance are not mandatory and will not directly contribute to your course grade. However, this is a lecture-based course and much of what we discuss in class will be directly related to the homework and exam questions. Therefore, it is in your best interest to attend and be actively engaged during the lectures. If you do miss a lecture, you are responsible for getting the notes and assignments from the missed class and to familiarize yourself with any missed material. If you know in advance that you will be absent, you are expected to check with me to find out if you will be missing anything significant. Any graded work or assignments that are due during a missed class cannot be made up unless you have talked to me (in advance, if appropriate) and you have provided documentation of a University excused absence.

Grade Determination: All assignments will be graded on an absolute scale. At the end of the semester, a normalization may be applied to the total absolute grades for the entire class to determine each individual's final grade. Your course grade will be determined using the scheme below. Please note that the meaning of letter grades are defined on pages 19 and 20 of the Student Handbook. Letter grades for this course are assigned according this scale.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>35%</td>
</tr>
<tr>
<td>Exams</td>
<td>45% (to be equally divided among the exams given)</td>
</tr>
<tr>
<td>Final</td>
<td>20%</td>
</tr>
</tbody>
</table>

Homework: Homework will be assigned throughout the semester. Unlike previous courses, we will use a draft/final approach on the homework. In this system, a draft version of your assignment is due at the scheduled time (typically during a class meeting). It is expected that you will attempt to complete the assignment in your draft submission. I will grade and mark what you submit and return your solutions later in the day. If you complete a problem in the draft submission, you will get full credit (10 points) and no additional work is required. If an error is made in your work, you can earn up to 5 of the possible 10 points based on what is submitted. You will then have the opportunity to revise your solution and collect up to 5 of the remaining points. The revisions will typically be due at the start of the next class meeting. If you only submit a final version of your solutions (i.e. you do not submit a draft), you can only get up to half of the credit (i.e. 5 points). Solutions will be posted after the final version has been submitted. If you submit a solution after the scheduled time without previously discussing it with the instructor, your submission may be marked at the discretion of the instructor. However, it will not be graded.

Your homework solutions should be organized, legible (typed or written in pen) and your answer should be clearly labeled (boxed, highlighted, bold, etc.). You are expected to justify your answer by showing your work and by stating, in words, what you are doing. Full credit will not be given without a description of what you are doing and why (i.e. the physics being used).

In addition to the homework solutions that you submit, it is expected that you will keep up with the course reading and are prepared for each class meeting.

Exams: Exams will be timed and given in class or in a take-home format. Regardless of the format, you will be told explicitly what resources will be available to you during the exam (typically, this will include your brain, a writing instrument and a math handbook). The use of anything else is considered as a case of academic dishonesty.

Exams must be taken at the stated times, except by prior agreement. Makeup exams will only be given if there is unavoidable and documented conflict. It is your responsibility to contact the instructor at least one week in advance (if possible) or no later than 24 hours (if unexpected). The exact date of the exams will be announced in class at least one week in advance.
Office Hours: You set the agenda for office hours - come with questions about the lecture, laboratory, reading, homework, exams, grading, or any other issue that is of concern or interest. You can attend in groups or as an individual. To discuss something in private, please make a separate appointment.

Online content: The course webpage and e-mail will be used, to some degree, to conduct course business. The webpage will serve as a central location for information related to this course; policies or information posted there supersede the information in this document. You are expected to review (and keep up-to-date with) the content of the webpage. E-mail will be used to conduct course business and make last minute announcements. All course related material will be sent to your Wittenberg account only and it is assumes that you will check your Wittenberg account at least once per day for course-related material. Be aware that while e-mail is excellent medium for communicating urgent, private or time-sensitive matters, it is a terrible medium for discussing physics. If you have a content question, it is best to ask in person. I typically respond to e-mails a few times a day between 9 AM and 6 PM. If you e-mail me outside of these hours, it likely that you will not receive a response until the next day.

Mathematica: Mathematica is a powerful software tool, which we will use in this course to gain physical insight on problems that we are considering. In particular, we will use Mathematica to visualize solutions, the effect of various physical parameters on the solution and numerically solving problems whose analytic solutions are not easily found or exist. Wittenberg has a campus-wide site license, which means that you can run Mathematica on any campus machine. Additionally, Wittenberg currently has an unlimited number of student copies that can be installed on your personal computer. If you are interested in this, you can download the student version of the software from Wittenberg’s web page, http://www.wittenberg.edu/software/.

Accommodations: Any student with a documented disability who needs to arrange reasonable accommodations must contact the instructor at the beginning of the semester and provide a self-identification letter. To obtain this letter, contact Vancenia Rutherford, the Assistant Provost for Academic Services, at 937-327-7924 in room 203 Recitation Hall.

Regarding Academic Honesty:

The important guiding principle of academic honesty is that you must never represent the work of others as your own. While it is expected that you will abide by the Wittenberg Honor Statement, the following guidelines should help govern your behavior in this course; please request clarification if you find yourself in any doubtful situations.

You are encouraged to seek assistance from the instructor, from your fellow students or from anyone you think would be useful with the homework and with preparing for class discussions. You are also encouraged to work with other members of your class on these assignments, as it is often very beneficial in the learning process. However, whatever you turn in MUST be your own work. Simply copying someone else's work is clearly a representation of work as your own and is a case of academic dishonesty. Exams must be entirely your own work. Detailed instructions will be given on the exams themselves and discussed in advance. No collaboration of any sort is allowed once an exam begins.
Course Schedule:

There will not be a detailed course schedule for this course. In my experience, it is very difficult to stick to a course schedule in an upper-level course and these courses are much more enjoyable when there is greater flexibility in the choice of topics and the pace of coverage. As a result, the pace and content of the course will be determined as the course progresses. This means that you will have to be engaged with the course, providing feedback on what your interest are and if the pace of coverage is too fast (or slow).

At the present time, I expect to cover Chapters 1-7 and Chapter 14. I do not expect that this will take the entire semester, which means that the remainder of the term will be spent covering topics that are of interest to you or me.

Useful Advice:

You will get more out of this course if you are actively engaged. To that end, below are a few pieces of advice that have been collected from my personal experiences, the experiences of my colleagues and students who have taken this course in the past.

1. If you are having trouble, ask for help. There are a number of resources available to you, including the office hours that are provided by the instructor, other faculty in the department and your peers.

2. Prepare for class by reviewing your class notes between lectures and reading the relevant portions of your text before coming to class. By doing this, you can come to class prepared to ask questions and you will get more from the class discussion.

3. The only way to learn physics is by doing it. This means that you should read with pen in hand to work out things described only briefly in the text or lecture and work extra problems if you need feel you need additional practice. I am happy to provide additional problems, if you let me know.

4. Successful and efficient problem solving is a process that requires focusing on the underlying physical principles. Before jumping into the mathematics, it is best to start by identifying what you know and what physical principles will help you to most efficiently find what you are looking for. After planning an approach, you should then begin working through the mathematics. Once you have found a solution, it is critical to then look at your result to determine if it is reasonable (i.e. do your values make sense, does your solution behave as you expect in the appropriate limits, etc.)

5. Don't spend more than a few hours on a single homework problem. If you are stumped, show clearly where you're stumped and then ask for help. Also, the problems that you will do in this course are more involved than those that you have previously seen. It is therefore in your best interest to start the assignment well in advance and not wait until the night before they are due.

6. Peruse the posted solutions.

7. Don’t get (too) frustrated if you are having trouble. Physics is hard. But, with practice and perseverance, it is all worth it.

As always, this syllabus is subject to change.