PHYS 350 Theoretical Mechanics

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Syllabus: Phys 350: Theoretical Mechanics  
Fall 2015

Professor: Dr. Laura Wessels  
Email: wesselsl@xavier.edu

Class: 11:00-11:50 am MWF  
Classroom: Logan Hall room 105  
Office: Linder Hall room 106  
Office Phone: 513-745-1952

Office Hours: MWF 2:00-3:00 pm; TR 10:00-11:00 am; or by appointment

Description: This course reinforces concepts from PHYS170 through the study of classical mechanics via the application of advanced mathematics. The course covers linear and 3D motion; oscillations (simple, damped and driven); gravitational forces; within the Newtonian and Lagrangian frameworks. Emphasis is placed on examples that use mathematical treatment of fundamental concepts.

Pre-requisites: MATH 230 & PHYS 170

Course Objectives: Students will learn to solve problem on a variety of mechanical systems of interest in physics, as described in the class description. Students will use computers to solve more complex problems. Students will practice writing in the physics context by writing a paper on a textbook chapter not covered in the class.

Summary of objectives: 1. Master solving problems in the field of mechanics; 2. Master the theory involved in the subject; 3. Practice the skills of writing a review paper.

Class Materials: Classical mechanics by Taylor (2005)  
ISBN-13 978-1891389221

Note: Useful additional books include a math handbook (your choice. Schaums makes one that is cheap and useful (ISBN 0071795375). The CRC handbook (ISBN 1439835489) is probably the most used, though more expensive. An additional useful reference would be an old edition of Classical Dynamics of Particles and Systems by Thornton & Marion. This book is very commonly used and makes a good second book to use studying, both for this class and the GRE and grad school.

Grading:  
Exam 1 15%  
Exam 2 15%  
Exam 3 15%  
Final Exam 20%  
Homework 20%  
Term Paper 15%
Your total grade for the course is weighted as listed above and follows the grading scale below.

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<td>90.0-92.9</td>
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<td>83.0-86.9</td>
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<td>60.0-66.9</td>
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Attendance: Although not mandatory, it is highly recommended that you do not miss class. If you miss an exam due to illness, then your final exam will be counted in place of the missed exam, making the final worth 35% of your grade.

Homework: As a general rule, work that is neatly written and easy to follow will always score better than work that is not. Homework is essential to mastering the skills that will be assessed on the exams. There will be problems on the homework that is longer and more involved than a test problem will be. That all means START EARLY! Come to me for help. Feel free to talk to your classmates about general questions on the homework. COPYING from your classmates, a book, OR LOOKING FOR AN ANSWER ON THE INTERNET is cheating! If I can tell this happened, you will receive a zero on the assignment.

Late homework will be penalized 20% per day (so if its more than 4 days late, don’t bother handing it in).

There will likely be at least 1 COMPUTER problem per assignment. These problems will require a computer to solve numerically. The platform is up to you. Some will be manageable in EXCEL. Others will require MatLab, Mathematica, or programming (Python, Fortran, C...) to solve, an to plot the answers.

Term paper: Learning to research a topic and write a paper on it is a skill that in the long term in a career in physics or a related field is at least as important as knowledge of the material. It is a skill, just as important and painful in acquisition as mathematics. To practice this, you will do a paper on sections from the text not covered in class. The paper will include: (1) an overview of the material in the chapter that is accessible to your classmates, (2) at least one representative example problem worked on a major topic and (3) a section on current research (2 or more projects less than 10 years old) that uses theory from those sections.

The paper will be formatted in the style used by American Journal of Physics. You may want to use LaTeX or AASTeX to make formatting the paper (and especially the equations) easier, but you are not required to do so.

The final paper can be NO LONGER than 10 pages. I will accept drafts up to 1 week before the final paper is due. Drafts can be longer but should be formatted correctly.

Plagiarism could result in a ZERO on the paper, depending on the severity of the offense, and certainly will mean points off. Plagiarism includes not citing where you got a picture or chart, direct copying or paraphrasing without citation, etc.
should be YOUR review of the topic not a copy of someone else’s! **IF IN DOUBT, CITE IT!**

Any student who feels s/he may need an accommodation based on the impact of a documented disability should contact the Learning Assistance Center at 513-745-3280 on the Fifth Floor of the Conation Learning Commons, Room 514, to coordinate reasonable accommodations. Further information can be found at [http://www.xavier.edu/lac](http://www.xavier.edu/lac).

Tentative Exam Dates:
Exam 1  9/18  
Exam 2  10/16  
Exam 3  11/18  
Final exam 10:00-11:50am Friday Dec. 18th