Physics 151: Principles of Physics I  
MWF 8:10-9:10  HSC116  
R 7:40-10:40 or R 2:00-5:00  HSC 104

Dr. Craig L. Caylor  
office hours: MW 2:00-3:00, T 11:00-12:30  
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Co-requisite: MTH 150 or higher

Text: Matter & Interactions, 4th Ed. by Ruth Chabay and Bruce Sherwood. We will cover Ch 1-12.

Physics is not a set of definitions and equations to be memorized. The most important thing in a physics analysis is the reasoning. We will discuss only a small number of fundamental principles:

1. the Momentum Principle,
2. the Energy Principle, and
3. the Angular Momentum Principle.

By applying those principles to simple models of matter, we can understand and explain a great deal using forward reasoning. Through the use of calculus ideas and techniques and some computer programming in VPython, we’ll develop quantitative answers to a variety of questions.

Outcomes: The successful student will be able to

A. State and explain fundamental principles of physics;
B. Describe atomic models of different kinds of matter;
C. Use physics principles to predict and describe the behavior of model systems;
D. Apply correct mathematical analysis;
E. Write programs in VPython and analyze program outputs; and
F. Compare expected system behavior with the outcomes of laboratory experiments.

Assessment: Students will be evaluated through

1. Performance on assigned homework problems;
2. Correct behavior of VPython code in assigned computational problems;
3. Completion of laboratory problem-solving, data collection, and analysis; and
4. Regular exams.
Grading:

1. Homework    10%        | A  90-100
2. VPython coding  15%    | B  80-90
3. Lab        15%        | C  70-80
4. Exams     60%        | D  60-70
F  <60
(with 3-pt ± zones, as applicable)

Assignment details:

Homework problems will be assigned for each chapter. You should think about the homework as the practice/training needed to be successful practitioners of physics. With that in mind, note that homework solutions should be more than just a string of equations. In each problem, you should begin with the most fundamental principle(s) you are applying. Logically coherent sentences/phrases to describe your thinking should accompany the equations you use. Each step should be clearly explained. Those are the standards that will be expected on your exams. If you begin work on the homework the day it is assigned, you will have the opportunity to see me or a tutor with questions before it is due. If you only begin work on the homework the night before it is due, you have made a wrong decision.

VPython coding problems will be assigned regularly. For each problem, you will e-mail me a link to your completed GlowScript file. The body of your e-mail needs to contain answers to any questions that were part of the assignment. Your grade on each problem will be based on your program displaying correct behavior and your correct answers to any questions. If you begin work on your coding the day it is assigned, you will have the opportunity to see me or a tutor with questions before it is due. If you only begin work on the coding the night before it is due, you have made a wrong decision.

Students are encouraged to meet with me about homework and coding assignments to obtain guidance. Students should feel free to consult with each other on homework and coding assignments. Students should not feel free to copy work from each other. If you work with others on a homework or VPython assignment, include “I worked with…” and their names at the top of the homework assignment or the e-mail you send to submit your code.

Students are not permitted to consult other sources (e.g. instructors’ solution manuals or online answer repositories) in working on their homework or coding assignments. Submitting others’ work as your own (including work from online sources) is a violation of Westminster College’s Academic Integrity Policy and will, if discovered, lead to a letter to the Dean and a failing grade for the course.

Labs occur weekly unless we are taking an exam during lab that week. They may include experimental measurements, analysis of demonstrations, VPython coding, and group problem solving. Most weeks there will be some written work to turn in. Your grade for each lab will depend on your successful completion of the lab assignments.

There will be four exams, one every three chapters. You should expect exams to feature both conceptual questions and quantitative problems to solve. Your grade for exam problems will depend on your application of fundamental principles, your use of mathematical processes, and the clarity and completeness of your solutions/answers. Exams will usually be scheduled during our lab period. The fourth exam will be scheduled during our final exam period.