

# Mechanics of Systems – Physics 252

## Westminster College

### 1 Pertinent Information

Instructor: Doug Armstead

Office: 124 Hoyt (724) 946-7201

Office Hours: WF 2-3. These are just the times I guarantee. I am available other times so feel free to drop by or to email me for an appointment.

Email: [armstedn@westminster.edu](mailto:armstedn@westminster.edu)

Course website: [www.westminster.edu/staff/armstedn/phys252.html](http://www.westminster.edu/staff/armstedn/phys252.html)

Lecture meets: MWF 12:50-1:50am in Hoyt 116.

Texts:

*Analytical Mechanics 7<sup>th</sup> Ed.* by Fowles and Cassiday published by Thomson Brooks/Cole.

Prerequisites: Physics 251 is a prerequisite and Math 252 is needed at least concurrently.

### 2 The Point of this Class

In Physics 251 you started to deepen the sophistication of your approach to mechanics. In this course we will

In this course we will make the first steps toward deepening the sophistication with which you approach mechanics. Some of this will come from your learning to apply mathematical tools such as series expansion, vector calculus, differential equations, symbolic solvers, and numerical integration. This sophistication will also come from looking more closely at the way a physical object behaves at high speeds (special relativity), when the observer is accelerating (noninertial reference frames), or is small (Bohr's atom).

### 3 Expectations

What you should expect from me:

- Explanations of physical concepts that include concrete examples and, where reasonable, demonstrations.
- In-class examples that help you to develop the level of reasoning that is necessary to do the problems you will encounter in the homework and on exams.
- Careful and respectful consideration of your questions.

- An open door policy—if my office door is open you should feel free to come in and talk about physics. This is in addition to my regularly scheduled office hours listed above.

What I expect of you:

- Your presence in class, both physical and mental, for the entire class period.
- If you have a question, ask it. Your fellow classmates will thank you—if you are unclear on something, chances are the person next to you is, too.
- Submit work for grading that is your own. If you copy from another student or source and submit it for a grade, then you risk receiving an F in the course.

## 4 Grades

The final score for the class is found in the following way:

$$score = \frac{H + E1 + E2 + E3 + F}{5} \quad (1)$$

where  $H$  =homework average,  $E1$  =exam one, and  $F$  =final exam.

### 4.1 Graded Elements

The point of the homework is to develop a clear understanding of the problems. This entails mastering the concept, technique, and thought process that leads from beginning to end using a clear, methodical plan. There are many aids at your disposal: the instructor, in and out of class; your classmates; and the library. But in the end nothing beats quiet concentration and gradually sorting things out for yourself.

The goal of the homework is the demonstration of the logic that leads to the answer, not the answer itself. This will also be the way the exams are evaluated. Some exams will be in-class and others take home. A make-up exam will only be administered for “Excused Absences” (see pages 70-71 of Undergraduate Catalog for details). Supporting documentation to excuse your absence will be required.

The score is mapped into a grade roughly as:

| Final % | Grade         |
|---------|---------------|
| 90-100  | A- to A       |
| 80-89   | B- to B+      |
| 70-79   | C- to C+ etc. |

Improvement and class participation may be used raise a border line grade.

### 4.2 Academic Integrity

You are expected to observe the College’s statements and procedures on Academic Integrity in the 2007-2008 Undergraduate Catalog, pages 71-75. Ask the instructor if you have any uncertainty about what is proper collaboration and what is not.

## 5 Class Schedule

All dates are tentative.

| Week | week starting | Chapter(s) | Topic   |
|------|---------------|------------|---|
| 1    | Jan. 21       | 7          | Dynamics of systems of Particles                  |
| 2    | Jan. 28       | 7          |   |
| 3    | Feb. 4        | 8          | Ridgid Bodies in Planar Motion                    |
| 4    | Feb. 11       | 9          | Ridgid Bodies in 3-D Motion                       |
|      |               |            | <b>Test: Chapters 7-8 on Wed. Feb. 13.</b>        |
| 5    | Feb. 18       | 9          |   |
| 6    | Feb. 25       | 9 & 10     | Lagrangian and Hamiltonian Mechanics              |
| 7    | Mar. 3        | 10         |   |
| 8    | Mar. 10       | 10         |   |
|      |               |            | <b>Test: Chapters 9-10 on Fri. Mar. 14. Final</b> |
|      |               |            | (Spring Break through M.)                         |
| 9    | Mar. 24       | 11         | Dynamics of Oscillating Systems                   |
| 10   | Mar. 31       | 11         |   |
| 11   | Apr. 7        | 11         |   |
| 12   | Apr. 14       | ?          |   |
|      |               |            | <b>Test: Chapters 11-? on Wed. Apr. 16.</b>       |
| 13   | Apr. 21       | ?          |   |
| 14   | Apr. 28       | ?          |   |
| 15   | May 5         | ?          |   |

**Exam from 11:30am-2pm on Friday, May 9, 2008**