PS 103 – Technical Physics I
Embry-Riddle University
Summer A 2008

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Required text: *College Physics*, 7th edition, by Serway, Faughn & Vuille
Recommended: any algebra-based physics textbook, choose one you like
Recommended in the library: *Understanding Physics*, by Asimov
Cartoon Guide to Physics, by Gonick & Huffman
3000 Physics Problems
Recommended online: *Hyperphysics*,

Point system:			*Grading scale*:	
1 final exam	200 points	200	A	900 –
3 tests	200 points each	600	B	750 – 899
120 problems	1 point each	120	C	600 – 749
25 work sheets	4 points each	100	D	500 – 599
2 reports	10 points each	20		
challenge problems	4 points each			

IMPORTANT NOTE

Listening to lectures is not enough (*you retain only 10% of what you hear* …). All processes of learning are somehow connected to active participation, and the learning of physics is no exception. Therefore, it is imperative that you work diligently at your own desk (… *80% of what you practice* …). However, this does not mean that you should only work alone. I encourage you to form study groups and collaborate with your classmates (… *and 90% of what you teach to others!*).

Course Description: A course in elementary physics. Stress will be placed on basic physics principles. Problem solving and problem solving logic will be an important, integral part of this course. Topics will include Newton's Laws, projectile motion, circular motion, work, energy, conservation laws, and momentum.
Prerequisite: MA 111 or MA 140. **Co-requisites**: MA 112 or MA 241, PS 103L.

Prerequisite Knowledge:
1. Solution of linear equations.
2. Solution of systems of equations.
3. Graphing techniques.
4. Exponents and roots.
5. Quadratic equation.
6. Ratio and proportion.
7. Elementary trigonometry.
8. Right triangle solutions.

Learning Outcomes:
1. Define physical units most frequently encountered in physics.
2. Use trigonometric relations, vectors and methods of vector addition in solving statics problems.
3. Describe the motion of an object in one dimension, including freely falling bodies with regard to various reference systems.
4. Calculate displacement, velocity and acceleration using the equations of motion.
5. Apply the equations of motion in two dimensions with emphasis on projectile motion.
6. Make calculations using the concept of inertia, force and acceleration of objects.
7. Apply Newton's laws of motion and draw free body diagrams to analyze objects in equilibrium and in non-equilibrium.
8. Calculate the speed, centripetal acceleration and forces acting on objects executing circular motion and apply it to motion of a satellite and artificial gravity.
9. Apply the concepts of work, kinetic energy and potential energy in solving problems.
10. Calculate work done by constant forces, kinetic energy of moving objects, gravitational potential energy of an object and power developed as work is done.
11. Apply the principle of conservation of energy to solve a variety of problems.
12. Quantitatively discuss the relationship between impulse applied and the corresponding change in momentum experienced by objects.
13. Apply the principle of conservation of linear momentum to solve problems of elastic and inelastic collisions.
14. Calculate angular displacement, angular velocity and angular acceleration using the rotational kinematic equations.
15. Apply Newton's law of rotation and describe the concepts of moment of inertia, and rotational work and energy as well as power.
16. Solve rotational kinematic and dynamic problems using the concept of torque.
17. Solve problems involving center of gravity locations and use the principle of conservation of angular momentum.

RULES

1. Arrive on time; depart on time.
2. Take notes, and bring calculator to each class.
3. No eating, no cell phones.

Final Exam

Comprehensive; two-hour; closed book; closed notes.
Tools: pen or pencil, scientific calculator, 3x5 card (both sides) for equations.
Date: Monday, 23 June, 10:30 am – 12:30 pm.

Tests

One-hour; closed book; closed notes.
Tools: pen or pencil, scientific calculator.
Dates: Wed 21 May, Wed 4 June, Wed 18 June.
Final exam will make-up for one missed test.

Problem sets

15 problems from each chapter 1-8; must be neat and stapled.
Due Dates: Ch1 5/13 – Ch2 5/19 – Ch3 5/27 – Ch4 5/30 –
Ch5 6/4 – Ch6 6/11 – Ch7 6/17 – Ch8 6/20.
Graded on correctness and effort.
Problems 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57

Work sheets

Due daily.

Reports

Two reports on assigned articles.
Due Dates: 30 May, 20 June.
One page, single-spaced, minimum 500 words; answer assigned questions.

Grading:		
	<500 words	-1 point
	<400 words	-2 points
	1-4 grammatical errors	-1 point
	5 or more errors	-2 points
	Each question not answered	-1 point

Challenge Problems

Assigned in class. Due following class period.

All assignments are due at the *beginning* of class on the due date, after which they will be considered late and the score will be reduced by 50%. After the beginning of the *next* class period, they will not be accepted.

General study habits

Repetition is critical for creating long-term memories. A good method for learning is the following sequence: read, listen, write, re-read, re-write, practice, and review. The textbook should be read THREE times: read once before class, read deeply (at least) once after class, and once as a review. In addition, you do not read textbooks as you would the newspaper. You must work through the examples, all mathematical steps should be confirmed, and you should write notes in the margins (it is your book, you can write in it!).

Notes

Taking notes during lecture is important – but you must review and re-copy those notes after class (within a few hours) for them to be useful. Notes that are never reviewed are less than worthless: they give you a false sense of security. It is important that you get into the habit studying every day.

Problem Solving

Solving problems is **critical** to your success in this course. An excellent method to prepare for the exams is to attempt problems at home in an exam-type environment. That is, once you have solved a group of problems, put aside the solutions and pretend that they are questions on an exam – attempt to solve them again, but without any help. Solve problems according to the following rules of coherence and readability:

- Describe *briefly*, but in clear and complete sentences, the basic principles used to solve the problem and explain the basic equations that are used in the solution [DO NOT simply rewrite the question].
- If a physical situation is discussed in the problem, draw an appropriate diagram.
- Identify in words, or by clear references to the diagram, all the symbols you use.
- Work through the problem symbolically, getting a simplified symbolic answer, and only substitute numbers (if appropriate at all) at the very end.
- If you obtain an explicit numerical solution, comment on whether the value you get is reasonable.
- Put boxes around your final answers.
- Write up the problem sets neatly.

Study Groups

Do not simply copy another student's work, and do not simply copy from the solutions manual, but I recommend that you form study groups and work together. This can help you through difficult sections and problems. I encourage you to discuss, argue, arm-wrestle, and finally master the problems. However, I expect you to write up your solutions individually, showing your own insights.

"For most individuals, learning is most effectively carried out via social interactions."

- Ed Redish