PS 215 – Physics I
Embry-Riddle University
Spring 2016

Instructor: M. Anthony Reynolds
email: reynodb2@erau.edu
web: http://pages.erau.edu/~reynodb2/ps215
phone: (386) 226-7752
office: COAS 319.20
office hours: MWF 1:00-2:00; MW 3:00-4:00

Required texts: *Problems and Solutions in Introductory Mechanics*, by David Morin, Chapters 1-9,11
Introductory Physics I, by Robert G Brown, Chapters 1-7, 12

Recommended: *Physics*, by Tipler – QC 21.2 .T548
Lectures on Physics, by Feynman – QC 23 .F47
Understanding Physics, by Asimov – QC 23 .A8
Cartoon Guide to Physics, by Gonick & Huffman – QC 24.5 .G66
"*Hyperphysics"* http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
"*Simple Nature*" http://lightandmatter.com/area1sn.html

Percentage system:		*Grading scale*:	
1 final exam	20%	A	90% –
3 tests	60% (20% each)	B	75% – 89%
Quizzes	20%	C	60% – 74%
Home-fun	1%	D	50% – 59%

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!*).

---

* This syllabus incorporates all existing University policies, especially those sections of the *Student Handbook* pertaining to academic integrity, civility, and respect. *

Course Description: Estimations, order of magnitude analysis, Newton's Law, gravitation, kinematics, work and energy, momentum, rotation, and harmonic motion. **Pre requisite:** MA241.

Goals: This course is the first of a three-semester course sequence for students in engineering programs. It is a survey course in mechanics, designed to provide the student with an appropriate background for more advanced physics and engineering course work.

Prerequisite Knowledge:

1. Basic algebraic manipulations.
2. Algebra of Polynomials.
3. Exponential and logarithmic functions and related manipulation. Scientific notation.
4. Trigonometric functions and identities and applications.
5. Limits and the limit process.
6. Graphical analysis of functions.
7. Vector algebra.

Learning Outcomes:

1. Solve problems involving vectors in polar coordinates and rectangular coordinates using vector addition, subtraction, multiplication (dot and cross products), and including finding magnitudes of vectors and angles between vectors.
2. Know the basic and fundamental units in the S.I. system and the English system. Be able to use dimensional analysis and be able to convert units. Be able to perform order of magnitude calculations.
3. Restate Newton's Laws of Motion. Solve vector problems using Newton's Laws. In doing this, employ the knowledge of friction (static and kinetic) and uniform circular motion. Derive the expression for centripetal acceleration for uniform circular motion. Draw free-body diagrams.
4. Define work, kinetic energy and potential energy. Compute work for constant and variables forces. Demonstrate the use of the work-energy theorem and the conservation of energy. Define the concepts of linear momentum, impulse, center-of-mass (conservation of momentum), and demonstrate understanding by solving problems in one and two dimensions.
5. Be able to solve problems using Newton’s law of gravity.
6. Work problems in rotational kinematics and rotational dynamics. Be able to use energy methods in rotational motion.

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: (at least) 2 sharp pencils, scientific calculator, 3x5 card (both sides) for equations.
Date: Wednesday, 4 May, 08:00 – 10:00.

Tests

One-hour; closed book; closed notes.
Tools: (at least) 2 sharp pencils, scientific calculator.
Dates: Fri 12 Feb, Fri 11 Mar, Fri 15 Apr.
Final exam will replace lowest test.

Quizzes

Every Friday, last 15 minutes of class. Second solution due following Monday.

Problem Sets

Approximately 10-20 problems due each week – usually Monday.

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 clearly, 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.

Do not simply copy another student's work (see the statement about plagiarism above), 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.

Study Groups

"For most individuals, learning is most effectively carried out via social interactions." (Ed Redish) I strongly suggest that you form study groups.

Schedule – Reading and Home-fun

week	topic	Reading Morin	Reading Brown	HF Morin	HF Brown	Due date
1	Problem solving	Ch 1	Preliminaries	All MC, P 1.1-1.9		Wed 1/20
2	1D kinematics	Ch 2	1.1-1.7	All MC, P 2.1-2.11	W1: P 2,3	Mon 1/25
3	2D kinematics	Ch 3	1.8-1.9	All MC, P 3.1,2,3,5,6, 7,8,11,12,14,15, 20,21,22	W1: P 5,6,12	Mon 2/1
4	Newton's Laws	Ch 4	1.5-1.6, 2.1-2.3	All MC, P 4.1-7	W1: P 4,7-11	Fri 2/5
4/5				P 4.14,19,21,23	W2: P 2-11	Wed 2/10
5	Review/probs				**Test #1**	**Fri 2/12**

HF = Home-fun
MC = Multiple choice (not to be turned in)
P = problems
W = week