Embry-Riddle Aeronautical University
Prescott Campus

Physics for Engineers I **Fall 2017** **3 credit hours**

Course	**PS150.05**	**M W F 3:00 – 3:50 pm**
	PS150.08	**M W F 10:00 – 10:50 am**
Instructor	**Dr. Darrel Smith**	
Office Hours	See my website: **http://physicsx.pr.erau.edu/**	
Office	Academic Complex 1 Room 253	
Phone	(928) 777-6663 (office)	

Course Description

Estimations, order of magnitude analysis, Newton's Laws, gravitation, kinematics, work and energy, momentum, rotation, harmonic motion.

Corequisite: MA241.

Goals

This course is designed primarily for students in the Engineering programs. It is the first of a three-semester sequence of introductory classical physics, designed to provide the student with an appropriate background for more advanced work in physics and engineering course work. Students are expected to have a working knowledge of beginning calculus, or enrolled in MA241.

LEARNING OUTCOMES:

1. Solve problems involving vectors in polar and rectangular coordinates, using vector addition, subtraction and multiplication (dot and cross products).
2. Analyze and solve problems in kinematics in one and two dimensions.
3. Restate Newton's Laws of Motion. Solve vector problems using Newton's Laws. Employ the knowledge of friction (static and kinetic) and 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. Recognize and apply the analog expressions for linear and rotational motions. Solve problems with constant and variable angular acceleration. Define and solve problems on torque, rotational inertia, angular momentum and the conservation of angular momentum.
6. Learn the conditions for static and dynamic equilibrium and apply to problems. Calculate the center of mass. Recognize the distinction between center-of-mass and center-of-gravity.

Textbook **University Physics plus Mastering Physics** by Young & Freedman
14th edition © 2016 Publisher: Addison & Wesley

Required Materials **A scientific calculator. Textbook** ISBN-13: 978-0321982582

Attendance "Regular attendance and punctuality, in accordance with the published class schedule, are expected at all times in all courses." . . . . ***Don't miss class !!***

Course Outline

Chapter 1	Units, Physical Quantities and Vectors
Chapter 2	Motion Along a Straight Line
Chapter 3	Motion in Two or Three Dimensions
Midterm #1	***September 22, 2017 (Friday)***
Chapter 4	Newton's Laws of Motion
Chapter 5	Applying Newton's Laws
Midterm #2	***October 11, 2017 (Wednesday)***
Chapter 6	Work and Kinetic Energy
Chapter 7	Potential Energy and Energy Conservation
Quiz	***October 31, 2017 (Tuesday) on-line outside of class***
Chapter 8	Momentum, Impulse, and Collisions
Chapter 9	Rotation of Rigid Bodies
Midterm #3	***November 20, 2017 (Monday)***
Chapter 10	Dynamics of Rotational Motion
Chapter 11	Equilibrium and Elasticity

Common Final **December 12, 2017 (Tuesday) 2:45-4:45 pm Location: TBD**

December 7, 2017 Last Day of Classes

Homework (25%)

Homework is an essential part of this course. The homework problems at the end of each chapter are designed to develop and improve (1) your critical thinking skills, and (2) your ability to apply physics principles when solving physics problems. The due dates for your homework are shown in MasteringPhysics (see below—**Homework Assignments**).

1. **Exercises** – By answering *homework exercises,* you will become familiar with the concepts, important formulas, units and dimensions. These exercises are keyed to specific sections within the chapter; similar exercises will be found in the three midterms and the final. "Most" of the answers from this section are numerical, while only a few are symbolic.
2. **Problems** – These are traditional physics problems that explore the geometrical relationships between physical quantities. They are not keyed to a specific section and often require the use of concepts from multiple sections or sometimes from previous chapters. Some problems call for the student to estimate or independently locate the data needed to solve the problem. By their very nature, homework problems usually take longer to solve compared to exercises. The answers to some of these problems can be *symbolic* rather than *numerical*, or they involve the combination of two or more physical concepts *(i.e., critical thinking skills)*. While similar problems may appear on the exams and final, some of them can be lengthy, thus making them inappropriate for in-class exams. However; the astute student will discover that mastering these problems will improve their performance on the exams, and also expand their insight to solving more challenging problems in the future.

Homework Assignments

Homework Assignments are posted on the Mastering Physics website. If you did not purchase Mastering Physics with your textbook, you can obtain a Mastering Physics license by logging on to **masteringphysics.com** and requesting (i.e., paying for) a student license. The Mastering Physics ID for this course is:

Mastering Physics ID	Class	Class Time
MPSMITH26180	**PS150.05**	**M W F 3:00 – 3:50 pm**
MPSMITH30978	**PS150.08**	**M W F 10:00 – 10:50 am**

Make sure you **enter the correct Mastering Physics ID.** Check to see if you're in the morning or afternoon section. You will find your homework assignments and exams for this course after you register into my Mastering Physics class.

Homework Grading

There are 3 categories in your Mastering Physics homework:

1. Études 10%
2. Homework 85%
3. Adaptive Follow-up 5%

Assignments in the Études and Adaptive Follow-up categories are weighted equally. Assignments in the Homework category are weighted by the "total points" in each assignment.

Classroom Notebook

You are required to have a "bound" classroom notebook for taking notes and recording the solutions of your MasteringPhysics homework problems. You will be able to bring this notebook to your exams along with your calculator. Loose-leaf notebooks will not be permitted at the exam. You cannot "cut and paste" material into your "bound" classroom notebook. All the material entered in the "bound" classroom notebook must be handwritten in the notebook by you.

I will do a cursory check of your "bound" classroom notebooks twice during the semester to monitor your progress in keeping notes for this class as well as solutions to the homework problems.

Final Exam (25%) Common Final Dec. 12 2:45—4:45 pm Tuesday

Grading	**Weight**		
Homework (MP)	25%		A = 90 – 100%
Quiz	5%		B = 80 - 90%
Midterms (3 of them)	45%	(10%, 15%, and 20%)	C = 70 - 80%
Final	25%		D = 60 - 70%

The best way to prepare for the exams is to understand how to solve the homework problems. You are responsible for understanding the solutions to homework problems as well as the material presented in class.

Quiz, Midterms and Final

Your quiz, midterms and final exam will be posted on Mastering Physics, and midterms and final exam will be completed in the classroom using your portable electronic tablet or laptop computer. You're permitted to use your "bound" classroom notebook and your calculator when taking the exams.

LEARNING OUTCOMES:

1. Solve problems involving vectors in polar coordinates and rectangular coordinates using vector addition, subtraction and multiplication (dot and cross products).
2. Determine the magnitude of vectors and the angles between vectors.
3. Demonstrate knowledge of the basic and fundamental units in the S.I. system and the English system. Be able to use dimensional analysis and to perform unit conversion. Show the ability to make "order of magnitude" calculations.
4. Restate Newton's Law of Motion. Solve vector problems using Newton's Laws. In doing this, employ the knowledge of friction (static and kinetic) and uniform circular motion. Draw free-body diagrams.
5. Define work, kinetic energy and potential energy and deal with problems involving constant and variable forces.
6. Demonstrate the use of the work-energy theorem and the employment of the conservation of energy.
7. Define the concepts of linear momentum, impulse and center-of-mass (conservation of momentum) and demonstrate an understanding of these principles by solving problems in one and two dimensions.
8. Understand and solve problems dealing with rotational kinematics and rotational dynamics and demonstrate an ability to use energy methods in rotational motion.

Access To Learning

ERAU is committed to the success of all students. It is University policy to provide reasonable accommodations to students with disabilities who qualify for services. If you would like to discuss and/or request accommodations, please contact Disability Support Services in Hazy Library Room 109, extension 6750, or 928/777-6750.

Civil Rights Equity and Title IX:

ERAU seeks to provide an environment that is free of bias, discrimination, and harassment. If you have been the victim of harassment, discrimination or sexual misconduct, we encourage you to report this. If you inform me of an issue of harassment, discrimination, or sexual misconduct I will keep the information as private as I can, but I am required to bring it to the attention of the institution's Title IX Coordinator. If you would like to talk to the Title IX Coordinator (Liz Higgins Frost) directly, she can be reached at Building 49, Dean of Students Office, 928-777-3747, froste@erau.edu. For more information, please refer to the Nondiscrimination/Title IX webpage at http://prescott.erau.edu/about/health/sexual-misconduct-and-title-ix/index.html.

Fall 2017 Schedule

Day	Assignment	Lecture Date
1	Ch 1	28-Aug
2	Ch 1	30-Aug
3	Ch 1	1-Sep
4	Ch 2	6-Sep
5	Ch 2	8-Sep
6	Ch 2	11-Sep
7	Ch 3	13-Sep
8	Ch 3	15-Sep
9	Ch 3	18-Sep
10	**Review**	**20-Sep**
11	**Test 1**	**22-Sep**
12	Ch 4	25-Sep
13	Ch 4	27-Sep
14	Ch 4	29-Sep
15	Ch 5	2-Oct
16	Ch 5	4-Oct
17	Ch 5	6-Oct
18	**Review**	**9-Oct**
19	**Test 2**	**11-Oct**
20	Ch 6	16-Oct
21	Ch 6	18-Oct
22	Ch 6	23-Oct
23	Ch 7	25-Oct
24	Ch 7	27-Oct
25	Ch 7	30-Oct
	Quiz	**31-Oct**
26	Ch 8	1-Nov
27	Ch 8	3-Nov
28	Ch 8	6-Nov
29	Ch 9	8-Nov
30	Ch 9	13-Nov
31	Ch 9	15-Nov
32	**Review**	**17-Nov**
33	**Test 3**	**20-Nov**
34	Ch 10	27-Nov
35	Ch 10	29-Nov
36	Ch 10	1-Dec
37	Ch 11	4-Dec
38	**Review**	**6-Dec**