

# Embry-Riddle Aeronautical University Prescott Campus

Physics for Engineers I

Fall 2018

3 credit hours

Course PS150.07 M W F 9:00 – 9:50 am Bldg. 54

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 calculus-based 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 courses in physics and engineering. 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  
14<sup>th</sup> edition © 2016 Publisher: Addison & Wesley

**Required Materials**  
**Attendance**

**A scientific calculator. Textbook** ISBN-13: 978-0321982582  
"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 21, 2018 (Friday)**

Chapter 4 Newton's Laws of Motion

Chapter 5 Applying Newton's Laws

**Midterm #2** **October 10, 2018 (Wednesday)**

Chapter 6 Work and Kinetic Energy

Chapter 7 Potential Energy and Energy Conservation

**Quiz** **October 31, 2018 (Wednesday) Mastering Physics outside of class**

Chapter 8 Momentum, Impulse, and Collisions

Chapter 9 Rotation of Rigid Bodies

**Midterm #3** **November 19, 2018 (Monday)**

Chapter 10 Dynamics of Rotational Motion

Chapter 11 Equilibrium and Elasticity

**Final** **December 11, 2018 (Tuesday) 12:30-2:30pm Comprehensive Exam**  
**Location: This classroom (Bldg. 54)**

**December 6, 2018** Last Day of Classes **(Thursday)**

## Homework (20%)

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 Mastering Physics (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 (*e.g., 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.

## Homework Assignments

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

<u>Mastering Physics ID</u>	<u>Class</u>	<u>Class Time</u>
MPSMITH84424	PS150.07	M W F 9:00 – 9:50 am

Make sure you **enter the correct Mastering Physics ID**. The homework assignments, along with the exams, are shown in Mastering Physics once you register into my Mastering Physics class. More details for opening a Mastering Physics account are found at the end of this syllabus.

**Grading** Since all your grades are recorded in Mastering Physics, your up-to-date grades for this course can be found in Mastering Physics. I will make a one-time transfer of the grades to CANVAS at the end of the semester.

There are 6 categories in your Mastering Physics assignments:

1.	Études	5%	
2.	Homework	20%	A = 90.0% -- 100%
3.	Adaptive Follow-up	8%	B = 80.0% -- 89.9%
4.	Midterm Exams	40%	C = 70.0% -- 79.9%
5.	Quiz	2%	D = 60.0% -- 69.9%
6.	Final Exam	25%	F < 60.0%

- Assignments in the Études and Adaptive Follow-up categories are equally weighted.
- Assignments in the Homework category are weighted by the “total points” in each assignment.
- Midterm Exams (3 of them) **Total = 40%** (10%, 15%, and 15%)
- Students earn automatic credit for each of the Adaptive Follow-ups if they score 95% (or better) on the individual homework assignments.

## Classroom Notebook

You are required to have a “bound” classroom notebook for taking notes and recording the solutions to your Mastering Physics 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 material entered in the “bound” classroom notebook must be handwritten by you.

I will conduct 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.

**The best way to prepare for the exams** is to understand how to solve the homework problems (e.g., use your “bound” classroom notebook). 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 presented on Mastering Physics, and midterms and final exam will be completed in-class using your portable electronic tablet or laptop computer. You’re permitted to use your “bound” classroom notebook and your calculator while 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.

## **Academic Integrity/Conduct**

Embry-Riddle is committed to maintaining and upholding academic integrity. This includes carrying out one's own course of study within the parameters set by one's instructors, by academic administrators, and by University values. It includes avoiding cheating and plagiarism; maintaining the quest for excellence in study, written assignments, and other academic tasks; and reinforcing honesty and rigor in all one's academic behavior. All students, faculty, and staff have obligations to reinforce the above and take corrective action when necessary. To report issues of academic integrity, contact (in appropriate order); the course Professor, the academic Department Chair and/or the Dean of the College. For more information about academic integrity, please refer to the academic catalog and your course syllabi.

For more information see the Student Handbook:

<https://prescott.erau.edu/-/media/files/prescott/campus-life/dean-of-students/prescott-student-handbook.pdf?la=en&hash=4A933D54C706D4A969DFD66AC05357E3D6820F>

## **Cheating**

On rare occasions, I’m confronted with a case of cheating on an exam. If I determine that cheating has occurred, my recommendation (for the first offense) is that a student will earn a “zero” for the assignment. If cheating by the same person recurs, then my recommendation is that the student will earn a “zero” for the course.

## Quick Access to Institutional Policies and Services

- Civil Rights Equity & Title IX <https://erau.edu/leadership/title-ix/>
- Disability Support Services <http://prescott.erau.edu/about/disability-support>
- Safety and Security <http://prescott.erau.edu/about/security>
- Student Handbook <https://prescott.erau.edu/-/media/files/prescott/campus-life/dean-of-students/prescott-student-handbook.pdf?la=en&hash=4A933D54C706D4A969DFFDD66AC05357E3D6820F>
- Academic Calendar <http://prescott.erau.edu/campus-life/academic-calendar>
- Institutional Review Board <https://erau.edu/research/resources/irb/>
- Vet Resources <https://prescott.erau.edu/veterans-resources/>

## 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.*

## Fall 2018 Schedule

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

## First, make sure you have these 3 things...

1. **Email:** You'll get some important emails from your instructor at this address.
2. **Course ID:** Ask your instructor for your Course ID!
3. **Access code or credit card:** An access code card may be packaged with your new book or may be sold by itself at your bookstore. Otherwise, you can buy instant access with a credit card or PayPal account during registration.



## Next, get registered and join your course!

1. Go to [Pearson Mastering Physics webpage](#).
2. Under **Register Now**, select **Student**.
3. Confirm you have the information needed, then select **OK! Register now**.
4. Enter your instructor's **Course ID** (ex. MAPprofessor12345), and choose **Continue**.
5. Enter your existing Pearson account username and password and select **Sign in**. You have an account if you've ever used a Pearson MyLab & Mastering product, such as MyLab Math, MyLab IT, or Mastering Chemistry.
  - If you don't have an account, select **Create** and complete the required fields.
6. Select an access option.
  - Enter the access code that came with your textbook or was purchased separately from the bookstore.
  - Buy access using a credit card or PayPal account.
7. From the "You're Done!" page, select **Go to My Courses**.
8. Select **Yes** and enter your **Course ID** to join your course. Click **Continue**.
9. If asked, enter your **Student ID** according to the instructions provided and click **Continue**. That's it! You should see the course home page for the course.

## To sign in later:

1. Go to [Pearson Mastering Physics webpage](#) and select **Sign In**.
2. Enter your Pearson account username and password from registration, and select **Sign In**.
  - If you forgot your username or password, select **Forgot your username or password?**

## To join another course for the same textbook (no additional purchase needed):

1. Sign in with the username and password that you specified during registration.
2. Select **My Courses** in the upper left and then choose **Join a Course**.
3. Enter the **Course ID** from your instructor and click **Continue**.
4. If asked, enter your **Student ID** according to the instructions provided and click **Continue**.
5. To switch courses, select **My Courses** from the course menu (left side).
6. Select any active course link that appears below **Switch to another course**.
7. The next time you sign in to Mastering, your course view will match the last course you chose.

*If you have a technical issue:* Contact [Pearson Support](#).