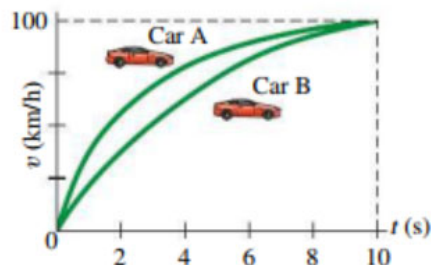


# Physics for Scientists and Engineers

FALL 2019

PHYS 4A

Section #51327



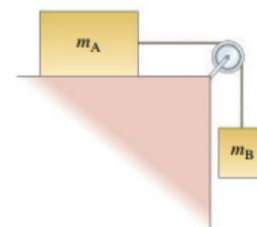
**Instructor:** Dr. John Heathcote  
**Class Times:** MTW 1:00-1:50pm, PHY-70  
Th (Problem Solving) 1:00-1:50pm, **BUS-43**  
Th (Lab) 2:00-4:50pm, PHY-70  
**Office:** FEM-1B (in the math study center)  
**Phone:** (559) 638-0300 ext. 3215  
**e-mail:** [john.heathcote@reedleycollege.edu](mailto:john.heathcote@reedleycollege.edu)

## Office Hours:

M 9:00-10:30am  
T 9:30-10:00am (in PHY-70)  
W 9:00-10:30am  
Th 9:30-10:00am (inPHY-70)  
F 9:00-10:00am

If you cannot make regular office hours, feel free to make an appointment.

**Corequisite:** MATH 5B  
**Advisory:** ENGLISH 1A



## Welcome to your first course in Calculus-Based Physics!

I would like to welcome you to PHYS 4A! In this course, you will learn the first topics in physics, including laws of motion, forces, work, energy, momentum, and many other topics. This course will use mathematics (algebra, trigonometry, and calculus) as a tool in analyzing and solving physics problems.

Physics is my favorite science. In physics, we aim to understand and describe the universe around us – everything from how the stars and galaxies form and evolve down to how subatomic particles interact. This course will mostly involve more everyday size scales that you deal with every day, such as how a ball flies through the air or how your car speeds up and slows down. In the end, you should have an appreciation for the physics that surrounds you every day and be prepared for more advanced classes in science and engineering!

I look forward to working with you in this class! This is a challenging topic, but we can work together so that you can be successful!

**Catalog Description:** The topics covered in this course include: classical mechanics, properties of matter, gravitation, fluid mechanics, oscillatory motion and mechanical waves.

**Required Textbook:** Physics for Scientists and Engineers, with Modern Physics, Douglas Giancoli, 4<sup>th</sup> Edition, Pearson

- This is a rather large and extensive book, but it will be the same book you will use in PHYS 4A, 4B, and 4C.
- Although a new book is very expensive, there are many cheaper, used books available online.
- If you only plan on taking PHYS 4A, you can purchase a smaller book labeled as “Volume 1”. However, if you plan on continuing with the other courses in the sequence, you will want to purchase the full version.

<b>Grading:</b>	45%	Tests
	20%	Final Exam
	25%	Homework and In-Class Problems
	10%	Presentation

**Tests and Final Exam:** There will be three tests and one final exam during the term. Each of the three will be given during a Thursday lab period and will cover a few chapters each. The final exam will be given during our scheduled final exam time (Monday, 12/9, 1:00-2:50pm) and will cover the topics from the entire semester. Rules for what students are allowed to us during each test and exam will be announced.

**Tentative Test Dates:** 9/12, 10/10, 11/7, 12/9

**Homework:** Homework will be assigned in order to practice the concepts and problem-solving skills taught in class. These will be handwritten assignments. You are required to show complete diagrams and full working of your problem solving for each assignment. Grades will be based upon both completeness, accuracy, and neatness. The homework is very important. Not only does it count for 20% of the overall grade, it will also be very useful practice for the problem solving techniques taught in this class.

**Use of Posted Solutions:** The solutions to the textbook problems are available at many locations online. You are allowed to look at these solutions as you complete your assignments. However, what is most important is that you understand these solutions. On the days of homework deadlines, certain students will be asked to show and explain the solutions to problems from the assignment. **Your performance on these days will be a portion of the Homework and In-Class Problems grade.**

**In-Class Problems:** The Thursday 1:00-1:50pm class meeting will usually be a problem-solving session. During this period, students may be asked to complete group-work problem set and may present solutions to each other. **These activities will be a portion of the Homework and In-Class Problems grade.**

**Presentation:** In order to see how the concepts of physics are applied to modern technology, students will research, prepare, and present about an application of the topics we learn during this semester.

**Late Work Policy:** It is very important that you submit all of your work (homework and in-class work). Late submissions will not receive full credit. However, it is much better to submit work late than to not submit it at all.

**Test Absence Policy:** Test dates will be announced well ahead of time. If you have a reason why you will be absent for a test, you need to let me know as soon as possible so that we can arrange a make-up time for you. If you are sick (or have some other reasonable excuse) on the day of a test, you need to contact me (by email, Canvas message, or phone call) to let me know that you are unable to attend. If I do not hear from you by the time of the test, I have no alternative but to give you a zero on the test.

<b>Grading Scale:</b>	90-100%	A
	80-89.9%	B
	70-79.9%	C
	60-69.9%	D
	<60%	F

**Accommodations for Students with Disabilities:**

If you have a verified need for an academic accommodation or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

<b>Add Date:</b>	Friday, August 30	Last day to add a course
<b>Drop Date:</b>	Friday, October 11	Last day to drop this course
<b>Holidays:</b>	Monday, September 2	Labor Day
	Monday, November 11	Veterans' Day
	Thursday-Friday, November 28-29	Thanksgiving Holiday
<b>Final:</b>	Monday, December 9, 1:00-2:50 pm	

## Course Outline:

Unit	Chapters	Topics	Weeks
A	1-3	Introduction, Unit Conversions, Velocity, Acceleration, Vectors, Kinematics, Projectile Motion	1-5
B	4-6	Forces, Newton's Laws, Free Body Diagrams, Friction, Circular Motion, Gravitation	5-9
C	7-9	Work, Energy, Potential and Kinetic Energy, Power, Linear Momentum, Collisions	9-13
D	10-12, Review	Angular Acceleration, Torque, Rotational Dynamics, Angular Momentum, Static Equilibrium, + Semester Review	13-18

## COURSE OUTCOMES:

Upon completion of this course, students will be able to:

- Apply algebra, trigonometry, and first-year calculus to solve physical problems such as: 1. Kinematic equations 2. Vector quantities 3. Newton's Laws 4. Conservation of energy and momentum 5. Rotating bodies 6. Gravity 7. Oscillatory motion 8. Mechanical waves
- Apply dimensional analysis to determine the units for an unknown quantity or to check the validity of equations.
- Correctly report the units of an observable when it is measured or calculated.
- Distinguish between important physical observables, such as mass and weight or speed and velocity.
- Identify the complementary roles of experimental investigation and theoretical explanation in science.

## COURSE OBJECTIVES:

In the process of completing this course, students will:

- Experience the interaction between theory and experiment in scientific investigation.
- Learn fundamental laboratory techniques.
- Learn to solve problems in oscillatory motion.
- Study the laws of fluid mechanics.
- Learn the basic concepts of mechanical waves.
- Learn to solve basic problems in classical mechanics.
- Study important properties of matter.
- Improve mathematical skills through the process of applying mathematics to the physical world.