

## Physics 1510-01: General Physics I Spring 2016

**Instructor:** Dr. Aaron Titus  
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**Office Hours:**  
Th 2:00 – 3:40PM; or by appointment

**Class Meeting Time:** MWF 8:10 AM – 9:00 AM, Congdon 206

**Course Description:** An algebra/trigonometry-based study of mechanics. Topics include Newton's laws of motion, properties of matter, momentum, and energy. The lecture must be taken concurrently with the lab (PHY 1511). Prerequisite: MTH 1210 (Pre-calculus) or higher.

**Textbook:** *Essential Physics*, 1st edition, by Andrew Duffy. An electronic textbook is included with your WebAssign purchase. (An iPad version is available for \$14.99 which includes all of the book content plus embedded simulations and animations. In the App store search "Andrew Duffy" and select the *Physics I HD* app.)

**Course Website:** <http://physics.highpoint.edu/~atitus/courses/phy1510/>

**Learning Objectives:** At the end of this semester, you will be able to

1. understand, apply, and interpret different representations of motion including verbal descriptions, graphs, and motion diagrams;
2. understand Newton's three laws of motion and apply them to solve a variety of one-dimensional and two-dimensional problems, including projectile motion and uniform circular motion;
3. distinguish between static and kinetic friction forces and solve a variety of problems involving friction;
4. understand the nature of pressure in a fluid and apply it to solve problems involving buoyancy;
5. apply knowledge of torque to solve a range of problems involving rotational statics and dynamics;
6. understand the relationship between force and momentum and apply the principle of conservation of momentum;
7. understand the relationship between work and energy and apply the principle of conservation of energy;
8. apply knowledge of oscillatory motion to solve problems involving systems that undergo simple harmonic motion.

**Grading Scale:** A+ (100-97.00), A (96.99-93.00), A- (92.99-90.00), B+ (89.99-87.00), B (86.99-83.00), B- (82.99-80.00), C+ (79.99-77.00), C (76.99-73.00), C- (72.99-70.00), D+ (69.99-67.00), D (66.99-63.00), D- (62.99-60.00), F (59.00-0). I reserve the right to decrease the minimum scores if it is appropriate.

**Grade Determination:** four quizzes (60% total), final exam (25%), homework (15%).

**Expectations:** Expect to work hard, to be challenged, to learn, and to work together. Expect to break through any struggles, doubts, and challenges, gain new abilities, accomplish new tasks, and develop analytical reasoning skills. **Expect to be lovingly pushed out of your comfort zone.**

Your success in physics will ultimately depend on how well you adhere to The Five P's<sup>1</sup>:

- **Be Present:** Your attendance in class is a key factor to your achievement. The dynamic of a live lesson cannot be replaced by the corresponding pages in a book.
- **Be Prompt:** Please arrive to class on time. Late arrival to class is disruptive.
- **Be Prepared:** Read the assignments you are given. Discussion is far more lively when you are prepared to question, discuss, debate, etc.
- **Be a Participant:** You must take responsibility for your own learning and not regard yourself as a passive receptacle into which knowledge will be poured. Understanding is NOT gained simply by being told. You must actively struggle with it in order to fully understand it. Ask questions and challenge my explanations or examples that confuse you. Contribute to class discussions, even if you are unsure of having the "right" answer.
- **Be Polite:** You must make this class a safe place for others to freely express their confusions, learn from their mistakes, and share their ideas without fear of ridicule. Listen to each other politely and deliver questions and criticism in an open and constructive manner. Be respectful of classroom materials and lab equipment. Before you leave class, return all equipment to its place and properly dispose of your trash.

My personal mission is to encourage you to be a life-long, interdisciplinary learner. If you are teachable, motivated, and diligent, you will be successful.

My educational philosophy is that you learn best when you are actively engaged with the subject through activities such as reading (and answering questions about what you read), discussing, experimenting, and solving problems. Lectures are useful for motivation and synthesis, but for most students merely listening to lectures and copying lecture notes is an ineffective method to learn. It's when you study individually, think deeply about the subject, ask questions, develop ideas and quiz them, and subsequently dialogue with classmates and the professor that you learn the most. My role as the professor is to create an environment that promotes active-learning, to assess your learning, and to provide guidance and mentorship along the way.

**Attendance:** Attendance is *required*. It relates directly to your performance in the class. If you miss three classes, you may be put on attendance probation. Further absences may result in you being withdrawn from the course.

**Homework - WebAssign:** Homework will be assigned, collected, and graded using WebAssign. You should visit [www.webassign.net](http://www.webassign.net) and self-enroll by clicking on "Students" and then "I Have a Class Key". Enter the following class key.

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**Quizzes:** There will be four quizzes throughout the semester. Your lowest quiz grade at the end of the semester may be replaced by your grade on the final exam (if the final exam grade is higher). Any missed quiz is a zero. If additional quizzes are missed because of serious illness, death in the family, or participation in official school events, the final exam will be substituted in place of the zero.

Quizzes will typically consist of two types of questions: (i) exercises and (ii) critical thinking/problem solving. The exercises will be based on low-level skills such as plug-and-chug calculations,

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<sup>1</sup> from Frank Noschese

knowledge of units, memorization of definitions, application of one equation or concept, proportional reasoning, etc. Critical thinking questions and problems will be based on higher-level skills such as multiple-step calculations, application of multiple concepts or equations, synthesis of concepts, and solving unfamiliar problems. I will supply you with an equation sheet for the quizzes.

**Final Exam:** The final exam will be comprehensive and will be given on Friday, April 29, from 8:00-11:00AM. You are not allowed to reschedule the final exam.

**Inquiry Sessions (a.k.a. Lab):** The labs for this course are of a different nature than many science labs you may have taken. They are not simply used to verify a law of physics that we have previously discussed in class. They are inquiry-based and frequently require you to investigate a topic *before* we discuss it in class. ***We will meet for lab the first week of class, Wednesday, January 13.***

**Course Expectations and Conduct:** In addition to attending class, students are expected to spend approximately 2 hours each week engaged in out-of-class work (i.e., reading, studying, doing homework, etc.) for every credit earned in this course. Thus, for our 3-credit class, you should spend at least 6 hours per week on this course, outside of class time.

Out of courtesy and respect for your instructor and fellow classmates, please refrain from using cell phones, tablets, or laptops during class.

**Tutoring:** Group tutoring is available through the Academic Services Center. I will post the schedule on Blackboard as it becomes available. For more information regarding tutoring and updated tutor walk-in schedules, please visit <http://www.highpoint.edu/academicservices>.

**Accommodations:** Students who require classroom accommodations due to a diagnosed disability must submit the appropriate documentation to Disability Support in the Office of Academic Development on the 4th floor of Smith Library. Student's need for accommodations must be made at the beginning of the course. Accommodations are not retroactive.

**Academic Integrity:** HPU has strict policies against cheating and plagiarism, which will be enforced in this class. The Honor Code asserts the following:

- every student is honor-bound to refrain from conduct which is unbecoming of a High Point University student and which brings discredit to the student and/or to the University;
- every student is honor-bound to refrain from collusion;
- every student is honor-bound to refrain from plagiarism;
- every student is honor-bound to confront a violation of the University Honor Code;
- every student is encouraged to report a violation of the University Honor Code.

I encourage collaboration on homework. You may work together to solve homework problems, and you may check your work with others. However, you must know how to solve problems independently so that you can solve unfamiliar problems on exams. On exams, you must do your own work. You will only be allowed to use the supplied equation sheet and your calculator. You may not use any stored programs, equations, or other data in your calculator during an exam.

I reserve the privilege to change this syllabus based on feedback from you and what I determine is best for the course. If the syllabus is updated, I will place an updated electronic copy of the syllabus on our web site.

**Tentative Course Schedule\*:**

<b>January</b>		
Wed-13	Introduction	
Fri-15	Displacement and Velocity	1.1 - 1.3, 2.1 - 2.3
Mon-18	<b>Martin Luther King, Jr. Day, No classes</b>	
Wed-20	Constant Speed Motion	2.4
Fri-22	Acceleration	2.5
Mon-25	Forces and Newton's 2nd Law	3.1 - 3.3
Wed-27	Applying Newton's 2nd Law	2.6 - 2.8, handout
Fri-29	More practice applying Newton's 2nd Law	3.4 - 3.8, handout
<b>February</b>		
Mon-1	Vectors in 2D	1.4 - 1.6
Wed-3	Quiz 1	
Fri-5	Newton's 2nd Law in 2D	
Mon-8	Normal Forces and Friction	5.1 - 5.3
Wed-10	Applying Newton's laws in 2D	
Fri-12	More practice applying Newton's laws in 2D	
Mon-15	Projectile Motion	4.4 - 4.8
Wed-17	More Projectile Motion examples	
Fri-19	Density and Pressure in Liquids	
Mon-22	Quiz 2	
Wed-24	Pressure and Buoyancy	9.1 - 9.2
Fri-26	Archimedes' Principle	9.3 - 9.5
Mon-29	Introduction to Uniform Circular Motion	5.5, 5.6, 5.8
<b>March</b>		
Wed-2	Apparent Forces in Circular Motion	
Fri-4	Newton's Universal Law of Gravitation	8.1 - 8.2
Mon-7 to Fri-11	<b>Spring Break; No classes</b>	

Mon-14	Orbital Motion	
Wed-16	Torque	10.4 - 10.5
Fri-18	Quiz 3	
Mon-21	Center of gravity; Static Equilibrium	10.10 - 10.12
Wed-23	Static Equilibrium; Impulse and Momentum	6.1 - 6.2
Fri-25, Mon-28	<b>Easter Break; No classes</b>	
Wed-30	Impulse and Momentum	
<b>April</b>		
Fri-1	More on Impulse and Momentum	
Mon-4	Conservation of Momentum	6.3
Wed-6	Quiz 4	
Fri-8	Kinetic Energy and Work	6.5
Mon-11	Gravitational Potential Energy	6.6
Wed-13	Conservation of Energy	7.1 - 7.3
Fri-15	More examples of Energy Conservation	
Mon-18	Hooke's Law, Elastic Potential Energy	12.1 - 12.2
Wed-20	Energy Conservation with Elastic Potential	12.3
Fri-22	Quiz 5	
Mon-25	Introduction to Simple Harmonic Motion	12.4 - 12.6
Wed-27	Final Exam Review	
<b>Fri-29</b>	<b>Comprehensive Final Exam (8:00-11:00AM)</b>	

\*Subject to change

\*\*Textbook sections listed for a particular date are to be read **before** coming to class on that date. For example, you are to read sections 1.1 - 1.3 and 2.1 - 2.3 in the textbook before coming to class on Friday, January 15.