

Physics 221—General Physics I with Calculus
Matter & Interactions
Fall 2009
High Point University
Syllabus

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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 test 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.

I expect you to learn the tools of scientific exploration that we will use in this class, including vector algebra, numerical analysis using VPython, curve-fitting, video analysis, and laboratory sensors and technology.

I hope that you will better understand the nature and process of science as a result of taking this course.

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 changed, you will receive an electronic copy of the updated version.

Lecture and Lab: MWF 12:00PM–1:50PM, Congdon 130; lecture and lab are integrated with approximately 1 hr of lecture and 1 hr of lab per day. During some days, the lab will require two hours and sometimes lab will be spread over more than one day. Lab includes experiments and computational physics exercises.

Office Hours: MW: 3–4 PM; T: 2–3PM; TH: 10–11 AM; F: 10–11AM.

Course Description: A calculus-based study of mechanics, properties of matter, waves, sound, and heat. Four hours credit. Three class hours; three laboratory hours. Prerequisite: MTH 142. You should also take MTH 241 as a prerequisite or corequisite.

Textbook(s): *Matter & Interactions*, Vol. I, 2nd edition, by Ruth Chabay and Bruce Sherwood

Course Web Site: <http://linus.highpoint.edu/~atitus/courses/phy221/>

Grading Scale (min%): A+ (96), A (92), A– (88), B+ (84), B (80), B– (76), C+ (72), C (68), C– (64), D+ (60), D (56), D– (52), F (<52).

Grade Determination: lab (15%), homework (10%), class participation (5%), quizzes (50%; 5 quizzes, 10% each), final exam (20%).

WebAssign: Homework will be delivered, collected, and graded using WebAssign. To get to WebAssign, you should first log in to Blackboard at the address shown below, select the link to this class, and then click on the link to WebAssign. (Right-click the link to WebAssign if you want to open it in its own window.)

<http://blackboard.highpoint.edu/>

Check WebAssign once per day to see if new homework assignments have been added.

Class Participation: We will use a classroom polling system (i.e. clickers) during every lecture in order to help you practice applying concepts taught in class. *You are required to own a clicker, and you are required to bring it to every lecture.* Specifically, we will use the TurningPoint ResponseCard RF by TurningTechnologies (<http://www.turningtechnologies.com/>). Each lecture will have numerous conceptual questions that must be answered in class with the clicker. For full credit, you must be present and you must answer all questions. Your grade will be your total percentage of responses. Correctness will not be counted, but rather you will receive full credit merely for responding to question(s). Worksheets may also be sometimes used as in-class activities and may count toward your grade.

During lectures and lab, use of cell phones and computers for social purposes is strictly forbidden. Violation of this policy will result in loss of your cell phone for the remainder of the class or lab. Repeated violations will result in a deduction of points for in-class activities at the discretion of the professor, possibly resulting in a zero for the semester for class participation.

You may use phones and computers for learning physics and communicating physics in class. For example, you may tweet questions to the professor during class, and you may view class presentation slides on the computer or look up a topic in Wikipedia that is being presented in class. If you are texting during class or receiving texts, the professor will ask to see the text to verify that it is related to lecture or lab.

You must be engaged with the material being presented in class and lab. Do not work on assignments for other classes. Do not use lab time to socialize. Stay engaged with this material, otherwise do not come to class. There is zero tolerance for unfocused and disengaged students in this class. If you are unfocused, then you will prevent others from learning to their full potential.

Quizzes: There will be six quizzes. Your lowest quiz score at the end of the semester will be dropped, and the average of your five highest quizzes will be computed and will have a weight of 50% of your overall course grade. Quizzes will be 1-2 hours and will be administered on the dates shown in Table 1. A missed quiz for ANY reason will count as a zero. If more than one quiz is missed due to a school activity or a medical condition that requires surgery or hospitalization, then the final exam grade will substitute for the (missed) quiz grade. Absences due to a school activity must be approved by the professor prior to the quiz.

Table 1: Tentative Schedule of Quizzes

Quiz No.	Date
1	Wed, Sept. 16
2	Wed, Sept. 30
3	Wed, Oct. 14
4	Wed, Nov. 4
5	Wed, Nov. 18
6	Wed, Dec. 9

Quizzes will consist of two sections: (1) conceptual and numerical multiple choice questions; (2) problem solving. Content will include topics and skills learned in lab.

Lab: Lab will consist of a pre-lab lecture and simulations, experiments, and/or other types of “hands-on” activities. For each lab, you will record all measurements, observations, and graphs in a lab notebook. You will submit your data and results in a lab report on WebAssign. The lab report is due the first day after the completion of the experiment. Your lab grade will consist of your grade on the lab report, your lab notebook (if collected), and lab participation, at the discretion of the professor. If you do not stay on task, if you goof around during an experiment, or if you act dangerously, you will be penalized on your lab grade or on class participation by an amount that is at the discretion of the professor.

Lab partners will be assigned by the professor. Be prepared to work with various lab partners throughout the semester.

Course Overview: The purpose of this course is for you to engage in a process central to science—to attempt to model a broad range of physical phenomena using a small set of powerful fundamental principles.

Note: this is not going to be equivalent to a typical high school physics course. You are expected to demonstrate strong analytical reasoning and problem solving skills.

The specific focus is on learning how to explain the nature of matter and its interactions in terms of a small set of physical laws that govern all mechanical interactions and in terms of the atomic structure of matter. Topics include:

1. types of matter and types of interactions
2. using the momentum principle to predict future motion, with applications to projectile motion, motion with air resistance, oscillations, uniform circular motion, orbits, and transverse and longitudinal waves.
3. an atomic model of solids
4. energy conservation including relativistic energy
5. energy in macroscopic systems including thermal energy
6. energy quantization

7. multiparticle systems and the point-particle system
8. collisions, including relativistic particle collisions
9. angular momentum and quantized angular momentum
10. entropy and statistical mechanics including the Boltzmann factor

Learning Objectives: You should be able to

1. apply a small set of fundamental physical principles to a wide variety of physical situations.
2. model complicated physical systems by making approximations and idealizations in order to apply fundamental principles.
3. use these fundamental principles to explain a wide variety of macroscopic and microscopic physical phenomena.
4. use these fundamental principles to predict the behavior of a variety of physical systems.
5. create a 3D, animated computer model of a physical situation.
6. set up an experiment to study the relationship between two variables and analyze a graph of the data to determine a mathematical relationship between the variables.

Final Exam: The final exam is comprehensive and will last approximately three hours. It will be given on Saturday, Dec. 12, from 1:30 PM–4:30PM. *The final exam can NOT be taken at any other time for any reason.* It will be exclusively multiple choice.

Help: Our class will meet for a review session each Tuesday night before a quiz, 7:30–9:30 PM in Rm 130 HHSC.

Academic Services Center has both individual and group tutoring available for HPU students. Individual tutoring is for those students who need one-on-one assistance with a course and is appointment based. To make an appointment contact Craig Curty, Director of Academic Services Center, by phone (336) 841-9014 or via e-mail ccurty@highpoint.edu. Group tutoring is available for specific courses certain days and times during the week and no appointment is necessary. All tutoring takes place in the lower level of Smith Library. For further information regarding tutoring and updated tutor walk-in schedules, please check the website <http://www.highpoint.edu/academics/asc>.

Expectations: Expect to work hard, to be challenged, to learn, and to work together. Expect to break through any struggles, doubts, and challenges to gain new abilities, accomplish new tasks, and develop new analytical reasoning skills.

Accommodations: Students who require classroom accommodations due to a diagnosed disability must submit the appropriate documentation to Ms. Irene Ingersoll, Coordinator for Disability Support, 405 Smith Library. Please inform her of your need for accommodations at the beginning of the semester. It is your responsibility as a college student to advocate for yourself. Accommodations are not retroactive.

Attendance: If you have more than six unexcused absences, you can be withdrawn from the class. *Absences are measured by your lack of response to in-class questions.* I reserve the right to choose whether to withdraw you or not for lack of attendance.

Course Evaluations: All students are expected to complete course evaluations in the week preceding final exams. These evaluations, which are delivered online, are an important part of High Point University's assessment program, so your cooperation in completing them is greatly appreciated. As the end of the semester or academic session draws near, you will receive information from the Office of Institutional Research and Assessment about how to complete the online evaluations. **IMPORTANT NOTE:** All communications from the Office of Institutional Research and Assessment will be sent to your High Point University e-mail account, so please be sure to check and maintain your account regularly.

Schedule: A tentative schedule of lectures is given in Table 2.

Table 2: Tentative Schedule of Lectures

Day No.	Date	Chapter
1	8/26	1
2	8/28	1
3	8/31	1
4	9/2	1
5	9/4	2
6	9/7	2
7	9/9	2
8	9/11	2
9	9/14	2
10	9/16	quiz
11	9/18	3
12	9/21	3
13	9/23	3
14	9/25	3
15	9/28	3
16	9/30	quiz
17	10/2	4
18	10/5	4
19	10/7	4
20	10/9	5
21	10/12	5
22	10/14	quiz
23	10/16	5
24	10/26	6
25	10/28	6
26	10/30	6
27	11/2	6
28	11/4	quiz
29	11/6	7
30	11/9	7
31	11/11	7
32	11/13	8
33	11/16	8
34	11/18	quiz
35	11/20	9
36	11/23	9
37	11/30	10
38	12/2	10
39	12/4	11
40	12/7	11
41	12/9	quiz