PHYS-0174-xxxx(xxxxx) Fall 2018

Basic Physics for Science and Engineering I

Instructor: Dr. Joseph Busche

Office: 113E OEH, but generally I will not be there. If we need to meet, we will arrange a location. Most likely, it will be outside the lecture hall in Alumni 343.

Phone: none

email: jbusche@pitt.edu

Office Hours: By arrangement. If necessary specified availability times will be posted on CourseWeb.

Textbook: Halliday, Resnick, & Walker "Fundamentals of Physics" 10th ed., Any other edition is fine with regards to subject matter, but when I refer to a problem, question, or section (etc.) it would be your job to figure out how to map it to what you are using.

Class: 343 Alumni Hall, M&W 6:00pm-7:45pm, But the October 17th lecture will be held in Scaife Auditorium 6.

Web: Couseweb (`http://courseweb.pitt.edu/`) will be used to post the syllabus, course policies, homeworks, announcements, etc. Grades posted on Couseweb are informative for you to keep track of your performance, but they will not be weighted and averaged for you.

Course Description: This course is the first half of a two term sequence of calculus based introductory physics for science and engineering students. Calculus is used as needed, and should be taken at least concurrently. The course begins with the basics of kinematics and vectors and then introduces the classical Newtonian dynamical framework for analyzing forces and the response of a system to forces. The concepts of work, energy, and power are developed as are momentum and the analysis of collisions. Rotational kinematics, rotational dynamics and angular momentum conservation are explored. These fundamental principles and skills are further developed in applications associated with topics such as statics, gravitation, simple harmonic motion, mechanical waves and simple wave phenonema.

Grading: Final grades are calculated from a weighted average of four tests (21% each), 8% for quizzes, and 8% for attendance/participation in recitation. Homeworks will be assigned but not collected and graded. It is expected that you understand the importance of doing the homework, especially in preparation for exams.

The calculation of your grade involves the following points.

- I reserve the right to implement a curve and/or a more lenient grading scheme if deemed necessary by circumstances.
- One test score will be replaced with your score on the final provided that your score on the final is higher.
- I reserve the right to assign a grade of 'A' or better only when such a grade is earned without a curve or test replacement.

Unless a more lenient grading scheme is deemed necessary by circumstances, a letter grade will be assigned from your weighted average X as follows:

A+	A	A-
$97 \leq X$	$93 \leq X < 97$	$90 \leq X < 93$
B+	B	B-
$87 \leq X < 90$	$83 \leq X < 87$	$80 \leq X < 83$
C+	C	C-
$77 \leq X < 80$	$73 \leq X < 77$	$70 \leq X < 73$
D+	D	D-
$67 \leq X < 70$	$63 \leq X < 67$	$60 \leq X < 63$
F	$X < 60$	

Recitation: Attendance and participation at recitation is part of your course grade. During recitation you will go over posted homework questions and possibly review material as it is covered in class. I may from time to time ask the TA to give a quiz during recitation.

Schedule: Tests are tentatively scheduled as follows:

- Test 1 - Sep 26th
- Test 2 - Oct 24th
- Test 3 - Nov 14th
- Test 4 - TBD based on the official final exam schedule. Probably Dec 12th

A draft with a tentative outline for material coverage is added at the end of this syllabus.

Exam Policy: Students must bring their ID cards to exams, and note their PeopleSoft number where appropriate. All exams are cumulative. If you miss an exam and would like to apply to take a makeup, you must download the appropriate form from CourseWeb and give it to the instructor as soon as is practically possible. Details regarding makeup tests are included in this form.

Missed Assignments/Exams By default, missed assignments (including exams) earn a zero grade. If you are aware of an impending conflict with the scheduled time of an exam or other in-class assignment, you should let me know as early in the semester as possible. In these cases, accommodations will be provided as long as the circumstances are reasonable and you can provide appropriate documentation. In cases where prior arrangements have not been made, missed exams can only be made up in cases of documented emergency, and only if you contact me within 48 hours of the missed exam.

Academic Integrity: Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. (http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html) Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

Disabilities: If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 (Voice or TTD) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union on the Oakland campus.

Department Specified Learning Outcomes

1. Make a graph of the instantaneous displacement, velocity, and/or acceleration of a system based on a description of the motion or using another graph.
2. Apply the equations of 1-D kinematics to one or more objects with constant acceleration. Examples include free-fall, two objects that meet one another, and an object that has different constant acceleration at different times.
3. Add or subtract two or more vectors. (Relative velocity problems are an application of this category.)
4. Find the dot product or cross product of two vectors.
5. Describe the behavior of an object undergoing projectile motion based on the equations of 2-D kinematics.
6. Apply a conceptual understanding of Newtons first and third law.
7. Draw a free-body diagram and solve for an unknown force or acceleration of a system under the influence of two or more forces.
8. Calculate the force of static/kinetic friction or the coefficient of friction.
9. Calculate the drag force or terminal speed of an object.
10. Identify the centripetal force that acts on a system undergoing circular motion.

11. Find the work done by a force in cases were integration is not required (perhaps by inspecting a graph of force versus displacement). Alternately, find the force given work and displacement.

12. Calculate the average power provided by a force.

13. Apply conservation of mechanical energy to describe the motion of a system.

14. Use the work-energy theorem to identify the amount of mechanical energy that has been lost.

15. Calculate the average force or impulse during a collision or series of collisions.

16. Apply conservation of momentum to an explosion or collision. Be able to identify whether a collision is elastic, inelastic, or completely inelastic.

17. Answer a conceptual question about momentum, rockets, and/or the motion of the center of mass.

18. Apply kinematics to a rotating system. Be able to convert between the tangential values of s, v, a and θ, ω, α using the radius r.

19. Distinguish between angular, tangential, and centripetal acceleration.

20. Determine the net torque acting on a body about a given axis and/or the angular acceleration of that body. Doing so may require the use of one or more moments of inertia.

21. Use the definition of static equilibrium to solve for one or more unknown forces or torques acting on a system.

22. Calculate the motion of a rolling object using torques and/or energy conservation. Rolling could be caused by a cord wrapped around the object, like in a yo-yo.

23. Find the rotational kinetic energy of an object.

24. Identify whether angular momentum is or is not conserved, and if appropriate, apply conservation of angular momentum to a rotating system.

25. Calculate the gravitation acceleration for an object inside or outside of a planet, given some combination of mass, radius, and density.

26. Apply energy conservation to a system with gravity to describe the motion of an object in a case where U = mg is not an appropriate assumption.

27. Use Kepler's laws of planetary motion to describe the motion of a planet, moon, or satellite about its parent body.

28. Apply the concepts of stress, strain, and ultimate strength to a deformed object.

29. Calculate a spring constant given the elastic properties of a material.

30. Identify when a system (spring, simple pendulum, or physical pendulum) is undergoing simple harmonic motion, and find the amplitude, period, frequency, angular frequency, phase angle, displacement, velocity, and/or acceleration.

31. Apply conservation of mechanical energy to a simple harmonic oscillator (spring, simple pendulum, or physical pendulum). Damping may be involved.

32. Determine the amplitude, period, frequency, angular frequency, wave number, wave length, and/or propagation speed of a transverse traveling wave. If the wave is on a string, be able to calculate the propagation speed using the tension and linear density.

33. Predict the result of interference between two waves with identical amplitude and frequency. Specifically, be able to identify constructive, destructive, and intermediate interference ... determining the amplitude and/or phase difference in the later case.

34. Identify the resonant frequencies and/or harmonics of a string or open/closed pipe.

35. Apply the equation for the Doppler effect to determine the shift in frequency caused by motion.

Addendum to Department Specified Learning Outcomes When I teach physics/engineering, I place a very strong emphasis on dimensional analysis (units) and dimensional consistency. This will be apparent in my coverage of the material as specified in the learning objectives above. I will expect you to understand basic unit analysis and how dimensional analysis and consistency can be a powerful tool for solving and checking problems.

Statement on Classroom Recording To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the students own private use.

Requirements Regarding In-Class Behavior

- Cell phones and all other electronic devices must be silenced. In addition, students are expected to refrain from excessive electronic communication during class. Laptops, tablets, and smart phones may be used for note taking or reference purposes. Watching videos, playing games, and/or browsing the Internet is not appropriate during lecture.

- Be courteous to your neighbors. Carrying on a conversation, habitually coming in late or leaving early, or misusing technology (as detailed above), are all disruptive to the class. Students who fail to show common courtesy will be asked to leave the classroom.

Course Schedule A tentative outline of the course material coverage (by date) is attached to the end of this syllabus. Please be aware that schedules can change due to unforseen circumstances, and that the provided outline is suggestive rather than absolute. For instance, I do expect to cover material slightly more quickly than shown with the intent of being able to do a little bit of review during the lecture before the exams.

Draft/Tentative Outline of the Course Schedule. Changes can happen for many reasons.			
IMPORTANT: I hope to do short reviews before the exams, but this depends on how quickly material is covered.			
Week of	Monday	Tuesday	Wednesday
08/27/18	Intro, Units, dimensional analysis		Lec 02 Vector Addition
09/03/18	**NO CLASS (labor day)**		Lec 03 Vec. Mult. (brief intro) 1-D motion
09/10/18	Lec 04: 1d/2d kinematics		Lec 05 more kinematics, begin Newton
09/17/18	Lec 06: Newton princples		Lec 07: FBDs
09/24/18	Lec 08: friction (maybe review)		**EXAM 1**
10/01/18	Lec 09: drag, circular		Lec 10: work/energy
10/08/18	Lec 11: work/potential energy		Lec 12: conservation of energy
10/15/18	**NO CLASS (fall break)**	**Lec 13: CM, impulse**	Lec 14: cons. momentum
10/22/18	Lec 15: rotation, moment of Inertia		**EXAM 2**
10/29/18	Lec 16: torque statics		Lec 17: rolling
11/05/18	Lec 18: angular moment		Lec 19: gravity
11/12/18	Lec 20: orbits (maybe review)		**EXAM 3**
11/19/18	Lec 21: elasticity, oscillations		NO CLASS (THANKSGIVING)
11/26/18	Lec 22: spring, damping, resonance		Lec 23: pendulums
12/03/18	Lec 24: trav. waves		Lec 25: sound, doppler
12/10/18	REVIEW		**FINAL EXAM**
****** October 15 CLASS is moved to October 16th**			
***** The October 17th lecture will NOT be in Alumni 343. It will be in Scaife Auditorium 6.			