Physics 100 – How Things Work
Fall 2017

Location: Phillips Hall 215 MWF 11:15a-12:05p Midterms: Phillips Hall 215 Sakai: PHYS100.ALL.FA17	Instructor: Dr Stefan Jeglinski Office: Phillips Hall 174 jeglin@physics.unc.edu Office Hours - posted on Sakai	SI: Gaither Frye TAs: • Kayla Redmond • Joe Marincel • Yaqi Hou

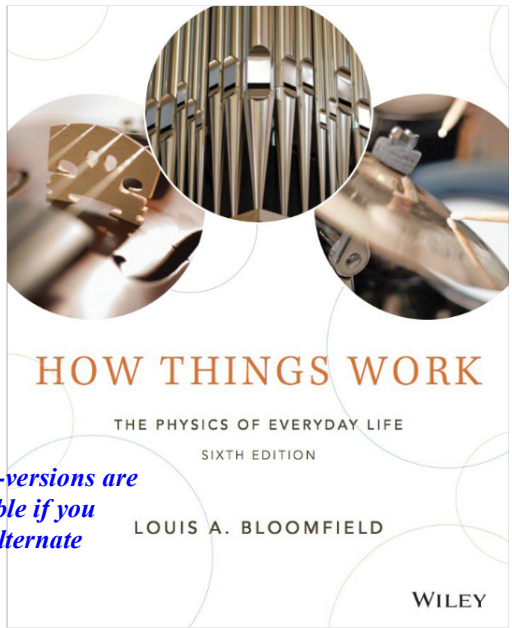
Course Description:

How does it work? This question, whether applied to an atomic nucleus, sound, a clock, the climate, or an air conditioner, is the essence of science. If you have asked it, and we all have at some point, then you have begun to study science. In this class we will use the everyday world around us as the starting point to ask, "How does it work?" and embark on the study of fundamental physics concepts. We will find, within the range of phenomena and technology encountered each day, large parts of the field of physics. Using both the textbook and many supplemental materials, the traditional concepts of physics … mechanics, electricity and magnetism, and thermodynamics … will be explored; however, our emphasis will be how these concepts help us understand the technology, and not the abstract concepts themselves. In this way, our class is different from a traditional physics class. By the same token, this course is not like a television show on gee-whiz technology. The essence of understanding is in the application of learned principles to new situations. You will have regular homework assignments on such topics in which you will provide a couple of pages of answers, usually in prose form. Similarly, your success will be measured by your ability to provide similar written explanations to questions on exams. We will also leverage the UNC Makerspace to *make*, and therefore experience firsthand an example of how things work!

Text: ***How Things Work***, by Louis A. Bloomfield (loose-leaf version, Wiley, New York, 6th Edition, 2016).

Intended Audience:

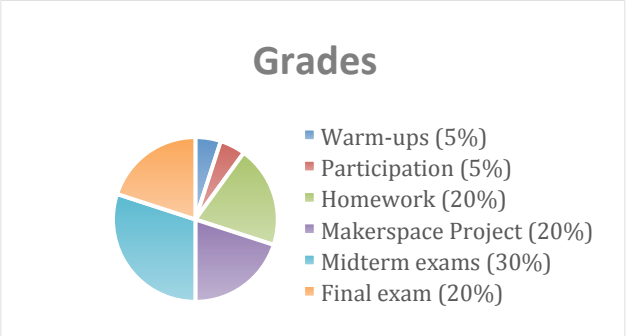
This class has no prerequisites, and should be interesting to anyone who wishes to gain a better understanding of our surrounding physical environment. Math concepts will include algebra and trigonometry that should be understandable to all students admitted to UNC. This class is intended for non-science majors, though students majoring in sciences other than physics may find the overview presentation of broad physical concepts useful.



Note: E-versions are acceptable if you prefer alternate media

Classwork:

The work that students perform for grades in this class consists of participation, warm-ups, homework, a Makerspace project, three in-class mid-term exams, and a final exam. Each of these is described below, and their weights are shown in the pie chart to the right.



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Warm-ups are multiple-choice questions based on each week's reading material. Your answers will be due via Sakai ***before*** the actual class in which the material is discussed. The idea behind these pretests is to get you to read the text and think about the course material *before* coming to class. *Important*: the warm-ups will set the tone for each week – although they count for relatively little, they are intended to get at the heart of many physics topics, and to inspire *your* questions. *The concepts covered in the warm-ups will help shape the midterms, and you can expect to see variations at a later date!*

Participation/Clickers: Students are *required* to purchase a clicker for use in the class, and then register it on-line. The only approved clickers are the i>clicker2 or the i>clicker+. These can be purchased at the Student Bookstores, or on-line, or used. See Sakai for a link to information on how to register and use the clickers. Class time will primarily consist of demonstrations and discussion rather than one-sided lecturing, and will include custom slide presentations that will be made available on Sakai after each class. The slide presentation will drive interactive questions that will be answered by students using clickers in a "think-pair-share" approach. Students will be asked to think about the question and provide an initial clicker answer. Students may then be asked to pair with each other and discuss the answers they have given, and finally to share their reasoning with the class. Attendance is important for learning – it will be measured using the clickers and is considered mandatory. *Using any clicker other than your own, or using more than one clicker during class, without the consent of the instructor, will be considered an honor code violation.*

Homework will be assigned according to the class schedule published on Sakai. Questions are posed and must be answered, either in prose if the question is conceptual, or by calculation if the question is quantitative. Every question must include an explanation and/or show the method by which the answer was obtained – any answer without an explanation or method will receive zero credit! *Important: you may consider the homework as an important predictor of midterm exam material, along with the warm-ups!* Most of the homework will look conventional – it will test your understanding of the textbook or other assigned reading; however, there are usually one or two "special" homework assignments during the semester that are more individualized. These special assignments may look like short term papers or lab experiments, and may be assigned in groups. Students are encouraged and allowed to collaborate on homework with other students enrolled in the class (not more than 2 or 3), but in the end, *your write-up submitted for credit must be your own work and individually submitted!* All completed homework should be placed in the alphabetized dropboxes located in the front 2nd floor hallway outside Rm 215 Phillips Hall. Assignments will *usually* be due on Fridays at the start of class – see the course schedule for exceptions. Homework turned in between the start of class and 5pm will receive a 10% penalty; homework will NOT be accepted after 5pm on the due date.

Makerspace Project: As part of the UNC Quality Enhancement Plan (*qep.unc.edu*), we are excited to introduce a *Makerspace* component to this course. To learn more about the Makerspace, visit ***beam.unc.edu***. The first part of the course will be used for training, and a *making project* will be introduced before the mid-term break – each student will receive a kit with which to build a *clock*

escapement (more info during the first week of class). You will be considered successful if you can manufacture and present a working escapement to the instructor at the end of the course.

Midterm Exams (3) will take place in the classroom. See the course schedule for the exam dates. Your final midterm exam grade will be the average of your best two grades on these three exams, with NO makeup exams. If you miss one exam, be sure that you take the other two!

Final Exam: Tue Dec 12 2017, 12 noon until 3p. Take note of the date and time *now* – there are no scheduling exceptions unless you acquire a pink slip from the Registrar.

Honor code: The Honor code and the Campus Code, embodying the ideals of academic honesty, integrity and responsible citizenship, have for over 100 years governed the performance of all academic work and student conduct at UNC. Acceptance by a student of enrollment presupposes a commitment to the principles embodied in these codes and a respect for this significant tradition. Your participation in this course is with the expectation that your work will be completed in full observance of the Honor Code, which can be found at *studentconduct.unc.edu/students/*

In this course you are *encouraged* to collaborate with other students, so you will be sharing data, results, and ideas; however, you are also encouraged to think independently before comparing results, *and any written answers that are submitted independently and not as a group must be in your own words and not copied from someone else.* In particular, note the following:

- Graders are encouraged to check for duplicate wording and style in submitted work – be very careful when collaborating, especially if a tool such as Google Docs is used.
- Exams will be solely the work of each individual student. Any instance of cheating on an exam will cause the exam to be zeroed.
- i>clickers will only be operated by the student to whom the clicker is registered.
- The use or distribution of any solution manuals for the textbook is forbidden and will be considered an honor code violation
- The use or distribution of online solutions from previous semesters is forbidden and will be considered an honor code violation.

Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work. If you have any questions about the Honor Code, please consult with someone in the Office of the Student Attorney General or the Office of the Dean of Students. Any issues that students encounter related to fairness or inappropriate conduct should be brought to the immediate attention of an instructor.

A note from the instructor:

Physics tends to be a daunting subject, and causes anxiety for many students. Your single best strategy in this class is to reach out early, even if you don't think you need help! Come in to visit both me and the SI, early (day 1!) and often (at least weekly!), and take advantage of office hours! Every time you come into my office, you'll walk out knowing more about How Things Work than when you walked in, even if for just 5 minutes. When it comes to exam time, would you prefer to have 10 examples of knowing just that little bit more, or just one (or none!)? I have a reputation for making myself accessible to students, either in person or in e-mail, so take advantage (plus you can usually score free candy in my office – I can't yet deliver M&Ms by e-mail). I'm looking forward to teaching this course!

Dr J