SPRING 2012: SCALE-UP

Physics 2049C
Physics For Engineers & Scientists - Syllabus
Dr. Jeffrey B. Bindell, Instructor
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Class schedule and location

Monday, Wednesday and Friday, 2:30PM – 4:20 PM
Classroom Building I, Room 218

Course description

SCALE-UP is a relatively new way to teach physics which combines classroom work (in teams) with coordinated laboratory exercises and which eliminates almost all lectures. This is in keeping with studied over the past 10 years or so that show lectures to be a very poor way to convey knowledge or fundamental understandings. This method used team (peer) instruction methods to allow students to work in groups to solve problems or perform simple experiments to provide conceptual insights into the material.

Because this is the second offering of this course format, schedules may not be accurate and although every attempt will be made to keep to what is outlined below, some changes may be unavoidable.

Content: This is a four credit-hour, calculus-based physics course that is the 2nd part of a two-semester sequence required for all UCF students majoring in engineering, computer science, biological science, and the physical sciences. This course covers electricity and magnetism and possibly waves and optics (time permitting). The SCALE-UP (Student Centered Activities for Large Enrollment Undergraduate Physics) sections at UCF are *different formats* of the course's normal sections that cover similar but *not identical* content.

Philosophy: This class will provide you with an enhanced opportunity to acquire a good physical understanding of the course material and to learn how to apply that understanding of physics to use in this course and beyond. This course places significant emphasis on qualitative physical reasoning as a complement to the mathematical quantitative aspects. It also centers on a *microscopic* model of electricity and magnetism. Research has shown that while traditional lecture does help many, it is not the best approach. Activity-based instruction like SCALE-UP can result in significantly improved understanding of concepts and a greater ability to solve problems. SCALE-UP is being introduced all over the country and has, for example, been adopted by MIT as well as other high profile universities.

Approach: This is an integrated lecture/laboratory course with minimal lecture (no more than 1 hour out of 6 hours of class time per week). Like a class in Shakespeare, you are expected to read and begin understanding the course material to prepare for each class. (Assignments will be made for these readings.) The majority of class time is planned to be spent on class activities to help you learn to understand and apply the material from the readings. The course will emphasize rigorous problem-solving in physics using interactive instruction, educational software, computer applications important for science and engineering students, and cooperative learning. Class time will require students to be responsive, to think, and to perform hands-on tasks. Lab time will be interspersed with classroom discussion. Good preparation is essential for successful classroom activities.

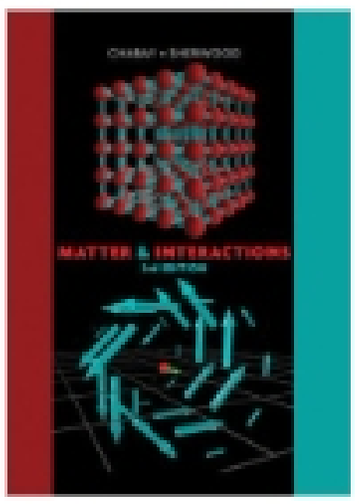
If you devote a modest amount of time each day to studying physics, you will be in a position to attack class activities and physics problems efficiently, based on a clear understanding of the fundamental physical principles that underlie all successful analyses. Students from similar offerings have made suggestions to help you succeed.

Collaborative Work: Scientists and engineers work in groups as well as alone. Social interactions are critical to their success. Most good ideas grow out of discussions with colleagues. This course encourages collaborative teamwork, a skill that is valued by most employers of scientists, engineers, and technicians. As you work and study together you should help your partners to get over confusions, ask each other questions, and critique your group homework and lab write-ups. Teach each other! You can learn a great deal by teaching your teammates. And they can learn much from you as well.

While collaboration is the rule in technical work, evaluation of individual performance also plays an important role in science and engineering. Individual quizzes, and exams are to be done without help from others; group quizzes and test problems are to be done only with members of your group/team.

Textbooks:

This course uses a **different** textbook than does the other PHY-2049 sections. Specifically, we will be using



Chabay and Sherwood, "Matter and Interactions", Volume II – Electric and Magnetic Interactions. 3rd Edition, Wiley, (2011).

This course also uses the **"i-clicker-2"** classroom technology. It will be necessary for you to purchase the new NUMERICAL version of the i-clicker that is available in the bookstore. This is a new device so do not purchase one on the used market. The older i-clickers are being phased out. http://www.iclicker.com/iclicker2/. If you still have the receipt for the original i-clicker purchase, let your instructor know and he might be able to get you a $10 rebate!

You will also need to purchase **WebAssign Access.** You **do not** need the Physics 2049 Laboratory Manual or any of the Course Paks in the bookstore. Materials will be provided in class, as needed.

Assignments

Assignments will be announced in class and posted on the class website or in WebAssign. Be sure to check WA for last minute assignments and messages. Changes and hints may be distributed also by email, so you should plan on checking your Knights email at least once per day. You are responsible for reading the textbook and working assigned the problems. Keeping up with the homework and the reading is essential for getting the most out of this or any other class. If you don't come to class prepared, we won't be able to as much in class to prepare you for the homework assignments. HW will take much longer if you don't keep up.

Remember that because this is a combined lecture/lab course, the workload is equivalent to two 3 credit lecture courses. You should Expect to spend about 12-16 hours per week on readings and homework if you want to do well in this course.

Readings: In SCALE-UP, assigned readings take the place of most of the lecture. It is your first introduction to course material and essential for understanding what we do in class. In class, we will do activities to help understand and learn to apply what you learn from the readings. While this is different than many other math and science courses, it is similar to how things are done in humanities classes. For example, if this was a class on Shakespeare, you would not expect us to read the book in class. You would expect to read the book at home and in class, discuss the themes, meaning, symbolism, etc. to help you develop a deeper understanding of the book. Without this understanding, homework assignments (see below) will take more time.

> When you come to class, you can expect some clicker questions on the reading material.

Homework: There are two types of homework in this class, textbook and special assignments that will be distributed in class. Textbook homework assignments are done through WebAssign while special assignments are from the material described above and submitted on paper. Typically you will have a few short *WebAssignments each week, each containing a few problems.*

WebAssign: Assignments will usually consist of 3-5 exercises and are due at the start of the class period. You are allowed a limited number of submissions. After each submission, WebAssign will immediately tell you which problems are correct. The additional submissions are to allow you to find your mistakes and with some additional effort, still receive full credit. Because WebAssign looks at answers and not solutions, you should keep a written version of the solution. Every day a WebAssign assignment is due, any written solutions will be collected.

WebAssign Login (From Bookstore or on-line). It is easy to register for WebAssign on-line at www.webassign.net. If you have used WebAssign before, your old password may still work. Your ID will be your PID number **with or without the leading zero** (ask your instructor which is correct). If you are new to WebAssign, your initial password will be "*ihatephysics*". Institution is "*ucf*" in *lower* case.