**Fall 2012: SCALE-UP**

Physics 2049 – Electricity and Magnetism
Physics for Engineers & Scientists II - Syllabus
Dr. Jeffrey B. Bindell,
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**Class schedule and location**

Monday, Wednesday and Friday, 930PM – 11:20 PM
SCALE-UP Facility (MAP) – *if completed on time*

Office Hours 8:00AM to 9:00AM MWF, PS Building, Room 148

**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 most lectures. This is in keeping with studies over the past 10 years or so that show lectures to be a very poor way to convey knowledge or fundamental understandings. This method uses 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.

This is the third offering of this course format but schedules may not yet 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. The textbook is also different.

**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 for most. 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. 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. Personal laptops or tablets are welcome. Since teamwork is emphasized, be prepared for a somewhat noisy class environment with continuous conversations being the norm.

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. These have been incorporated into the structure of this evolving approach to improved physics instruction.

**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 (if utilized) 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). We will be using a specially published *Black and White* printing that is less expensive than the color version. An e-book can also be used. Students can order the eBook via CourseSmart, by going to [www.coursesmart.com](https://webmail.ucf.edu/owa/redir.aspx?C=d02202b2ccf94b5eb3ef27da0f8d04ac&URL=http%3a%2f%2fwww.coursesmart.com), or the bookstore can carry the codes directly.  The EBook is $107.00 net **$40 more than discounted book** and WebAssign package.

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. The older i-clickers are being phased out. <http://www.iclicker.com/iclicker2/>.

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

**Assignments**

Assignments will be announced in class and posted on the class WebCourses site. As usual, WebAssignments will be posted directly on the WA site. Be sure to check WA for last minute assignments and messages. Changes and hints may also be distributed by email, so you should plan on checking your UCF email at least once per day. You are responsible for reading the textbook and working out the assigned 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 accomplish 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 a 4 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 perform activities to help you to understand and learn to apply what you learn from the readings. While this is different from 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 plays 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](http://webassign.net/student.html) while special assignments are from the material described above and submitted either on paper or electronically. Typically you will have a few short *WebAssignments each week, each containing a few problems*. Some assignments will be longer than others but all are meant to assist you in preparing for examinations and quizzes.

**WebAssign:**Assignments will usually consist of 3-5 exercises and will usually be 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 effort, still receive full credit. Because WebAssign looks at answers and not solutions, you should keep a written version of the solution.

[**WebAssign Login**](http://www.webassign.net/info/support/access_codes.html) (From Bookstore or on-line). It is easy to register for WebAssign on-line at [www.webassign.net](http://www.webassign.net). If you have used WebAssign before, your old password may still work. Your ID will be your **P**ID 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.

As mentioned above, if you are **not** new to WebAssign, your old password may still work, so try both. If you get the message that you are “not in the class”, that means that your name was not on the instructor’s roster when the class list was downloaded. Send an email to your instructor and your name will be added to the roster as quickly as possible.

Be sure to check WebAssign a few times a week as well as the class website for the latest information about the course.

**Note on Homework:**

Homework (WebAssign) is to be submitted on time or input will be blocked (unless a valid excuse/reason is offered). Requests for extensions should be made through WebAssign and not through e-mail. Although teamwork on homework is encouraged, individual submissions are required.

*Lately it has become possible to "buy" or “Google” homework solutions. This practice in unethical and if anyone is found to be using these services, he/she will be recommended for appropriate action (very unpleasant!). This policy also extends to quizzes and examinations. In any such case, an F could be "awarded". Note that there are legitimate solutions manuals that you may want to purchase. These are very helpful if they are used properly.*

Because these solutions are so prevalent, the overall grading values for homework assignments may be reduced if this type of activity is suspected. This does not reduce the importance of doing these assignments because the WebAssign problems, or problems similar to them, have a nasty habit of showing up on examinations and quizzes.

**Group Work:** Some WebAssign or classroom activities will be on a *group* basis. Every member of the group will receive the same grade for this work. Teamwork is essential.

**Real-World Problems:** To help make the connection between course concepts and the "real world," your group will often work on complex problems that often involve making estimations and assumptions, researching on the web, and completing fairly complicated calculations. These will require the “GOAL” problem-solving approach we will be explained in class. You will have time to work on these problems in class and to discuss the solutions.

**Laboratory:** You will be offered hands-on, inquiry-based activities during the class period that allow you to uncover various aspects of a physics concept. Lab activities will vary in length and complexity. Some labs will have associated group homework assignments that will be passed out in class or posted online on the class website or WebAssign.

**Notes:** You should keep concise class notes for all in-class work.

**Missing class or homework due to excused absences:**

In general, there are 4 acceptable excuses for missing class: illness or medical emergency, religious holiday, family emergency and approved university activity (varsity sports, required club function, etc.). You are not penalized for excused absences except for the clicker points which cannot be adjusted by the instructor. Advance notice is required for religious holidays and approved university activities. Notice of family emergencies would also be greatly appreciated if possible. Remember that attendance counts towards your class participation and clicker portions of your grade.

**Quizzes:** A quiz consists of a problem or two designed to take you 15 minutes or less. Starting in week 2, there will be a quiz on most Fridays. Exams are scheduled below and they are on Fridays as well. Your *lowest* quiz grade will be dropped.

**Tests:** Tests consist of questions pertaining to the previously assigned material. Formula sheets will NOT be distributed in this class but you will be permitted to bring one *3x5 index card* to an exam with whatever material on it that you feel you need. In this case, *less is more*. A comprehensive final exam will cover all of the course material.

Test Dates: Actual dates will be posted on WebCourses but are subject to change slightly. At least one week’s notice will be provided.

|  |  |
| --- | --- |
| **EXAMINATION** | **DATE** |
| #1 |   |
| #2 |   |
| #3 |   |

**Final Exam:** according to the University Final Exam Schedule. For this class it soetimes winds up on a Saturday. We will try to avoid this, if possible.

**Grade Requirements**

Grades will be assigned based on your overall, weighted class average using the weighting scheme, is presented below:

|  |  |
| --- | --- |
| SCORE | GRADE |
| 85-100 | A |
| 75-84 | B |
| 60-74 | C |
| 50-59 | D |
| <50 | F |

*No* (+) or (–) *grades are given in the Physics Department*. For those who wind up just short of the next higher grade, issues such as overall improvement during the semester, class participation, etc. will be considered.

**Contributions to your Grade:**

*Remember that the value of homework will be reduced if it appears that students are getting their solutions from external sources. At the same time, working with your group to solve problems (that’s solve, not copy) is encouraged.*

|  |  |
| --- | --- |
| Item | % |
| Mid Semester Examinations | 30 |
| Final Examination  | 20 |
| Homework (**Subject to change**) | 10 |
| In Class Quizzes | 10 |
| Clicker Score | 15 |
| Inquiry & Participation Component | 15 |

***Approximate* Schedule of Topics:**

|  |  |  |
| --- | --- | --- |
| **Week** | **Chapter** | **Topic (s)** |
| **1** | 14 | Coulomb’s Law |
| **2** | 14 | The Electric Field |
| **3** | 14,15 | Electric Fields & Matter, Charge |
| **4** | 16 | Distributed Charges |
| **5** | 17 | Electric Potential |
| **6** | 18 | The Magnetic Field |
| **7** | 19 | Electric Fields & Currents |
| **8** | 20 | Circuit Elements (DC Circuits) |
| **9** | 21 | Magnetic Forces |
| **10** | 21,22 | Magnetic Forces, Field Patterns |
| **11** | 22 | Field Patterns and Gauss’s Law |
| **12** | 23 | Faraday’s Law |
| **13** | 23 | Faraday’s Law |
| **14** | 24 | Electromagnetic Waves / Optics |
| **15** | 24 | Electromagnetic Waves / Optics |
| **16** | **ALL** | **FINAL EXAMINATION** |

Note: We almost **NEVER** manage to keep to this schedule**.**

**THE FINE PRINT**

The University of Central Florida is committed to providing reasonable **accommodations for all persons with disabilities**. Dr. Bindell shares the same commitment. Students with disabilities who need accommodations must be registered with Student Disability Services (SDS), , phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from Dr. Bindell. Students who are registered with SDS and need accommodations in this class must contact Dr. Bindell at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations that are sanctioned by SDS.

At UCF, academics come first. **Attendance at examinations is mandatory, and there will be no make-up examinations**. University excused absences exist only for religious observances, intercollegiate activities and athletics, and university-verified family or medical emergency. Weddings, plane tickets that your parents got on priceline.com, or tickets to the Bahamas do not count as legitimate excuses. Therefore, plan your semester accordingly.

It is Physics Department policy that making up missed work will only be permitted for University-sanctioned activities and bona fide medical or family reasons. Authentic justifying documentation must be provided in every case (in advance for University-sanctioned activities). At the discretion of the instructor, the make-up may take any reasonable and appropriate form including, but not limited to the following: a replacement exam, replacing the missed work with the same score as a later exam, allowing a 'dropped' exam, replacing the missed work with the homework or quiz average. NC grades are NOT available.

Any cheating detected on examinations will be punishable by no less than a zero on the examination in question and up to expulsion from UCF.



“Dr. Bindell, May I be excused? My brain is full!”

**WELCOME TO SCALE-UP !!**