Boston College, Department of Physics, Spring 2011
PH184 Foundations of Physics

Scheduled class meeting times:
Tuesday 1:30-2:45 PM and Thursday 1:30-2:45 PM
Room = Higgins Hall 310


Instructor: Fr. Cyril P. Opeil, S.J., Ph.D.
Assistant Professor
Office: Higgins 330J, 617-552-8450
Laboratory: Higgins 130, 617-552-3589

Office Hours: As posted at 330J:
Tuesday 3:15-5:00 PM
Thursday 3:15-5:00 PM
Friday Homework due by 5:00 PM

To contact Fr. Opeil, S.J. outside of class the most efficient way is via email: opeil@bc.edu, please feel free to call at 2-8450 or 2-3589, but do not leave a phone message.

Graduate Assistants/Home Work Grader:
Sovit Khadka (2-6715, Higgins 145, khadkas@bc.edu) is the teaching assistant assigned to this class. His primary job is to grade homework assignments, provide assistance on homework problems upon request, and assist the instructor in correcting the midterm exams. He has office hours in Higgins 145 on Tuesday, 3:00-5:00 PM.

Pre-requisites: There are no Boston College pre-requisites for this course. A high school algebra, calculus and/or a previous course in high school physics will prove to be a very helpful background. Experience with Calculus is not necessary for this course.

Co-requisites: Students should also be enrolled in Physics Laboratory.

Grading:
3 mid-term exams (15% each) 45 %
1 final exam (comprehensive) 20 %
homework 25 %
Burns Library Project 10 %

Course Description: Foundations in Physics PH184 (3 credits) is a continuation of Fall semester, PH183 and designed to provide a basic understanding of the physical world through a combination of simple theoretical models, controlled experiments and non-calculus based mathematics. Topics covered include electricity, magnetism, light and geometric optics. Elementary DC and AC electrical circuits will be discussed. The ability to solve word problems will be integral to success in this course.

Course Goals: This is the second semester of a two-semester course. In the second semester, the course goals are: (1) to better understand the fundamental principles (forces
and motion) governing, charged particles, electricity and magnetism (2) to formulate these principles in mathematical terms; and (3) to be able to use these mathematical expressions to predict the behavior of simple charged systems. The subject of elementary optics and ray diagrams will also be discussed. This the first course of three in which the principles of electricity and magnetism are taught which feature the implications of Gauss' Law, Ampere’s Law and Faraday’s Law and the equations of Maxwell. See books by Griffiths (advanced-undergraduate) and Jackson (graduate) for details.

Attendance, Participation and Academic Honesty: Continuity and active participation are crucial to the success of this course. You are responsible for all information from each class lecture session whether you attend or not. Absences due to excused absence sports activities are to be discussed with the instructor prior to the planned absence.

Academic honesty is expected at all times in accordance with published Boston College policies. Discussion of the concepts and problem-solving techniques between students, and with the instructor and grader, is strongly encouraged. However, under no circumstances is it acceptable to copy and turn in solutions taken from ANY source – all work must be your own. Please review the Boston College Standards of Academic Integrity that are published in the university catalog and on the web at: http://www.bc.edu/offices/stserv/academic/resources/policy/#integrity.

It is your responsibility to ensure that all work you submit is in accordance with university policies. If you have any questions, please consult with me. Violations will be reported to the Deans' Office and reviewed by the College's Committee on Academic Integrity. Sanctions for violating this policy include the possibility of failing this course.

Textbook Reading Assignments: Members of this course are responsible for reading particular pages in the textbook on a daily/weekly basis. Textbook sections listed in the schedule are to be read prior to attending class. Any changes in the textbook reading assignments schedule will be announced in class.

Homework Exercises: Expect homework assignments each week, note particular schedule below. Homework solutions are due on Friday afternoon in the instructor’s office (Higgins 330J) by 5:00 PM. Homework turned in after that time, e.g. 5:00 PM will be graded, but worth a maximum of 50% of the normal credit. Homework solutions will be available to the students after homework assignments are collected. Emailing the instructor with the solutions prior the deadline also acceptable.

In order to receive FULL CREDIT for your problem solutions you must fully explain your solutions: briefly outline the logic of your approach to the solution in words, and write out all equations used to obtain your solution. For multiple-questions, the answer requires more than a letter choice, you must include an explanation why that choice is correct. Please be neat: if we can’t read it, we can’t grade it properly. Homework exercises are worth 10 points each and are given partial credit for incomplete answers.

Students are strongly encouraged to discuss problems with the instructor – during office hours – they are posted. The course calendar/schedule below lists when
assignments are due. *Actually doing the problems is not the equivalent of copying the problems from another student's solution.*

Homework solutions may be emailed to the instructor (Opeil@bc.edu) prior to this date and time if the student plans not hand-in homework assignments for any reason. Homework assignments will not be accepted for full credit after the time on the assigned dates. For problem set details see schedule below. Corrections and emendations to the homework schedule may be made by the instructor as the course progresses.

**Class participation:** Students are expected to participate in class discussions and exercises, and will be given a grade based on that participation. Clearly you need to attend class to participate, and attendance in classes will be monitored and will count towards your grade.

**Midterm and Final Exams:** Three written midterms (75 minutes each) and a cumulative final exam (two hours) are to be given according to the Course Schedule listed below. Midterm exams cover all material discussed in class, example problems, assigned readings in the textbook and problems assigned for homework. *No one is allowed to take the final exam at any other time without written permission* of the A & S Dean. Anyone not taking the final exam will receive a grade of zero for that exam and the grade will be averaged in with the other grade components.

**Disabilities:** If you have a disability and will be requesting accommodations for this course, please register with Kathy Duggan [kathleen.duggan@bc.edu], Associate Director, Academic Support Services, The Connors Family Learning Center (learning disabilities and ADHD) or Suzy Conway [suzy.conway.1@bc.edu], Assistant Dean for Students with Disabilities (all other disabilities). Advanced notice and appropriate documentation are required for accommodations.

**Eating and Drinking:** *Absolutely* no food or beverages are to be brought into or consumed in the lecture room. Not consuming of food and or beverages in the lecture hall is a matter of simple courtesy and civility toward the professor and fellow students.

**Extra Help:**
Please see the instructor during his regularly scheduled office hours if you have any questions or concerns about this course, homework or course material. See graduate student graders or teaching assistants assigned to this course for additional help. Also, there are additional resources. You may drop in on afternoons without an appointment to the Department of Physics’ “Undergraduate Resource Room” (URR), located in the Higgins Atrium. On the 2nd floor of O’Neill Library, the Connors Family Learning Center has tutors available for introductory physics. Sessions are free of charge, but you must make your appointments in advance.
**Physics Laboratory:**
There are many laboratory sections that run concurrent with this lecture course. Please, consult your academic advisor if you should be enrolled in one of them. The lecture and laboratory courses are completely independent to accommodate student schedules.

**Burns Library Project:** A short archive project will be assigned to groups in the class that involves using the resources of the Burns Library. The resources are rare books only available in Burns. The assignment will be due 15 April 2011 by midnight in my email box "opeil@bc.edu". Details of this assignment will be forthcoming, 01 February 2011.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>17 Jan</td>
<td>Martin Luther King Day, no classes</td>
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<tr>
<td>18 Jan</td>
<td>Lecture 1: Semester begins, Syllabus Review, Sec. 15.1, 15.2, 15.3</td>
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<tr>
<td>20 Jan</td>
<td>Lecture 2: Sec. 7.5, 7.6, 15.4, 15.5, 15.6</td>
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<tr>
<td>21 Jan</td>
<td>HW1: 15.1, 15.5, 15.12, 15.17, 15.22, 15.30</td>
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<td>25 Jan</td>
<td>Lecture 3: Sec. 15.7, 15.8, 15.9, 16.1</td>
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<td>26 Jan</td>
<td>Last day for UG drop class on line</td>
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<td>27 Jan</td>
<td>Lecture 4: Sec. 16.2, 16.3, 16.4, 16.5</td>
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<td>28 Jan</td>
<td>HW2: 15.36, 15.41, 15.44, 16.1, 16.5, 16.11, 16.16</td>
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<td>01 Feb</td>
<td>Lecture 5: Sec. 16.6, 16.7, 16.8, 16.9</td>
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<td>03 Feb</td>
<td>Lecture 6: Sec. 16.10, 17.1, 17.2, 17.3</td>
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<td>08 Feb</td>
<td>Lecture 7: Sec. 17.4, 17.5, 17.6, 17.7</td>
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<td>10 Feb</td>
<td>Lecture 8: Sec. 17.8, 18.1, 18.2, 18.3</td>
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<td>11 Feb</td>
<td>HW4: 17.9, 17.14, 17.24, 17.36, 18.1, 18.6, 18.12</td>
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<td>15 Feb</td>
<td>Lecture 9: Sec. 18.4, 18.5, 18.6, 18.7</td>
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<td>17 Feb</td>
<td>1st Mid-term Exam</td>
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<td>18 Feb</td>
<td>HW5: 18.16, 18.21, 18.26, 18.32, 18.38</td>
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<td>22 Feb</td>
<td>Lecture 10: Sec. 19.1, 19.2, 19.3, 19.4</td>
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<td>24 Feb</td>
<td>Lecture 11: Sec. 19.5, 19.6, 19.7, 19.8</td>
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<td>01 Mar</td>
<td>Lecture 12: Sec. 19.9, 19.10, 20.1, 20.2</td>
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<td>03 Mar</td>
<td>Lecture 13: Sec. 20.3, 20.4, 20.5</td>
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<td>04 Mar</td>
<td>HW7: 19.60, 19.61, 20.1, 20.6, 20.19, 20.28</td>
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<td>07 Mar</td>
<td>Spring break begins - no classes</td>
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<td>08 Mar</td>
<td>No classes</td>
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<tr>
<td>10 Mar</td>
<td>No classes</td>
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<tr>
<td>11 Mar</td>
<td>Spring break ends - no classes</td>
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<tr>
<td>15 Mar</td>
<td>Lecture 14: Sec. 20.6, 20.7, 20.8</td>
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<tr>
<td>17 Mar</td>
<td>Lecture 15: Sec. 21.1, 21.2, 21.3</td>
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<tr>
<td>22 Mar</td>
<td>Lecture 16: Sec. 21.4, 21.5, 21.6, 21.7 (Guest Lecturer)</td>
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<tr>
<td>24 Mar</td>
<td>Lecture 17: Sec. 21.8, 21.9, 21.10 (Guest Lecturer)</td>
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<td>29 Mar</td>
<td>2nd Mid-term Exam</td>
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<tr>
<td>31 Mar</td>
<td>Lecture 18: Sec. 21.11, 21.12, 21.13</td>
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T-05Apr  LECTURE_19: Sec. 22.1, 22.2, 22.3
Th-07Apr  LECTURE_20: Sec. 22.4, 22.5, 22.6, 22.7
F-09Apr10 HW11: 22.30, 22.34, 22.42, 23.2, 23.6, 23.15
T-12Apr  LECTURE_21: Sec. 23.1, 23.2, 23.3
Th-14Apr  LECTURE_22: Sec. 23.4, 23.5, 23.6, 23.7
F-16Apr  HW12: 23.21, 23.23, 23.30, 23.36,
M-18Apr  Patriot's Day - no classes
T-19Apr  LECTURE_23: Sec. 24.1, 24.2, 24.3, 24.4
                      Last day to withdraw from the course, WP/WF
Th-21Apr  Easter Holiday - Holy Thursday – no classes
F-22Apr  Easter holiday – Good Friday – no classes
M-25Apr  Easter holiday – no classes
T-26Apr  LECTURE_24: Sec. 24.5, 24.6, 24.7, 24.8
Th-28Apr  LECTURE_25: Sec. 24.9, 25.1, 25.2, 25.3
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T-03May  LECTURE_26: Sec. 25.4, 25.5, 25.6, 25.7
Th-05May  3rd Mid-term Exam, Last day of class.
F-06May  Study day – no classes.
M-09May  Study day – no classes.
T-10May  Final examination start.
W-11May  Final examinations.
Th-12May  Final examinations.
F-13May  Final examinations.
M-16May  Final examinations.
T-17May  Final examinations end.
                      Date of final examination in PH184 available online.
M-23May  University Commencement.
Homework Assignment

Foundations in Physics – PH184, Spring 2011

Directions: This page is the first page of every homework assignment you hand in for credit. Put your name in the space below and circle the correct homework assignment number below. The absence of this page will be a 5 point deduction. Please, staple your solutions to the upper right hand corner of this page. The staple’s absence will be a 5 point deduction.

Name: ____________________________________

Homework Assignment: (circle one below)

01  02  03  04  05  06  07  08  09  10  11   12   13

F-21Jan  HW1: 15.1, 15.5, 15.12, 15.17, 15.22, 15.30
F-28Jan  HW2: 15.36, 15.41, 15.44, 16.1, 16.5, 16.11, 16.16
F-11Feb  HW4: 17.9, 17.14, 17.24, 17.36, 18.1, 18.6, 18.12
F-18Feb  HW5: 18.16, 18.21, 18.26, 18.32, 18.38
F-04Mar  HW7: 19.60, 19.61, 20.1, 20.6, 20.19, 20.28
F-09Apr10 HW11: 22.30, 22.34, 22.42, 23.2, 23.6, 23.15
F-16Apr  HW12: 23.21, 23.23, 23.30, 23.36,