Boston College, Department of Physics, Fall 2010
PH183 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

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:
Zhensong Ren (2-3436, Higgins 160, renzd@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 exams.

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.

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%
Biographical essay 10%

Course Description: Foundations in Physics PH183 is a three-credit course designed to provide a basic understanding of the physical world through a combination of simple theoretical models, controlled experiments and mathematics. The ability to solve word problems will be integral to success in this course. In the first part the physics of mechanics is introduced which involves one and two-dimensional motion and the effects of gravity on freeing falling bodies. Newton’s three laws of motion are of particular interest here. In the second part of the course the concept of thermal energy is explored and how energy is transferred in matter. The third part of this course investigates simple harmonic motion, planetary motion and wave behavior as a means of energy transfer.
Course Goals: The first semester goals of this course are: (1) to understand the fundamental principles (forces, motion, potential and kinetic energy) governing: freely falling bodies in one and 2 dimensions, thermal energy transfer and how vibrations transmit energy (2) to formulate these principles in mathematical terms; and (3) to be able to use these mathematical expressions to predict the behavior of simple systems.

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 4:45 PM. The instructor will be in Higgins 330J from 4:15-4:45 to collect the homework assignments. Homework turned in after that time, e.g. 4:46 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.
Scientific Biographical Essay: Each student is to write a short scientific essay. The topic of this brief biographical essay will be chosen from the list of people given below. The scientific biographical essay must answer the following questions.

1) What are the origins of this person, in what era did they live and how were they educated?
2) Describe their unique contribution to science, if they had many choose one.
3) How did their scientific discovery or work influence science or technology today?

The essay is to be typed, 12 point Times New Roman, double-spaced, with (approximately) one-inch margins and include a complete bibliography. The length is minimum three pages and maximum of six pages. The absolute deadline for this essay is Monday, 29 November 2010 at 5:00 PM for full credit. Essays must be emailed to opeil@bc.edu.

You may use Wikipedia to begin your research but do not use it as a resource nor include Wikipedia in the bibliography.

Louis Pasteur, Alexander Fleming, Nicholas Copernicus, Marie Skłodowska Curie, Rene Decartes, Marie Ampere, Antoine Henri Becquerel, Athanasius Kircher, Antoine Lavoisier, Roger Boscovich, Guglielmo Marconi, Evangelista Torricelli, Alessandro Volta, Christopher Clavius, Pierre Vernier, Roberto de Nobili, Gregor Mendel, Christopher Scheiner, Pierre-Simon Laplace, François d'Aguilon, Jean-Baptiste Biot, Charles Coulomb, Joseph Louis Gay-Lussac, Francesco Maria Grimaldi, James Cullen, Ignace Pardies, Joseph Stepling, John Baptist Riccioli, and Thomas Wulf

+++ Semester Schedule for Fall 2010

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<tr>
<th>Date</th>
<th>Monday</th>
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<tbody>
<tr>
<td>Labor Day</td>
<td>Labor Day no classes</td>
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<td>Labor Day no classes</td>
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<tr>
<td>07September</td>
<td>L01-Semester classes begin. Syllabus Review, Sec. 1.1-1.5</td>
<td>L02-Sec. 1.6, 1.7, 1.8, 2.1</td>
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<td>09September</td>
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<td>L03-Sec. 2.2, 2.3, 2.4, 2.5, 2.6</td>
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<td>10September</td>
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<td>HW1: 1-4, 1-12, 1-26, 1-33, 1-36, 1-39</td>
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<td>14September</td>
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<td>15September</td>
<td>Last day for UG to declare P/F or drop class online</td>
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<td>16September</td>
<td>L04-Sec. 3.1, 3.2, 3.3, 3.4, 3.5 (Holy Spirit Mass 12:00-1:30PM)</td>
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<td>17September</td>
<td>HW2: 2-11, 2-21, 2-31, 2-45, 3-3, 3-13, 3-25, 3-35</td>
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<td>21September</td>
<td>L05-Sec. 4.1, 4.2, 4.3, 4.4</td>
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<td>23September</td>
<td>L06-Sec. 4.5, 4.6, 5.1, 5.2</td>
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<td>24September</td>
<td>Parents weekend begins. HW3: 4-9, 4-11, 4-13, 4-17, 4-36, 4-53, 5-3, 5-11</td>
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<td>25September</td>
<td>Parents weekend.</td>
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<td>26September</td>
<td>Parents weekend ends.</td>
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<td>28September</td>
<td>L07-Sec. 5.3, 5.4, 5.5, 5.6</td>
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<tr>
<td>30September</td>
<td>L08-Sec. 6.1, 6.2, 6.3, 6.4</td>
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<tr>
<td>01October</td>
<td>HW4: 5-9, 5-23, 5-33, 5-53, 5-61, 6-3, 6-11, 6-24</td>
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Last day to drop class through A & S Dean

T-05Oct  1st Mid-term Exam
Th-07Oct L09-Sec. 6.5, 7.1, 7.2, 7.3, 7.4
F-08Oct  HW5: 6-49, 7-3, 7-5, 7-17, 7-27, 7-35, 7-43
M-11Oct  No classes. Columbus Day celebration.
T-12Oct  L10-Sec. 7.5, 7.6
Th-14Oct  L11-Review of example problems.
T-19Oct  L12-Sec. 8.1, 8.2, 8.3, 8.4
Th-21Oct  L13-Sec. 8.5, 8.6, 8.7
F-22Oct  HW6: 8-3, 8-8, 8-13, 8-33, 8-42, 8-50, 8-63
T-26Oct  L14-Sec. 9.1, 9.2, 9.3, 9.6
Th-28Oct  L15-Sec. 10.1, 10.2, 10.3
F-30Oct  HW7: 9-5, 9-13, 9-21, 10-3, 10-13, 10-23, 10-27, 10-33

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T-02Nov  L16-Sec. 10.4, 10.5, 11.1, 11.2
Th-04Nov  L17-Sec. 11.3, 11.4, 11.5, 12.1
F-05Nov  HW8: 10-45, 11-1, 11-11,11-15, 11-21, 11-27, 12-1
T-09Nov  2nd Mid-term Exam
Th-11Nov  L18-Sec. 12.2, 12.3, 12.4, 12.5
F-12Nov  HW9: 12-7, 12-15, 12-35, 12-49
T-16Nov  L19-Sec. 13.1, 13.2, 13.3, 13.4
Th-18Nov  L20-Sec. 13.5, 13.6, 13.7, 13.8
T-23Nov  L21-Sec.13.9, 13.10, 13.11
W-24Nov  Thanksgiving holidays begin. No classes.
Th-25Nov  Thanksgiving holidays. No classes.
M-29Nov  Last day to withdraw from a course. Biographical Essay Due.
T-30Nov  L22-Sec. 14.1, 14.2, 14.3

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Th-02Dec  L23-Sec. 14.7, 14.8, 14.9
T-07Dec  L24-Sec. 14.10, 14.11, 14.12, 14.13
Th-09Dec  3rd Mid-term Exam, Last day of class.
F-10Dec  Study day no classes
M-13Dec  Study day no classes
T-14Dec  Final examinations
W-15Dec  Final examinations
Th-16Dec  Final examinations
F-17Dec  Final exam given on this day.
M-20Dec  Final examinations
T-21Dec  Final examinations

Date of final examination for PH183 available online
Homework Assignment

Foundations in Physics – PH183  Fall 2010

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

F-10Sept  HW1: 1-4, 1-12, 1-26, 1-33, 1-36, 1-39
F-17Sept  HW2: 2-11, 2-21, 2-31, 2-45, 3-3, 3-13, 3-25, 3-35
F-24Sept  HW3: 4-9, 4-11, 4-13, 4-17, 4-36, 4-53, 5-3, 5-11
F-01Oct   HW4: 5-9, 5-23, 5-33, 5-53, 5-61, 6-3, 6-11, 6-24
T-12Oct   HW5a: 6-49, 7-3, 7-5
F-15Oct   HW5b: 7-17, 7-27, 7-35, 7-43
F-22Oct   HW6: 8-3, 8-8, 8-13, 8-33, 8-42, 8-50, 8-63
F-29Oct   HW7: 9-5, 9-13, 9-21, 10-3, 10-13, 10-23, 10-27, 10-33
F-05Nov   HW8: 10-45, 11-1, 11-11,11-15, 11-21, 11-27, 12-1
F-12Nov   HW9: 12-7, 12-15, 12-35, 12-49