

Syllabus PHY 183 – Section 4, Fall 2014
Projects and Practices in Physics

Class meetings: Tuesdays & Thursdays 12:40pm – 2:30pm in BPS 1300
Course staff: Prof. Danny Caballero, BPS 1310A, caballero@pa.msu.edu
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Help session hours: Fridays **XXpm – XXpm** (BPS 1310) and by app't
Course materials: <http://pcubed.pa.msu.edu> & LON-CAPA

Course Description: *Projects and Practices in Physics (P³)* is an introductory calculus-based mechanics course that uses a problem-based learning approach. Rather than listening to lectures and answering clicker questions, during P³ class meetings, you will work in groups to solve complex physics problems on whiteboards and to make models of these problems using a computer. Course instructors will not lecture, but will facilitate your learning by asking questions, prompting discussions, and, only when absolutely necessary, guiding your group. Pre-class readings and homework will introduce you to physics concepts.

In P³, our aim is for you to develop a deep *conceptual understanding* of physics along with *problem solving* and *computational modeling* skills that will serve you well in your future studies. Throughout P³, you will learn that physics is about making simple models of systems and adding complexity to those models to make better predictions and to provide richer explanations.

P³ emphasizes four core ideas in mechanics:

- 1) Atomic interactions give rise to macroscopic phenomenon
- 2) Forces cause changes in momentum; conservation of energy
- 3) Changes in energy result from work done and heat exchanged;
conservation of energy
- 4) Torques cause changes in angular momentum; conservation of angular momentum

Prerequisites: MTH 132 or MTH 152H or LBS 118

Not open to students with credit in: LBS 271 or PHY 181B or PHY 183 or PHY 193H or PHY 231 or PHY 231B or PHY 231C

Required course materials:

- 1) There are no required materials for this course. All course notes and materials are available online. This course follows a different progression than other sections of PHY 183.

NOTE: If you absolutely have to have a textbook, the course most closely

follows the presentation in *Matter & Interactions, Vol. 1*, 3rd edition, which you can rent from Amazon for less than \$30. Otherwise, any inexpensive, used physics textbook will contain similar content (just not in the order discussed in the course).

Course activities

- 1) **Pre-class Reading & Homework:** For you to succeed in this course, you must be prepared to work on problems in your group. This will rely on your reading course notes, watching video lectures, and completing pre-class homework problems so that you come to class primed to work with relevant physics concepts for the problem at hand. Pre-class homework will be posted on LON-CAPA (login at <http://loncapa.msu.edu>) and will consist of 6-10 conceptual physics problems. Pre-class homework will be due each Monday evening at 8pm and are graded online.
- 2) **Class Meetings:** P³ uses a problem-based approach. Rather than listening to lecture and answering clicker questions, during class meetings, you and your group will work through complex physical problems and model the solutions to some of those problems using a computer. Computational modeling will make use of VPython, a Python-based programming language. Whiteboards and markers as well as laptop computers will be available to your group for every class meeting. Course instructors will not lecture, but will facilitate your learning by asking questions, prompting discussions, and, only when absolutely necessary, guiding your group.

NOTE: You and your group will be assessed on your understanding and group function each week (*see the “How will in-class group work be assessed?” document*). Your two lowest scores out of fourteen will be dropped. Class attendance will be essential to your success in this course.

- 3) **Post-class Homework:** You will be assigned post-class homework using the course’s LON-CAPA website, which will generally focus on one or two specific topics that were addressed by the complex problems solved in class. The homework questions will consist of multiple-choice, numerical response, and graph-oriented questions. There will be a single homework set each week. Homework will be due on Sundays at 8:00pm.

NOTE: While we refer to this as “post-class” homework, it will be posted at the beginning of the week and can be completed any time before the due date.

- 4) **Individual & Collaborative Exams:** P³ will have three 110-minute exams and one 2-hour final exam. Exams will be open-ended not scantron graded. The regular exams will be given in class on a Thursday (*see the “Course Schedule” for exact dates*) and will cover up to the content that you worked

with in the previous week (i.e., the material discussed through the Thursday prior to the exam). Each exam, while not explicitly cumulative, will require that you demonstrate your understanding of prior material in some way. Regular exams will consist of two parts: (1) an individual exam that must be completed in 50 minutes, and (2) a group exam that must be completed in the remaining 60 minutes. The final exam will have a similar structure, but with 60 minutes devoted to each part. *You may not miss any exam* except for reasons beyond your control, approved by course instructors (usually a confirmed medical problem or University-sanctioned event).

NOTE: During the individual portion of class exams, no notes or books will be allowed, although you may bring a calculator (sharing of calculators and other electronic devices are not allowed). During the group portion of class exams, laptop computers and whiteboards will be made available. A mock exam will be made available at least one full week prior to the scheduled exam.

Grading Information

The course grade is determined by contributions from several sources: pre-class homework, group work in class, post-class homework, in-class exams, and the final exam. Each of these contributes to the final grade in the following percentages:

- Pre-class homework 10%
- In-class group work (dropping two lowest scores) 20%
- Post-class homework: 20%
- 3 in-class exams: 30%
(individual portion: 75%; group portion: 25%)
- Final exam: 20%
(individual portion: 75%; group portion: 25%)
- Total 100%

This course is not "graded on a curve". The guaranteed scale below is based on the total percentage of points.

Course Score	Earned Grade
p > 92%	4.0
92% > p > 84%	3.5
84% > p > 76%	3.0
76% > p > 68%	2.5
68% > p > 60%	2.0
60% > p > 52%	1.5
52% > p > 44%	1.0
p < 44%	0

Other important information:

Class Hours: The classroom component of this course meets twice a week, on Tuesday & Thursday in BPS 1300, which is from 12:40pm to 2:30pm. There is only one section of this course (section 4) that will cover the material needed for your exams, so please do not attempt to attend other sections in lieu of this one. Please bring paper, pencil, and a calculator to class every day.

You will have 3 in-class exams, which have an individual portion (worth 75% of the exam grade) and a group portion (worth 25% for the exam grade). No exams will be dropped, so it is imperative that you make it to every exam. *You may not miss any exam* except for reasons beyond your control, approved by course instructors (usually a confirmed medical problem or University-sanctioned event).

Help session hours: Most course staff have offices in the suite adjacent to the classroom (BPS 1310). We will hold help session hours on Friday afternoons from ***XXpm – XXpm***. BPS 1310 has a large space to work together. Course instructors are also available by appointment to meet with you or your group; just send us an email.

You are also welcome to stop by our office suite (BPS 1310) whenever at any time, but know that we might ask you to come back at some later time. Note that there will be no help room hours during the first partial week of class or the weeks of Thanksgiving and of final exams.

Disabilities: Please see any course instructor in the first 2 weeks of class, if you have any special needs.

Any information in this syllabus is as accurate as is possible at the time of writing. Announcements about changes of any kind will be made in class, and (usually) posted on the web (LON-CAPA), and will *take precedence over this syllabus*. You are responsible for what is said in class, whether or not you are in attendance.