

General Physics I (Physics 121)

Justification

1. One of the goals of this course is to familiarize students with empirical and theoretical methods of physics. This goal is achieved by (i) placing main concepts discussed in the course in their historical and methodological context, and (ii) designing the laboratory component of the course in such a way that, in every lab assignment, students emulate processes involved in empirical methods of knowledge creation in physics.
2. This course will provide students with a general picture positioning physics within wider field of natural sciences and larger society through a variety of means. First, students will be required to read additional texts of more general nature discussing historical, economic, and cultural background of physics discoveries studied in class. Second, lectures and recitations will use examples from adjacent disciplines and technological applications of studied concepts as illustrative material and practical problems – Reinforcing the concept of quantitative nature of all natural sciences. Third, students will be given special assignments reinforcing students' understanding of societal and technological role played by the studied area of physics in the history of civilization.
3. The course covers all of the material considered standard for non-calculus-based introductory physics courses. The syllabus is also designed to meet the MCAT physics requirement since a good proportion of the students taking this course are pre-med majors. Through the combination of recitations, labs and homework assignments, students receive training enabling them to take the MCAT or the DAT (dental) tests. Besides helping in these tests, this course will also give the students the experience to solve problems through logical reasoning and reductionist approach.
4. The concept of time and change is one of the most important concepts in the course. The students will follow the history of discoveries that have happened and how they shaped our current view of the physical world. This will be achieved through additional reading materials which are discussed below.
5. The structure of labs in the course stimulates students to actively engage in obtaining empirical knowledge regarding concepts and phenomena discussed from a theoretical point of view.
6. Students will be assigned to read excerpts from books that discuss the progress of science especially in the context of physics. For example, the book by Stephen Hawking, "On the shoulders of giants," will be an ideal reading material to get historical perspective.

Assignments

Compulsory assignments:

Problem solving assignments, developing ability to apply concepts to practical situations as well as enhancing students' computational skills

Reading assignments will include regular textbooks and additional literature as determined by instructor. Possible examples may be: "On the shoulders of giants," by Stephen Hawking; "Pleasure of finding things," by Richard Feynman

Additional assignments may be assigned at discretion of an instructor and may include: oral presentations on topics devoted to historical context of the studied material and applications of physics in other sciences and technology; blogs in which students summarize their learning experiences and/or comment on societal issues related to material learned in class; using clickers to do short quizzes on the historical topics, etc.

Assessment

Learning outcomes will be assessed in the course through a variety of means. First, students will be given three “mid-term” exams and a final exam, which will test students knowledge of concepts studied in the course, their ability to apply the concepts to practical problems, their understanding of historical context of the studied discipline and its role in development of society. Second, Department of Physics traditionally conducts a survey of students’ opinion about courses taken at the Department; in the case of this course, the survey will be modified to reflect its PLAS designation. Third, at the end of the semester students might be asked if practical (at the discretion of instructor) to write a short final essay reflecting their understanding of the role of physics in society and how this course helped them to shape their view. Finally, the students will also be tested on their understanding of the reading of historical material using clicker based quizzes in class.

Administration

The curriculum committee of the department will be in charge of designing, implementing and assessing learning outcomes of all PLAS courses. The chair of the committee will be in charge of the process. The course will be taught primarily by full time faculty. The curriculum committee will develop a unified curriculum for the course and oversee its actual implementation. The curriculum committee will also review and approve all final exams given in this course.