SFSU Physics 220: General Physics with Calculus I

Professor Lu Li  
e-mail: luli@sfsu.edu

Lectures: TTh 2:10-3:25 in SCI 210

Final Exam: Tuesday 05/21/13  1:30pm-4:00pm

Office: SCI 386

Office Hour: Thursday 1:00pm-2:00pm in SCI 386

Other Instructor’s Office Hours:

ERIC SANSONE: TBA
SHAFINAZ ALI: TBA
ALI SHAYEGAN: TBA

If you have questions about Physics 220 and Physics 222, you can go to ANY OF THESE instructor’s office hours.

So that I can identify and respond to e-mails from you expeditiously, please put [PHYS220] at the beginning of the subject line, followed by your complete name. I will respond to email within 48 hours. Please use email for administrative matters or short clarifications of lecture or homework problems.

Course Overview

This course is an introduction to Newtonian mechanics, which is the study of motion of macroscopic objects (at speeds much less than the speed of light). Topics include: vector algebra, kinematics (position, velocity, acceleration, linear motion, projectile motion, circular motion, relative motion), Newton’s Three Laws of Motion (inertia/inertial frames, \( \vec{F} = ma \), action-reaction) & the concept of force (weight, gravity, normal forces, tension, spring forces, friction, etc.), impulse & linear momentum, work & kinetic energy, potential energy & conservation of energy, elastic & inelastic collisions, torque & angular momentum, rigid body statics & dynamics, and oscillatory motion (springs, pendulums).

The triad of Physics 220 (mechanics), 230 (electricity & magnetism), and 240 (fluid mechanics, wave motion, optics, thermodynamics) is an almost complete introductory survey of “classical” physics, and serves as the foundation for advanced study for students concentrating in any of the physical sciences and/or engineering. Note that Physics 230 and 240 do not depend on each other and can be taken in either order. Students (such as those studying pre-med/health/life sciences) who prefer a two semester, algebra/trig-based sequence covering the same material at less depth (but faster pace) should consider Physics 111 & 121.

Course Objectives

(1) Qualitatively and quantitatively describe motion and explain its causes.
(2) Interpret graphs of mechanics concepts (e.g., position, velocity, and acceleration versus time; potential energy as a function of position, etc.); translate graphs into written/verbal descriptions and vice versa.
(3) Model a real physical system by a more simplified system using the appropriate approximations; be aware of the underlying assumptions and limitations of any model
(4) Translate physical principles into the language of mathematics (algebra, geometry, trigonometry and calculus), and solve for the desired quantities.
Student Learning Outcomes for Lower Division Science GE Classes

(1) Explain the steps in the scientific method of inquiry, which involves gathering observable, empirical and measurable evidence subject to specific principles of reasoning, and recognizing that reproducible observation of a result is necessary for a theory to be accepted as valid by the scientific community.

(2) Analyze specific examples of how the scientific method has been used in the past to collect data through observation and experimentation, and to formulate, test and reformulate hypotheses about the physical universe; evaluate scientific information from a variety of sources and use that information to articulate well-reasoned responses to scientific concerns.

(3) Evaluate scientific information from a variety of sources and use that information to articulate well-reasoned responses to scientific concerns.

(4) Recognize the utility of alternative scientific hypotheses in the development of scientific theories, research and applications and understand how scientific evidence is used to develop hypotheses and theories.

(5) Describe ethical dilemmas arising out of contemporary scientific research and applications, which may include those related to social justice, and may have implications for local and/or global communities.

(6) Use scientific theories to explain phenomena observed in laboratory or field settings.

(7) Discuss the relevance of major scientific theories and research to their lives.

Prerequisites & Corequisites

Because this course uses calculus in lectures and in homework, students must have completed the following prerequisites:

(1) Math 226 (Calculus I) or its equivalent, with a grade of C or better. If you did not complete this requirement at SFSU, be prepared to supply proof (e.g., unofficial transcript from another institution, A.P. Calculus exam with score of 4 or 5) in the first week.

(2) Sufficient score on the Math Qualification Test for Introductory Physics (Physics Readiness Exam). See: [http://www.physics.sfsu.edu/Academics/Readiness.html](http://www.physics.sfsu.edu/Academics/Readiness.html) for more information on this diagnostic test. The passing score is 70%. If you did not pass the exam at the early test date, you MUST take the test during the first lab meeting.

In addition to the above prerequisites, students must have previously completed OR be co-enrolled in the following:

(3) Math 227 (Calculus II),

(4) Physics 222 (General Physics I Laboratory).

Please see me in the first week if you have any concerns about your preparation.

Learning Resources

Required:


(2) Scientific calculator (graphing capabilities NOT necessary)

(3) Reliable internet access: Login to [www.webassign.com](http://www.webassign.com) to access the online homework system. When you register, you will need:
   Institution code: sfus
   Class key: sfus 5348 4736
Assignment of Grades

Homework Assignments 10%
Clicker Quizzes & Class Participation 18%
3 In-class Exams 36% (12% each)
Final Exam 36%

All exams are cumulative however with emphasis on material covered between exams.

There will be NO make-ups for any of the exams or quizzes.

Letter grades will be assigned according to the following scheme:

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<th>Grade</th>
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<td>B+</td>
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Note that a minimum grade of C is required to move on to Physics 230 or 240! Students who earn a grade of C- or lower will need to repeat Physics 220.

Homework

You cannot learn physics solely from lectures. You must work through many problems, seeing how the theoretical concepts discussed in lecture apply in various different contexts. Homework is an integral part of the learning process; how serious you take the homework will ultimately determine how much you will understand physics and how well you will do in the course overall. There will be approximately one homework assignment due per week. Homework will be submitted via WebAssign (www.webassign.com). Please self-enroll as soon as possible. One of the advantages of a system like WA is that your homework is graded immediately. I strongly suggest first writing-up your solutions on paper, complete with diagrams and explanations, before logging into the WA system to enter your answers. That way, if you get the answer wrong, you can look over what you did to identify the error. Also, you will have a record of what you have done to aid you in studying for exams. Although you will not be graded on diagrams and explanations in WA, you must include them on exams in order to get full credit!!

Academic Integrity

You are encouraged to form study groups with your peers to discuss homework; however, you should write up your solutions on your own, and submit your own answers on WebAssign. Cheating via any method on exams will result in a grade of zero on that exam and being reported to the department chair and college dean for possible discipline. Please see the official academic integrity policy for the Department of Physics & Astronomy at: www.physics.sfsu.edu/policy/plagiarism.pdf.

Drop, Withdrawal & Repeat Policy

The “Drop deadline is 02/08/2013. You can drop yourself from the class online without any penalty and without any record, for any reason. After 02/08/2013, students must petition for an official “withdrawal”. Because Physics 220 & 222 are “impacted” courses, withdrawal after the 3rd week will only be allowed for serious, extenuating circumstances (e.g., serious illness of student, serious illness or death of family member, loss of job and financial aid). Documents must be provided to support the petition to withdraw. If the petition is approved, the designation “W” will appear on the transcript. Students are only allowed to repeat a class once at SFSU. Note that designations of W, WU, NC count toward this limit. The Physics and Astronomy Department Withdrawal Policy is at: http://www.physics.sfsu.edu/policy/withdrawal.pdf.
**Expected Code of Conduct**

Classroom discussion and participation are strongly encouraged. However, please refrain from unrelated chatter. Also, please remember to place cell phones and other electronic communication devices on silent or vibration mode so as not to distract your fellow classmates. If you must arrive late or leave early, please sit toward the back of the room near the doors so as to minimize disruption.

**Disability Access**

Students with disabilities who need reasonable accommodations are encouraged to contact me early in the semester. The Disability Programs and Resource Center is available to facilitate the reasonable accommodations process. The DPRC, located in Students Services Building 110, can be reached by phone at 415-338-2472 (voice/TTY) or by e-mail at dprc@sfsu.edu.

**Religions Holidays**

The faculty of San Francisco State University shall accommodate students wishing to observe religious holiday when such observances require students to be absent from class activities. It is the responsibility of the student to inform the instructor, in writing, about such holidays during the first two weeks of the class each semester. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed.

*The information on this handout may be altered during the semester -- announcements will be made in class or see the instructor for details about any changes.*