Lectures & Office Hours

Lectures: MWF 2:10–3:00 PM in Science 201
Office Hours: WF 3:10–5:00 PM in Thornton 308

Quick note on e-mail contact

So that I can identify and respond to e-mails from you expeditiously, please put [PHYS220] at the beginning of the subject line. Your emails should have a salutation/greeting, a body written in standard academic English with correct spelling & grammar, and a closing/signature. I will respond to email within 48 hours. Please use email for administrative matters or short clarifications of lecture or homework problems. More extensive help with homework and/or detailed clarifications of lectures are best done in person in office hours.

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, $\vec{F} = m\vec{a}$, 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, planetary motion, 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 after completing Physics 220 with a grade of at least C. 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).
(5) Understand and apply the fundamental conservation theorems (linear momentum, angular momentum, mechanical energy).

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, 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.

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

2. Physics 222 (General Physics I Laboratory).
3. Math 227 (Calculus II).

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

**Learning Resources**

**Required:**

1. Lea & Burke, Physics: The Nature of Things, custom copy (Ch. 0-12, 14), $110 at SFSU Bookstore. Comes with online access to WebAssign for homework. If you purchase a used copy, you will need to purchase a subscription to WebAssign separately (see below).
2. i>clicker2, $56 new, $42 used, $28 rent at SFSU Bookstore. Please register your i>clicker2 on the ilearn course website (look for “Remote Registration”).
3. Scientific calculator (graphing capabilities NOT necessary).
4. Reliable internet access:
   - (a) Login to ilearn.sfsu.edu (note: no www in web address) to access course website. Please check frequently for new announcements, updates to the syllabus & schedule, tips & tricks on the homework, and links to additional learning resources.
   - (b) Login to www.webassign.com to access online homework system. Cost included with purchase of custom textbook.

If you purchased used textbook, cost is $30 online with credit card. When you register, you will need:
   - Institution code: sfsu.
   - Class key: sfsu 7835 8163.

**Optional:**

6. Elby, Portable TA: A Physics Problem Solving Guide; out of print, but can be found online
7. Lea & Burke, Student Solutions Manual to Physics: The Nature of Things; out of print, but can be found online
8. Celesia, Preparation for Introductory College Physics: A Guided Student Primer

**Assignment of Grades**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework Assignments</td>
<td>22.222%</td>
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<tr>
<td>Class participation (iClicker)</td>
<td>11.111%</td>
</tr>
<tr>
<td>3 In-class Exams</td>
<td>33.333% (11.111% each)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>33.333% (3 parts, 11.111% each)</td>
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“Resurrection Final” – The final is comprehensive: there will be 3 parts; each part consists of content corresponding to the 3 in-class exams. If you do better on a part of the final exam than you did on the corresponding in-class exam, then I will replace that in-class exam with the final exam score for that part. I want to reward students who show improvement over the course of the semester.

There will be NO make-ups for any of the 3 in-class exams. Instead, the grade for the corresponding part of the Final Exam will be used in place of the missing in-class exam.

Letter grades will assigned according to the following scheme:

- A: 90.0% – 100.0%  
- A+: 95.0% – 99.9%  
- A-: 90.0% – 94.9%  
- B+: 85.0% – 89.9%  
- B: 80.0% – 84.9%  
- B-: 75.0% – 79.9%  
- C+: 75.0% – 79.9%  
- C: 70.0% – 74.9%  
- C-: 65.0% – 69.9%  
- D+: 60.0% – 64.9%  
- D: 55.0% – 59.9%  
- D-: 50.0% – 54.9%  
- F: 00.0% – 39.9%

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 seriously 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). One of the advantages of a system like WA is that your homework is graded immediately, and you will have the opportunity to correct your answers for full credit (up to 10 free attempts per numerical or symbolic problem, increasing penalties after 10 attempts up to 15 attempts, multiple choice have only 1 attempt). 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!!

Policy on homework extensions: Every student has one free homework extension without penalty. Extensions must be requested within 2 weeks of the assignment due date. Requests must be made within the WebAssign system. After the one free extension, additional extensions will result in a 50% penalty, unless there is a serious and compelling reason (e.g., medical emergency, death in immediate family; documentation is required).

Preliminary Schedule (Subject to Change!!)

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<thead>
<tr>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tr>
<td>Feb. 1: Vector Algebra</td>
<td>Feb. 3: 1D Kinematics</td>
<td>Feb. 5: 1D Kinematics</td>
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<td>Feb. 8: 1D Kinematics</td>
<td>Feb. 10: 2D Kinematics</td>
<td>Feb. 12: 2D Kinematics</td>
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<td>Mar. 7: Momentum &amp; Impulse</td>
<td>Mar. 9: Momentum &amp; Impulse</td>
<td>Mar. 11: Momentum &amp; Impulse</td>
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<td>Apr. 4: Conservation of Energy</td>
<td>Apr. 6: Conservation of Energy</td>
<td>Apr. 8: Conservation of Energy</td>
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<td>Apr. 11: Rotational Dynamics</td>
<td>Apr. 13: Rotational Dynamics</td>
<td>Apr. 15: Rotational Dynamics</td>
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<td>Apr. 18: Rotational Dynamics</td>
<td>Apr. 20: Rotational Dynamics</td>
<td>Apr. 22: Rotational Dynamics</td>
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<td>Apr. 25: Rotational Dynamics</td>
<td>Apr. 27: Rotational Dynamics</td>
<td>Apr. 29: Rotational Dynamics</td>
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<td>May 2: Planetary Motion</td>
<td>May 4: Planetary Motion</td>
<td>May 6: Exam 3</td>
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<tr>
<td>May 9: Oscillations</td>
<td>May 11: Oscillations</td>
<td>May 13: Oscillations</td>
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<td>May 16: Review</td>
<td>May 18: Final Exam, 1:30 – 4:00 PM</td>
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Where to get help

(1) Office hours! Dr. Barranco and the lab GTAs will have open office hours spread throughout the week. Note that you can go to the office hours of ANY GTA, not just the one who teaches your lab.

(2) Enroll in Science 220: Science Concepts for Physics with Calculus I, 1 unit, Tuesdays, 12:35-13:50 in Trailer TP-4 (behind Thornton Hall). This is a “supplementary instruction” course that reinforces conceptual ideas and covers problem solving strategies.

(3) Campus Academic Resource Program (CARP): http://www.sfsu.edu/~carp1/. You can make free appointments with peer tutors for individual or small group tutoring.

(4) Learning Assistance Center (LAC): http://www.sfsu.edu/~lac/tutoring.html. You can make free appointments with peer tutors for individual or small group tutoring.

(5) Khan Academy: https://www.khanacademy.org/

(6) Open Yale Course: oyc.yale.edu/physics/physics/phys-200

(7) Coursera online course from University of New South Wales: https://www.coursera.org/learn/mechanics-particles-planets

(8) EdX online course from Weston High School: https://www.edx.org/course/ramp-ap-physics-c-mechanics-weston-high-school-mechc101x
Drop, Withdrawal & Repeat Policy

The “Drop” deadline is Monday, February 8. You can drop yourself from the class online without any penalty and without any record, for any reason. After February 8, 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.

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. Using someone else’s i-clicker to help them earn participation points while they are absent, or having someone else use your i-clicker in order to get you class participation points when you are absent, is considered cheating. Both parties will receive scores of zero for class participation for the entire semester. Please see the official academic integrity policy for the Department of Physics & Astronomy at: www.physics.sfsu.edu/policy/plagiarism.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 Student Services Building 110, can be reached by phone at 415-338-2472 (voice/TTY) or by e-mail at dprc@sfsu.edu.

Religious Holidays

The faculty of San Francisco State University shall accommodate students wishing to observe religious holidays 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.

Student Disclosures of Sexual Violence

SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Dean of Students. To disclose any such violence confidentially, contact:

The SAFE Place - (415) 338-2208; http://www.sfsu.edu/~safe_plc/
Counseling and Psychological Services Center - (415) 338-2208; http://psyservs.sfsu.edu/
For more information on your rights and available resources - http://titleix.sfsu.edu