PHYS 101: General Physics I (Spring 2017)

Instructor: Dr. Justin Dressel
Email: dressel@chapman.edu

Course Time: MWF 11am-11:50am
Course Location: 103 Beckman Hall

Office: 110 Hashinger Science Center
Office Hours: MW 1pm-3pm or by appointment

Lab Instructor: Shiva Lotfallahzadeh Barzili
Email: lotfalla@chapman.edu

Supplemental Instructor: William Parker
Email: parke173@mail.chapman.edu

Course Webpage: https://blackboard.chapman.edu

In-Class Participation: https://b.socrative.com/login/student/ Channel: SCSTPHYS101

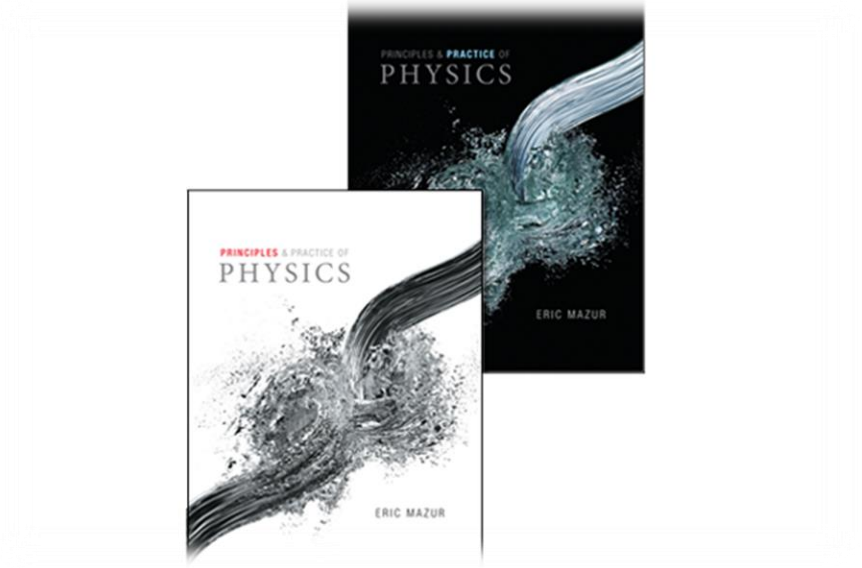
Slack Discussion: https://scststudents.slack.com/ Channel: #phys101-17s

Course Description:

PHYS 101 along with its associated laboratory supplement 101L is an introductory course in physics that focuses on the core principles of classical mechanics. Students will learn how to abstract and apply natural laws to new situations, with an emphasis on developing broadly applicable critical thinking and problem-solving skills. Topics include kinematics (describing motion), symmetry and conservation laws (momentum, energy, angular momentum), special relativity, and fundamental forces.

Course Textbook:

***Principles* & *Practice* of Physics Plus MasteringPhysics**
By Eric Mazur
Publisher: Pearson Education, Inc. 2015.
(Note: we will use *MasteringPhysics* -- the online part of the book -- heavily in this course.)



Instructional Methods/Strategies:

The class is flipped, meaning that **minimal in-class time will be spent lecturing.** The teaching philosophy of both the primary textbook and the instructor is to learn by doing, with many in-class exercises, group-work, and activities. Participation in class will be expected, and a large component of the course grade. **Students are expected to read the textbook to familiarize themselves with the material BEFORE coming to class and honing their understanding. Students are also expected to bring a web-enabled device to class (preferably mobile) to participate in the in-class Socrative quizzes**---please let the instructor know if you do not own such a device.

Methods of Evaluation:

In addition to in-class assessment of abilities, students will be challenged by a combination of regular online homework through the *MasteringPhysics* system, written reports of formal homework solutions, two mid-term exams, and a final exam.

Student Assessment:

Class Participation and Attendance	15%
Homework	20%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	25%

Course Objectives and Learning Outcomes:

After completing this course students will be able to:

1. Recognize, explain, and apply the laws of classical mechanics to analyze physical phenomena.
2. Apply critical thinking strategies to correlate observed experimental data with fundamental physical principles using logically consistent theoretical models.
3. Effectively communicate scientific ideas and results, both verbally and in writing.

Specifically, the Course Learning Outcomes above will be measured by the ability to:

1. Apply SI (Systeme International) units and metric prefixes to measurable quantities.
2. Use vectors and scalars to model physical quantities, and use vector operations correctly to solve the underlying geometry of mechanics problems.
3. Relate the kinematics concepts and graphs of displacement, velocity, and acceleration versus time using integration and differentiation.
4. Solve 1, 2, and 3D kinematics problems including free fall, projectile, and circular motion.
5. Explain the concepts of force, inertia, and mass and apply Newton's laws to solve problems in linear and circular motion.
6. Describe the concepts of energy -- work, kinetic energy, potential energy, and power -- and use them to solve translational and rotational mechanics problems for both conservative and non-conservative force situations.
7. Define linear momentum and impulse and use these principles to solve problems involving 1 and 2 dimensional, elastic, inelastic, and perfectly inelastic collisions.
8. Define the concepts of moment of inertia, torque, and angular momentum and use them to solve problems involving rotating and rolling objects and systems.
9. Calculate moments of inertia for systems of particles and solids using the parallel axis theorem and integration.
10. Describe the conditions necessary for static equilibrium and solve problems involving static equilibrium of rigid bodies in two dimensions.
11. Use Newton’s universal law of gravity and Kepler's laws of planetary motion to describe planetary and satellite motions.
12. Explain the concepts of both Galilean and Special relativity, and their implications on the applicability of physical laws in practice.
13. Solve basic problems of harmonic oscillation, and explain its ubiquity in practical engineering.

Physics Program Objectives and Learning Outcomes

1. Demonstrate knowledge and understanding of basic mathematics and physical principles used to model natural phenomena.
2. Demonstrate ability to convey physical concepts with mathematical expressions and/or computation, and effectively derive quantitative predictions from a model through mathematical/computational analysis.
3. Demonstrate competency in using computer tools.
4. Demonstrate the ability to apply knowledge of advanced mechanics, electromagnetism, thermodynamics and quantum physics to the solution of problems in physics.
5. Demonstrate the ability to effectively communicate information, scientific or otherwise, in both written and verbal form.
6. Demonstrate the ability to write clear, organized and illustrated technical reports with proper references to previous work in the area.
7. Demonstrate the skills and motivation for continued self-education.

Supplemental Bibliography:
Students are encouraged to practice solving problems as much as needed to grasp the material. The *MasteringPhysics* online component of the primary textbook has a large number of resources for additional study. The following (optional) book is also useful to provide worked examples for additional guidance:

Schaum's Outline of Physics for Engineering and Science, Third Edition, Michael Browne, ISBN-13: 978-0071810906.

Blackboard:
Access to the textbook and *MasteringPhysics* online homework is through Blackboard. Grades will be posted on Blackboard. Updated course schedules and announcements will be posted on Blackboard.

Slack:
Group discussion and contact with the professor will be facilitated by Slack, at http://scststudents.slack.com . Ensure that you have an account. Please notify the instructor if you need to be invited. The channel for this course will be **#phys101-17s** and is set to auto-notify the instructor. Note that this is a public forum, but private chats are also available as required.

Socrative:
For in-class quizzes and activities, we will be using Socrative. When in class, log in as a student via the link https://b.socrative.com and join the class channel **SCSTPHYS101** . Please use your full name when logging in so that proper class participation credit may be recorded.

Collaboration Policy:
I encourage you to discuss and study course material together. Physics (and science in general) cannot be learned passively – discussing ideas and solving problems with each other can greatly help the learning process. However, all work you submit for this course must be your own. Any incidents of academic misconduct will be dealt with severely in accordance with the Chapman University Academic Integrity policy (see below), especially incidents involving the online homework system.

Supplemental Instruction:
There will be one supplemental instructor (SI) for the course, who will help with in-class activities. The SI will also hold problem-solving practice sessions and exam reviews. All students are expected to make use of these additional opportunities for practice with the material.

Chapman University's Academic Integrity Policy:
"Chapman University is a community of scholars that emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work and academic dishonesty of any kind will be subject to sanction by the instructor/administrator and referral to the university Academic Integrity Committee, which may impose additional sanctions including expulsion. Please see the full description of Chapman University's policy on Academic Integrity at http://www.chapman.edu/academics/academicintegrity/index.aspx."

Chapman University's Students with Disabilities Policy

"In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Disability Services Office. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services at (714) 516–4520 or visit www.chapman.edu/students/student-health-services/disability-services if you have questions regarding this procedure or for information or to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for an accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course."

Chapman University's Equity and Diversity Policy

"Chapman University is committed to ensuring equality and valuing diversity. Students and professors are reminded to show respect at all times as outlined in Chapman's Harassment and Discrimination Policy. Please see the full description of this policy at http://www.chapman.edu/faculty-staff/human-resources/eoo.aspx. Any violations of this policy should be discussed with the professor, the dean of students and/or otherwise reported in accordance with this policy."

Student Support at Chapman University

Over the course of the semester, you may experience a range of challenges that interfere with your learning, such as problems with friend, family, and or significant other relationships; substance use; concerns about personal adequacy; feeling overwhelmed; or feeling sad or anxious without knowing why. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. You can learn more about the resources available through Chapman University's Student Psychological Counseling Services here:
https://www.chapman.edu/students/health-and-safety/psychological-counseling/
Fostering a community of care that supports the success of students is essential to the values of Chapman University. Occasionally, you may come across a student whose personal behavior concerns or worries you, either for the student's well-being or yours. In these instances, you are encouraged to contact the Chapman University Student Concern Intervention Team who can respond to these concerns and offer assistance:
https://www.chapman.edu/students/health-and-safety/student-concern/index.aspx
While it is preferred that you include your contact information so this team can follow up with you, you can submit a report anonymously. 24-hour emergency help is also available through Public Safety at 714-997-6763.

Tentative Course Schedule:

Week	Monday	Wednesday	Friday
1 - 1/30	Orientation and Tech Setup	Foundations 1.1 -- 1.5	Foundations 1.6 -- 1.9
2 - 2/6	1D Motion 2.1 -- 2.4	1D Motion 2.5 -- 2.9	Acceleration 3.1 -- 3.4
3 - 2/13	Acceleration 3.5 -- 3.8	Momentum 4.1 -- 4.4	Momentum 4.5 -- 4.8
4 - 2/20	Energy 5.1 -- 5.4	Energy 5.5 -- 5.8	**No class** (University Address)
5 - 2/27	Galilean Relativity 6.1 -- 6.4	Galilean Relativity 6.5 -- 6.8	Review 1.1 -- 6.8
6 - 3/6	**Midterm I** **1.1 -- 6.8**	Interactions 7.1 -- 7.6	Interactions 7.7 -- 7.10
7 - 3/17	Force 8.1 -- 8.8	Force 8.9 -- 8.10	Force 8.11 -- 8.12
8 - 3/20	**Spring Break**	**Spring Break**	**Spring Break**
9 - 3/27	Work 9.1 -- 9.4	Work 9.5 -- 9.8	2D Motion 10.1 -- 10.5
10 - 4/3	2D Motion 10.6 -- 10.10	Circular Motion 11.1 -- 11.3	Circular Motion 11.4 -- 11.6
11 - 4/10	Torque 12.1 -- 12.4	Torque 12.5 -- 12.8	Review 7.1 -- 12.8
12 - 4/17	**Midterm II** **7.1 -- 12.8**	Gravity 13.1 -- 13.4	Gravity 13.5 -- 13.6
13 - 4/24	Gravity 13.7 -- 13.8	Special Relativity 14.1 -- 14.4	Special Relativity 14.5 -- 14.6
14 - 5/1	Special Relativity 14.7 -- 14.8	Periodic Motion 15.1 -- 15.4	Periodic Motion 15.5 -- 15.6
15 - 5/8	Periodic Motion 15.7 -- 15.8	Review 13.1 -- 15.8	Review 1.1 -- 15.8
16 - 5/15	**Final : 8am-10:30am** **1.1 -- 15.8**		

READ THE INDICATED BOOK CHAPTERS PRIOR TO CLASS