SYLLABUS - PHYS-107-04
PHYSICS FOR LIFE SCIENCES I
Schmid College of Science and Technology
Chapman University
Fall 2015

Dr. Justin Dressel
dressel@chapman.edu
Phone: (714) 516 - 5949

Office: HSC 110
Hashinger Science Center

Office Hours:
Mon, Wed 1–3 pm
(or by appointment)

Lecture Times:

MW 4:00-5:15 PM
Hashinger Science Center 150

Course Website:

https://blackboard.chapman.edu/

Required Textbook:

Fundamentals of Physics
Extended 10th Edition with WileyPLUS
Halliday, Resnick, & Walker
(Chapters 1 - 12, 14 plus additional topics)

Additional Resources:
 (not available in the bookstore)

Schaum's Outline of Physics for
Engineering and Science, Second Edition
Michael Browne
(Example and solved problems)

http://www.khanacademy.org

Description: A calculus-based, general introduction to physics and its principles.

Physics for the Life Sciences reveals the beauty and unity of nature through its most fundamental laws, and demonstrates the central role physics plays in understanding the basic workings of nature, while highlighting physics' essential role in all of science and technology in the contemporary world. This course is primarily for students majoring in biological sciences or in pre-clinical programs.

Topics: measurements and units, kinematics, vectors and other mathematical tools, Newton's laws of motion and universal gravitation, energy and work, center of mass, linear momentum, rotation, torque, angular momentum, conservation laws, rigid body statics and elasticity, and fluid mechanics

Prerequisite: Math 110.

Corequisite: Physics 107L.

Course Grade:

The course is comprised of two complementary components: Lecture and Laboratory. Lectures will be held in Hashinger 150, and Labs will be held in SC 003.

The course will be graded "on a curve," which means your letter grade will be determined by your overall percentile rank among all students in the course. In a curved grading system, absolute scores only matter in relation to the scores of all other students. The historical average grade in this course is roughly a B-, and (barring exceptional circumstances) the curve will be set accordingly. Improvement over the course will be taken into consideration in the final exam.

Your overall percentile rank will be determined by a weighted combination of your percentile rank on the following:

- **Physics Lab: 20% (Lowest lab score is dropped)**

- **WileyPLUS Homework: 5% (Lowest score is dropped)**

- **In-class group quizzes/exercises: 5%**

- **Three Midterm Exams: 45% (15% each)**

    o **Exam I (Wednesday Sep 30, 2015)**

    o **Exam II (Wednesday Oct 28, 2015)**

    o **Exam III (Wednesday Nov 18, 2015)**

- **Final Exam (Cumulative): 25% (Thursday Dec 17, 2015, 8:00 - 10:30 AM)**
    o **Final Exam percent score will be used to replace the lowest of the three midterm exam percent scores if the final exam percent score is greater**

PHYS 107L Laboratory:

Students taking PHYS 107 are required to take the associated laboratory course PHYS 107L concurrently. The difference in course number is artificial. Students will be graded for the course as a whole. The topics of experiments covered each week will parallel or follow the topics covered in lecture.

Each student is a member of a lab section, from section 01 to section 12, according to the Laboratory they attend. All the labs are coordinated and perform the same experiment each week except Week 1 and 2.

Lab reports are due at the end of each lab section. The lowest lab score will be dropped.

Structure of Lab Sections:

1. **Discussion Section:** The first 50 minutes of each lab.
   - **Purpose:** Review concepts, examples and practice solving problems.
   - **Attendance is mandatory**

2. **Laboratory Section:** 170 minutes of hands-on experimental work.
   - **Purpose:** Conducting laboratory experiments to validate and clarify the concepts learned in lecture.
   - **Attendance is mandatory**

WileyPLUS Homework:

Homework will be assigned, submitted and scored *online* using WileyPLUS, which you can access from the course Blackboard. You will need an access code to complete the homework assignments.

Helpful video: http://youtu.be/Vbsmr5tM4fo

Complete the integration, or "pairing," by entering the WileyPLUS Product ID on the "Get Started with WileyPLUS" screen within Blackboard (see the Content folder).

There are two ways to acquire an access code:

1. If you bought a new "Fundamentals of Physics" textbook from the Bookstore, it includes a card that will give you an access code for WileyPLUS. You may also purchase the access code separately from the bookstore, if available.

2. Otherwise, you can purchase an access code directly from the WileyPLUS site.

3. (You can also choose the 14-day free Grace Period option to start using WileyPLUS, until your code arrives.)

Students who are not on the course roster may not have an account or be able to login. Please let me know if you cannot login ASAP.

> (For general information about the WileyPLUS system, please see the student guide at http://www.webassign.net/manual/student_guide/index.html. The instructor cannot assist you with WileyPLUS issues, such as access code or technical support questions. Any question about accessing WileyPLUS you may have should be addressed to WileyPLUS customer or technical support. WileyPLUS also has 24-hours online chat assistance.)

Homework will be assigned and posted on WileyPLUS, and must be submitted there by the due date (listed below in the tentative course calendar, but you are responsible to double check). The solutions to the homework problems are available on WileyPLUS after the due date.

Homework is important, and solving problems is the primary method for gaining a real, working understanding of the material. It is recommended to do the homework on paper and set up the problem as you would on an exam, before entering answers in WileyPLUS.

The lowest homework score will be dropped.

Exams:

There will be three midterm exams and a cumulative final exam (see schedule above).

Exams are closed book and closed notes; however, you are allowed to bring a single two-sided 8.5"x11" sheet of paper containing formulas. **No worked out problems or partially set up problems are allowed**. The sheet must be submitted with the exam, so include your name.

Make-up Policy:

There will be NO make-ups for missed exams and no late homework accepted.

If you have a valid, written document with verifiable contact information explaining why an exam could not be taken (e.g. illness with doctor's note, or jury duty with court's notice), then your final exam score will be assigned to your missed exam score.

Reading Assignments:

It is strongly recommended that you read the assigned sections of the text before lecture.

This will not only familiarize you with the terminology and concepts, but will also allow you to ask for clarification of anything you may find confusing.

Calculators:

ONLY a basic scientific calculator is allowed during all exams.

You may purchase a simple and inexpensive scientific calculator for around $10 from our bookstore, or elsewhere.

Access to advanced calculators during any exam will be considered as an attempt at cheating. The student will be dismissed, and receive an exam grade of zero.

Admissable: TI-30XA, TI-30XIIS, HP 300s, HP 10s, and similar.

Inadmissable: phones, tablets, laptops, graphing, programmable, or advanced scientific calculators, calculators that have large memories (e.g. 32KB), calculators that can store files, have a USB connection, internet access, or can do calculus or other symbolic calculations (e.g. TI-83, TI-84, etc.).

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Electronic Class Participation:

Outside of exams, student are *encouraged* to bring electronic devices, particularly internet-enabled phones, tablets, laptops, or chromebooks. These devices will be used for in-class participation quizzes and games. Please let me know if you have no suitable device.

Class site: http://b.socrative.com/ **Room Code:** ProfDressel

Course Learning Outcomes:

1. Master a broad set of physical principles that form the basis of classical mechanics.
2. Apply the computational and mathematical tools required to analyze and solve physics problems, sometimes using novel and creative methods.
3. Implement, analyze, and evaluate experiments.
4. Become proficient in setting up, using, adjusting, and calibrating scientific equipment to conduct experiments using technical diagrams, instructions, and instructor assistance.
5. Comprehend and evaluate scientific data and uncertainties (including their sources).
6. Apply the tools, content, and principles learned in the course to identify, formulate, and solve complex real world problems.
7. Effectively employ statistical tools and methods to reveal physical laws and principles.
8. Demonstrate an understanding of relationship of key principles in physics to concepts and principles of biology and life sciences.

Program Learning Outcomes:

Upon graduation, students will:

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

Academic Integrity:

"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/academic-integrity/

Accommodation for Students with Disabilities:

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.

Equity and Diversity:

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.

Tentative Course Calendar:

Week	Monday	Wednesday
1 (08/31 , 09/02)	**Introduction to PHYS 107** • Course overview • Intro to Physics • Scientific Method	**Chapter 1** (*Measurement*) • Fundamental Forces • Dimensions and Units • Dimensional Analysis
2 (09/07 , 09/09)	No Class **Labor Day Holiday**	**Chapter 2** (*Motion Along a Straight Line*) • Position, Displacement, Velocity & Acceleration • Constant Acceleration • Free-Fall **HW#1 (Ch. 1) due by 10pm Wednesday (09/09)**
3 (09/14 , 09/16)	**Chapter 3** (*Vectors*) • Scalars and Vectors • Vector Addition/Subtraction Geometric/Algebraic Method	**Chapter 3** • Coordinate Systems **HW#2 (Ch. 2) due by 10pm Wednesday (09/16)**
4 (09/21 , 09/23)	**Chapter 4** (*Motion in 2 and 3-D*) • Kinematics in 2-D • Projectile Motion	**Chapter 4** • Relative Motion **HW#3 (Ch. 3) due by 10pm Wednesday (09/23)**
5 (09/28 , 09/30)	**Chapter 5** (*Force and Motion I*) • Newton's 3 Laws of Motion **HW#4 (Ch. 4) due by 3pm Tuesday (09/29)**	**Midterm Exam I** (Chapter 1 – 4)
6 (10/05 , 10/07)	**Chapter 5** • Applications of Newton's Laws	**Chapter 6** (*Force and Motion II*) • Friction • Terminal Velocity • Uniform Circular Motion **HW#5 (Ch. 5) due by 10pm Sunday (10/11)**
7 (10/12 , 10/14)	**Chapter 7** (*Kinetic Energy & Work*) • Kinetic Energy, Work Work Done by a Constant Force	**Chapter 7** • Work Done by a Variable Force • Gravity • Spring **HW#6 (Ch. 6) due by 10pm Sunday (10/18)**
8 (10/19 , 10/21)	**Chapter 8** (*Potential Energy, Conservation*) • Potential Energy • Conservation of Mechanical Energy	**Chapter 8** • Conservative and Non-conservative Forces • Work Done by External Force **HW#7 (Ch. 7) due by 10pm Sunday (10/25)**

Week		
9 (10/26 , 10/28)	**Chapter 9** (*Center of Mass, Momentum*) • Center of Mass • Linear Momentum **HW#8 (Ch. 8) due by 3pm Tuesday (10/27)**	**Midterm Exam II** (Chapter 5 – 8)
10 (11/02 , 11/04)	**Chapter 9** • Law of Conservation of Linear Momentum • Impulse and Momentum • Collisions • Rocket/Jet Propulsion	**Chapter 10** (*Rotation*) • Angular Position, Displacement, Velocity, Acceleration • Rotational Kinematics **HW#9 (Ch. 9) due by 10pm Sunday (11/08)**
11 (11/09 , 11/11)	**Chapter 10** • Rotational Kinetic Energy • Rotational Inertia • Torque • Newton's 2nd Law for Rotation • Work and Rotational Kinetic Energy	**Chapter 11** (*Torque, Angular Momentum*) • Rolling • Angular Momentum • **HW#10 (Ch. 10) due by 10pm Sunday (11/15)**
12 (11/16 , 11/18)	**Chapter 11** • Newton's 2nd Law in Angular Form • Conservation of Angular Momentum **HW#11 (Ch. 11) due by 3pm Tuesday (11/17)**	**Midterm Exam III** (Chapter 9 - 11)
13 (11/23 , 11/25) **Thanksgiving Week**	No Class	No Class

14
(11/30 , 12/02)
	Chapter 12 (*Equilibrium, Elasticity*)
	• Equilibrium
	• Biomechanics
	• Muscle Forces
		Chapter 12
		• Elasticity
		  • Young's Modulus
		  • Shear Modulus
		  • Bulk Modulus
		• DNA Elasticity
		
		HW#12 (Ch. 12) due by 10pm Sunday (12/06)

15 (12/07 , 12/09)	**Chapter 14** (*Fluids*) • Fluids, Density and Pressure • Pascal's Principle	**Chapter 14** • Archimedes' Principle • The Equation of Continuity • Bernoulli's Equation **HW#13 (Ch. 14) due by 10pm Sunday (12/13)**

HW #	Homework (End-of-chapter Problems section)	Due Date
1	Ch. 1: 1, 3, 9, 12, 14, 21, 27, 46	Wed 9/09
2	Ch. 2: 5, 9, 13, 17, 20, 22, 23, 27, 33, 39, 45, 47, 51, 55, 60, 62, 68, 70, 75	Wed 9/16
3	Ch. 3: 5, 9, 11, 15, 19, 32, 34, 41, 51, 61	Wed 9/23
4	Ch. 4: 3, 5, 7, 13, 17, 23, 29, 35, 39, 43, 58, 67, 69, 75, 77, 80	Tue 9/29
5	Ch. 5: 4, 7, 13, 16, 17, 31, 34, 39, 45, 51, 55, 57	Sun 10/11
6	Ch. 6: 7, 9, 11, 12, 15, 19, 23, 29, 31, 33, 36, 41, 45, 49, 51, 57, 63	Sun 10/18
7	Ch. 7: 1, 5, 7, 11, 15, 17, 19, 25, 26, 31, 34, 43, 65	Sun 10/25
8	Ch. 8: 2, 3, 11, 13, 23, 26, 27, 34, 37, 39, 40, 45, 55, 57	Tue 10/27
9	Ch. 9: 1, 5, 9, 13, 17, 19, 33, 40, 51, 58, 65, 71, 79	Sun 11/08
10	Ch. 10: 5, 9, 18, 22, 25, 35, 37, 41, 45, 47, 51, 54, 63	Sun 11/15
11	Ch. 11: 1, 3, 11, 14, 15, 25, 29, 33, 39, 43, 62, 66	Tue 11/17
12	Ch. 12: 5, 11, 13, 20, 22, 27, 37, 43, 47, 61, 85	Sun 12/06
13	Ch. 14: 11, 17, 29, 31, 39, 59, 71	Sun 12/13

Problems in WileyPLUS will be equivalent to the problems given in the textbook except for changes in values of quantities given in the problem. Note that some of the problems have solutions available in the Student Solutions Manual, available within 'Read, Study & Practice' in WileyPLUS (these problems in the textbook have SSM next to it) and other problems have interactive solutions at http://www.wiley.com/college/halliday (for problems in the textbook with ILW next to it).