

PHYS 2514 Syllabus

General Physics for Engineering and Science Majors

Purpose of the Course

This course covers the following concepts:

- Significant figures and scientific notation;
- Order of magnitude estimation and dimensional analysis;
- Work with velocity and acceleration;
- Vectors and scalars;
- Motion in one and two dimensions;
- Newton's Laws and Gravity;
- Conservation Laws;
- Rotation and static equilibrium;
- Fluids and how density and pressure affect them;
- Archimedes' principle
- Equation of continuity and Bernoulli's equation;
- Different types of oscillations;
- Harmonic motion;
- Waves, transverse and longitudinal waves;
- Wavelength and amplitude;
- Sound and the Doppler effect.

Course Description

To learn how physics affects the universe using mathematics and Newton's Laws and the Laws of Conservation, among other topics, to describe the motion of the things around us.

Course Objectives

Upon completion of this course, students will be able to do the following:

1. Solve problems pertaining to motion in one direction and in two directions.
2. Explain Newton's three laws and use them to solve problems.
3. Describe the laws of conservation of energy and momentum.
4. Describe and apply concepts related to rotational motion, angular momentum, and static equilibrium.
5. Define concepts associated with fluids, oscillations, wave motion, and sound.

Required Text and Materials

Douglas C. Giancoli, *Physics for Scientists and Engineers*, Vol. 1 (Chs 1-20) 4/E, Addison-Wesley, 2008.
ISBN-10: 0132273586, ISBN-13: 9780132273589

Douglas C. Giancoli, *Student Study Guide and Selected Student Solutions Manual for Scientists & Engineers with Modern Physics*, Vol. 1, 4/E Addison-Wesley, 2008 ISBN-10: 0132273241, ISBN-13: 9780132273244

Core Concepts in College Physics, Version 2.0 CD-ROM, Algebra/Trig-based, 2nd Edition, includes Workbook, Saunders, 2001. ISBN-10: 0030337011, ISBN-13: 9780030337017

You will also need a scientific calculator and access to a computer with high-speed internet access and a program that can open and read PDF files.

Lesson Assignments

You are required in each lesson to

- Read the lesson objectives,
- Read the assigned chapter in the textbook,
- Read and study the Study Notes,
- Answer the Chapter Questions,
- Solve the Chapter Problems, and
- Answer the Lesson Assignment Questions.

Viewing the modules and solving the problems on the CD will also be helpful.

Exams

Your grade will be based on five exams given. Each exam will be worth 20% of your grade. Because the subjects covered will build on what you have already learned, each exam will contain information from the previous exams. For instance, many problems involving dynamics (Chapters 4–6) also incorporate kinematics (Chapters 1–3). So Exam 2 will concentrate on dynamics but will necessarily involve kinematics as well. Each exam will concentrate on the material covered since the previous exam but will contain all material studied through that point in the class. You will have 2 hours to complete each exam.

I have included practice exams you can use to assess your readiness for each exam. You will find solutions for the practice exams under Appendix III. Don't be discouraged if you find the exams difficult. The average grade on a physics exam tends to be about 60 to 70%. You will be able to use one equation sheet for each exam. An equation sheet has been included in the Appendices on Canvas for your use. The equation sheet has all the equations listed that you will need throughout the semester so that you don't have to memorize equations. This equation sheet may also be used during exams. Your primary goal during the exams will be to apply the principles you have learned by reading the book, doing the homework, studying lesson questions, and working problems from the accompanying CD to solve new problems on the exam.

Course Evaluation and Grading Criteria

There are five (5) exams, and each exam is worth 100 points. The total number of points for this course is 500.

The following grading scale will be used in this course:

Grade	Points	Percentage
A	400–500	80–100%
B	300–399	60–79%
C	200–299	40–59%
D	100–199	20–39%
F	99 or fewer	19% or less

This syllabus is subject to change with notice.

Academic Integrity

As a student taking a course at the University of Oklahoma, you are expected to uphold the academic integrity code. Please visit the Academic Integrity website at <http://www.ou.edu/integrity> and familiarize yourself with the standards you will be held to while taking your course.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays without penalty.

Reasonable Accommodation Policy

Students requiring academic accommodation should contact the Accessibility and Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information, please see the Accessibility and Disability Resource Center website at <http://www.ou.edu/drc>. Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the instructor personally as soon as possible to discuss accommodations necessary to ensure full participation and facilitate educational opportunities.

Adjustments for Pregnancy-Related and Childbirth-Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please visit the Institutional Equity Office website at <http://www.ou.edu/eoo/faqs/pregnancy-faqs> for commonly asked questions.

Title IX Resources and Reporting Requirement

For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on call 24/7, counseling services, mutual no-contact orders, scheduling adjustments, and disciplinary sanctions against perpetrators. Please contact the Sexual Misconduct Office at 405-325-2215 (8 to 5, M–F) or OU Advocates at 405-615-0013 (24/7) to learn more or to report an incident. In addition, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. For more information, please visit the Institutional Equity Office website at <http://www.ou.edu/eoo/>.

Course Plan for PHYS 2514

Unit 1: Kinematics

Lesson 1: Introduction

1. Read the Lesson 1 Objectives.
2. Read Chapter 1.0–1.7, pages 1–13 in the textbook.
3. Read and study the Lesson 1 Study Notes.
4. Answer Chapter Question 4, page 14.
5. Complete Chapter Problems 10, 16, 21, 28, 36, and 45, pages 14–17.
6. View Module 1 on the *Core Concepts in Physics* CD.
7. Answer the Lesson Assignment questions.

Lesson 2: Motion in One Dimension

1. Read the Lesson 2 Objectives.
2. Read Chapter 2.0–2.9, pages 18–43 in the textbook.
3. Read and study the Lesson 2 Study Notes.
4. Answer Chapter Questions 4 and 10, page 43.
5. Complete Chapter Problems 16, 23, 41, 43, 63, 72, 89, and 90, pages 44–49.
6. View Modules 3.1–3.4 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 7, 8, 9, and 10 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 2 Questions.

Lesson 3: Motion in Two Dimensions

1. Read the Lesson 3 Objectives.
2. Read Chapter 3.0–3.9, pages 51–74 in the textbook.
3. Read and study the Lesson 3 Study Notes.
4. Answer Chapter Questions 8 and 10, page 75.
5. Complete Chapter Problems 9, 10, 21, 24, 33, 34, 48, 62, 70, 82, 85, and 88, pages 75–82.
6. View Modules 2.1–2.5, 2.7, 3.5, 3.7, and 3.8 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 2, 3, 4, 11, 12, and 14 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 3 Questions.
9. Complete the Unit 1 Practice Exam.
10. Schedule the Unit 1 Exam.
11. Take the Unit 1 Exam.

Unit 2: Dynamics

Lesson 4: Newton's Laws

1. Read the Lesson 4 Objectives.
2. Read Chapter 4.0–4.8, pages 83–102 in the textbook.
3. Read and study the Lesson 4 Study Notes.
4. Answer Chapter Questions 20 and 22, page 104.
5. Complete Chapter Problems 26, 29, 33, 35, 42, 49, 52, 54, 67, and 70, pages 104–111.
6. View Modules 4.1–4.6 on the *Core Concepts in Physics* CD.

7. Complete Workbook Problems 15–21 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 4 Questions.

Lesson 5: Newton's Laws, Continued

1. Read the Lesson 5 Objectives.
2. Read Chapter 5.0–5.6, pages 112–130 in the textbook.
3. Read and study the Lesson 5 Study Notes.
4. Answer Chapter Questions 1 and 6, page 130.
5. Complete Chapter Problems 14, 26, 30, 39, 42, 53, 54, 58, 88, and 91, pages 132–138.
6. View Modules 4.7 and 4.9 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 13 and 23 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 5 Questions.

Lesson 6: Gravity

1. Read the Lesson 6 Objectives.
2. Read Chapter 6.0–6.7, pages 139–155 in the textbook.
3. Read and study the Lesson 6 Study Notes.
4. Answer Chapter Questions 2 and 17, page 157.
5. Complete Chapter Problems 7, 9, 29, 44, 56, 58, and 60, pages 158–162.
6. Complete the Lesson 6 Questions.
7. Complete the Unit 2 Practice Exam.
8. Schedule the Unit 2 Exam.
9. Take the Unit 2 Exam.

Unit 3: Conservation Laws

Lesson 7: Work and Energy Introduced

1. Read the Lesson 7 Objectives.
2. Read Chapter 7.0–7.47, pages 163–176 in the textbook.
3. Read and study the Lesson 7 Study Notes.
4. Answer Chapter Questions 12 and 13, page 170.
5. Complete Chapter Problems 13, 18, 59, 73, 76, 79, and 82, pages 172–182.
6. View Modules 2.6, 5.1–5.5, and 5.7 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 5, 6, 25, 26, 27, 29, and 30 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 7 Questions.

Lesson 8: Conservation of Energy

1. Read the Lesson 8 Objectives.
2. Read Chapter 8.0–8.9, pages 183–205 in the textbook.
3. Read and study the Lesson 8 Study Notes.
4. Answer Chapter Questions 5, 9, 18, and 25, pages 205–206.
5. Complete Chapter Problems 15, 20, 36, 56, 85, 90, and 91, pages 207–217.
6. View Modules 5.6 and 5.8–5.10 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 28 and 31–33 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 8 Questions.

Lesson 9: Conservation of Momentum

1. Read the Lesson 9 Objectives.
2. Read Chapter 9.0–9.10, pages 214–238 in the textbook.
3. Read and study the Lesson 9 Study Notes.
4. Answer Chapter Questions 1, 3, and 28, pages 239–240.
5. Complete Chapter Problems 4, 5, 6, 53, 65, 66, 88, 89, 95, 100, 105, and 107, pages 240–247.
6. View Modules 6.1–6.9 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 34–40 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 9 Questions.
9. Complete the Unit 3 Practice Exam.
10. Schedule the Unit 3 Exam.
11. Take the Unit 3 Exam.

Unit 4: Rotation and Static Equilibrium

Lesson 10: Rotational Motion

1. Read the Lesson 10 Objectives.
2. Read Chapter 10.0–10.10, pages 248–274 in the textbook.
3. Read and study the Lesson 10 Study Notes.
4. Answer Chapter Questions 4 and 10, page 275.
5. Complete Chapter Problems 12, 19, 25, 30, 38, 41, 46, 59, 67, 75, and 93, pages 276–283.
6. View Modules 7.1–7.7 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 41–46 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 10 Questions.

Lesson 11: Angular Momentum

1. Read the Lesson 11 Objectives.
2. Read Chapter 11.0–11.6 and 11.8–11.9, pages 284–302 in the textbook.
3. Read and study the Lesson 11 Study Notes.
4. Answer Chapter Questions 6, 10, and 16, page 303.
5. Complete Chapter Problems 3, 10, 27, 47, 48, 49, and 65, pages 303–310.
6. View Modules 2.7, 4.8, and 7.8–7.10 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 24 and 47 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 11 Questions.

Lesson 12: Static Equilibrium

1. Read the Lesson 12 Objectives.
2. Read Chapter 12.0–12.5, pages 311–323 in the textbook.
3. Read and study the Lesson 12 Study Notes.
4. Answer Chapter Questions 2 and 15, pages 329–330.
5. Complete Chapter Problems 12, 13, 16, 20, 21, 28, 45, 47, 63, 80, and 87, pages 322–331.
6. Complete the Lesson 12 Questions.
7. Complete the Unit 4 Practice Exam.
8. Schedule the Unit 4 Exam.
9. Take the Unit 4 Exam.

Unit 5: Fluids, Oscillations, and Waves

Lesson 13: Fluids

1. Read the Lesson 13 Objectives.
2. Read Chapter 13.0–13.11 and 13.13, pages 339–360 in the textbook.
3. Read and study the Lesson 13 Study Notes.
4. Answer Chapter Questions 12, 17, and 24, page 362.
5. Complete Chapter Problems 16, 17, 18, 28, 35, 60, 87, 93, 95, 96, and 97, pages 363–368.
6. Complete the Lesson 13 Questions.

Lesson 14: Oscillations

1. Read the Lesson 14 Objectives.
2. Read Chapter 14.0–14.8, pages 369–387 in the textbook.
3. Read and study the Lesson 14 Study Notes.
4. Answer Chapter Question 11, page 388.
5. Complete Chapter Problems 15, 17, 24, 37, 41, 71, and 83, pages 388–394.
6. View Modules 8.1–8.3, 8.10–8.12, and 9.5 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 48, 54, and 55 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 14 Questions.

Lesson 15: Wave Motion

1. Read the Lesson 15 Objectives.
2. Read Chapter 15.0–15.11, pages 395–416 in the textbook.
3. Read and study the Lesson 15 Study Notes.
4. Answer Chapter Question 2, page 417.
5. Complete Chapter Problems 24, 49, 50, 52, 54, and 81, pages 412–415.
6. View Modules 8.4–8.9, 8.13–8.14, and 9.1–9.11 on the *Core Concepts in Physics* CD.
7. Complete Workbook Problems 49–53 and 57–61 on the *Core Concepts in Physics* CD.
8. Complete the Lesson 15 Questions.

Lesson 16: Sound

1. Read the Lesson 16 Objectives.
2. Read Chapter 16.0–16.8, pages 424–444 in the textbook.
3. Read and study the Lesson 16 Study Notes.
4. Answer Chapter Question 8, page 447.
5. Complete Chapter Problems 21, 39, 40, 59, 66, 89, 90, and 95, pages 448–453.
6. Complete the Lesson 16 Questions.
7. Complete the Unit 5 Practice Exam.
8. Schedule the Unit 5 Exam.
9. Take the Unit 5 Exam.