

PHYSICS 2424, §010
Physics for Life Science Majors
Spring 1999

INSTRUCTOR: Dr. Michael G. Strauss, Nielsen Hall 311, 325-3961 ext. 36311
Email: mgstrauss@ou.edu
Office Hours: Mon, Fri 2:00-3:30 p.m. or by appointment.

CLASS HOURS: M,W,F 12:30-1:20 p.m., Dale Hall Room 211

DISCUSSION: Section 011 - Tuesday, 8:30- 9:20 a.m., Nielsen 209
Section 012 - Tuesday, 9:30-10:20 a.m., Nielsen 209
Section 013 - Tuesday, 11:30-12:20 p.m., Nielsen 320
Section 014 - Tuesday, 12:30- 1:20 p.m., Nielsen 211
Section 015 - Tuesday, 9:30- 10:20 p.m., Gould Hall 101
Section 016 - Tuesday, 10:30-11:20 a.m., Dale Hall Tower 104

TEACHING ASST: John Walkup, Nielsen Hall, 325-3961
Office Hours: TBA

TEXTBOOK: *Physics, 4th Edition*, by Douglas Giancoli (Prentice Hall, 1995)
Optional: *Study Guide for Physics: Principles with Applications*, by Joseph H. Boyle

CLASS WEB PAGE: <http://www.nhn.ou.edu/~strauss/phys2424>

1. Course Description and Objectives

1.1 DESCRIPTION

Physics 2424 is the second semester of a two semester introductory physics course aimed primarily at the health science professions and life science majors. The course focuses on three major areas of physics: electricity and magnetism, light and optics, and "modern" physics including atomic, nuclear, and elementary particle physics.

1.2 OBJECTIVES

1.2.1 Understand the Basic Physics Principles Covered During the Semester

The goal of physics is to understand the physical universe. An understanding of the subjects covered in the class will help prepare those of you who must take pre-professional exams covering physics. Beyond that, an understanding of physical principles may help you perceive the world around you in a more comprehensible, enjoyable, and fascinating way.

1.2.2 Think Critically, Logically, and Analytically When Solving Problems

In order to solve a problem, you must critically examine the information available in a given situation, determine an effective method to approach the problem, and carry through to the solution, including a critical examination of the final answer to see if it is reasonable. These skills are not only essential to solving problems in physics, but to solving problems in general, and are applicable to many situations in many different environments.

1.3 PREREQUISITES

Physics 2414 and **Math 1523** are required prerequisites. Much of the material learned during the first semester will be used in this class. Math skills required include the use of basic algebra and trigonometry, solving simultaneous equations, polynomial functions, logarithmic and exponential functions, and introductory analytical geometry (e.g. vectors). A short discussion of some of these topics appears in the appendices to the text.

2. A Word About Physics

This is a physics class and, therefore, it has similarities to all other physics classes. Physics is a mathematical science and will require using mathematics as a tool for solving problems. For some students, the math serves as an obstacle to learning physics. I highly recommend that you become very comfortable with the mathematics described in the appendices in the text *before* progressing any farther into the semester.

Some students believe that if they can follow the lectures in class, then they have learned physics. This is not true. To learn physics, a student must do a significant amount of work outside of class thinking about, and interacting with, the course material. *No one ever learns physics by simply reading about it or listening to someone talk about it. You learn it by making the effort to understand the material and by solving problems using the principles learned.* The standard requirement in a college class is that you spend two hours outside class working on the material for every hour in class. Since this is a four hour class, **you will need to spend about eight hours per week outside of class** interacting with the material and solving problems. Few students will be able to succeed in this class without investing that amount of time.

Finally, physics is an objective science. Problems assigned in physics will usually have objective answers. Consequently, grading standards tend to remain high in physics and other science classes.

3. Course Philosophy

I want you to enjoy Physics 2424. The material we will be covering is fascinating and applicable. It's implications can be observed in almost everything you interact with every day. In order to make this class as interesting and useful as possible, I will need to get feedback from you. Please feel free to ask questions in class and to come by my office during office hours. During the semester, I will give you opportunities to write a summary of which concepts are difficult, and of which you find interesting.

As stated in Section 2, you can only learn physics by personally interacting with the material and solving problems. Consequently, I emphasize three methods of learning in this class:

1. Reading and thinking about the assigned material before it is discussed in class.
2. Solving problems using the physics concepts and principles.
3. Discussing the material and solving problems in class, including working with your classmates.

Thinking about problems and solving them on a regular basis will allow you to learn and appreciate the subject matter in a natural way, without having to cram everything at the last moment. Remember that this is a four hour class so you should spend about eight hours per week outside of class interacting with the material.

4. Course Structure and Assignments

The course will be divided into **8 units**, each about one to two weeks long. A few days before each unit begins, I will distribute a detailed description of the material and problems covered in that unit. A calendar listing the tentative due dates for course assignments is attached as the last page of this syllabus. The calendar may be revised at the discretion of the professor. The eight units are outlined below.

Unit	Chapters	Subject
1	16	Electric Charge and Electric Fields
2	17-18	Electric Energy, Capacitance, and Currents
3	19-20	DC Circuits and Magnetism
4	21-22	Electromagnetic Induction, AC Circuits, and EM Waves
5	23	Geometric Optics
6	24-25	Wave Nature of Light and Optical Instruments
7	27, 28, 30	Quantum Mechanics and Nuclear Physics
8	31, 32, 26	Nuclear and Particle Physics, and Relativity

Each unit will consist of the following graded assignments:

1. Reading Questions (one per chapter)
2. Group Problems

3. Homework Problems
4. Unit Quiz or Midterm Exam or Final Exam

4.1 READING QUESTIONS

It is important that you read the material covered in class **before** we discuss the material. Therefore, you will be asked to read every chapter before we discuss it in class and answer **Reading Questions** about the chapter. These Reading Questions will consist of short answers to a number of questions about each chapter. Class lectures will be used to clarify and elaborate on concepts which were difficult to understand during your own study. Questions must be answered using the form on the WWW which is accessible from the class home page at <http://www.nhn.ou.edu/~strauss/phys2424>. See Section 5 on grading for details on how these assignments will be graded.

4.2 GROUP WORK

Early in the course you will be divided into groups in each of your discussion sections based on information you provide me with in a questionnaire. Occasionally, groups may be rearranged during the semester. The groups will allow you to work together with your peers to understand the material. Group activities will include discussion of homework, as well as working on other problems designed to help you understand the material. *At the end of the semester each class member will evaluate his or her group members. This "peer evaluation" will form a part of your final grade.* All activities in the group are cooperative, not competitive. A good group member is not necessarily one who knows the answers. A good group member is one who comes prepared and regularly participates in the group discussion, who enters into the spirit of trying to help his or her fellow group members answer questions, work problems, and better understand the material.

4.3 HOMEWORK

One homework assignment will be given for each unit. The homework will consist of about 20-25 problems assigned mostly from the text. **Homework will be due by 5:00 p.m. on the date specified.** It may be turned in to your discussion group leader, or deposited in the box outside of my office. Here are some suggestions for how to get the most out of the homework:

Read the problems as soon as you get them. You don't have to spend any time working on them; just think about them as you read and study the material.

Don't procrastinate. You will have at least a week to work on the problems. Don't wait until the last minute to do them. In particular, you will have an opportunity in your discussion section to discuss the problems with your peers. This time will be of greater value if you have already attempted to work the problems. Many students find that it is very helpful to attempt the problems even before the material is discussed in the class lecture.

- ◊ *Ask Questions.* If you are having problems with the homework, seek help. You may discuss the problems with your classmates, with me during office hours, or with the discussion section instructor.

Although you may discuss the homework with your classmates, all work handed in must be your own. Copying another person's work is plagiarism, and will be considered cheating. I encourage you to talk with others in order for you to get a general understanding of the problem. However, each person must work out a detailed solution of the problem individually. Doing the homework is the best way to prepare for the quizzes and exams, since test questions will be similar to problems assigned for homework.

4.4 QUIZZES and EXAMS

There will be an exam or a quiz at the end of every unit. The quizzes will be held at the end of the discussion section on Tuesday and will cover material from one unit. The midterm exams will be held during the regular class time and will cover material from two units. The final will be comprehensive, covering material from the entire semester. The best preparation for these tests is a thorough understanding of the material and an understanding of the problems done for homework.

5. Grading

Your grades will be based on all of the assignments discussed in section 4. Most of the Reading Questions