PHYSICS 4C: PHYSICS FOR SCIENTISTS AND ENGINEERS

COURSE AND INSTRUCTOR INFORMATION:

Semester: Spring 2023 (51078)
Title: Physics for Scientists and Engineers
Units: 4.00 CEUs
Hours: 3 lecture, 3 lab hours
Time: Lecture Tuesday 2:00 PM – 4:50 PM, Lab Thursday 2:00 PM – 4:50 PM
Location: PHY 70
Instructor: Kylee Ford
Email: kylee.ford@reedleycollege.edu (Please give me 24 – 48 hours to reply)
Office Hours: TBD

COURSE DESCRIPTION:

The topics covered in this course include: electromagnetic waves, optics, modern physics, condensed matter and nuclear physics.

PREREQUISITES:

Physics 4B. Advisories: Math 17 and English 1A or 1AH.

STUDENT LEARNING OUTCOMES:

- ✓ Develop mathematical skills through the process of applying mathematics to the physical world.
- ✓ Improve fundamental laboratory techniques.
- ✓ Advance in basic problem solving techniques as they apply to theoretical concepts.
- ✓ Investigate important properties of matter.
- ✓ Observe the interaction between theory and experiment in scientific investigation.
- ✓ Acquire problem solving skills as they are applied to oscillatory motion.

CSLOs:

PHYS-4C SLO1: Solve problems that are applied to the theory of basic concepts of atomic and nuclear interactions.
PHYS-4C SLO2: Solve problems that are applied to the theory of basic concepts of condensed matter physics.
PHYS-4C SLO3: Solve problems that are applied to the theory of basic concepts of relativity and quantum theory.
PHYS-4C SLO4: Solve problems that are applied to the theory of Maxwell's Equations of electromagnetism.

REQUIRED COURSE MATERIALS:

Textbook Option 1: Physics for Scientists and Engineers, 4th Edition (Giancoli, Douglas C)
Textbook Option 2: OpenStax University Physics Volume II available here: https://openstax.org/details/books/university-physics-volume-2 and OpenStax University Physics Volume III available here: https://openstax.org/books/university-physics-volume-3/pages/1-introduction

OTHER MATERIALS:

- iPad or Tablet: Lots of students these days are using iPads and tablets, which are great because your work can be written digitally and uploaded immediately instead of having to take pictures or scan your work, expensive though.
- Traditional pencil and paper: You definitely need to write out your notes and your work (I also recommend making a notebook of your homework solutions) so if you don't have access to a tablet, pencil and paper are great! I personally use blank white paper, but graph paper, engineering paper, or lined paper are just fine.
- Scientific Calculator: A calculator is a nice tool to have and to be comfortable with. But there are other programs you can use when doing your homework such as:
    - Wolfram Alpha
    - Math is Fun
    - You can't use these other programs on the exam though, so practice using a calculator!

ATTENDANCE:

I will be taking attendance in class during lecture and lab. **Lab attendance is mandatory.** You will not be allowed to make up labs without reasonable notification and credible supporting documentation of legitimate reasons (doctor's note, obituary, etc.). A missed lab can greatly affect your grade. ***Three missed labs = failing the course.***

PARTICIPATION/PROBLEM SOLVING:

Participation is based on your participation during class. I will be keeping track of this, as we will be having many problem solving sessions during lecture. Problem solving sessions will consist of you doing your work in-person during lecture, instead of homework at home.

HOMEWORK:

Homework should be done by the **provided due date set on Canvas**. Homework will consist of posted videos on Canvas and answering questions about them. More details to come. No late homework will be accepted.

LABORATORY REPORTS:

Lab is mandatory and will be done in class. Each lab is due **at the end of the class period**, unless otherwise stated. Complete all lab assignments neatly in **pencil** so that you can cleanly erase any mistakes. Show all your work, where relevant. Further instruction for each lab will be given in the modules and in class.

EXAMS:

There will be three exams and one cumulative final. They will be based on lecture, problem solving sessions, homework, and labs. More detailed information on exams will be provided as the exams get close.

COURSE POLICIES:

Communication:

If you ever need to reach me, consider one of the following options to do so. Please give me 24 – 48 hours to respond and I will respond as soon as I am able. When messaging me, please identify yourself with your full name and the course which you are enrolled (ex. "Kylee Ford, PHYS 4A").

- Message me using the "Inbox" tab on Canvas.
- Email me directly.
- Office Hours are virtual (through Zoom) and will be determined through a poll.

Attendance and Drop Policy:

- Module 0 (Introduction to the course) must be done by the due date to keep enrollment in the course. If you do not complete this module by the due date, you will be dropped you from the course.
- Attendance will be taken through the participation. Remember, **attendance is mandatory**, so if you do not participate in class and quizzes, it is as if you did not attend class.
- You must do all lab activities assigned. Attendance in lab is mandatory. Remember, **three missed labs = failing the course**.

Late Work Policy:

- Late work will only be accepted unless the student has a compelling reason AND has reached out to the instructor beforehand. Late work may be accepted with a documented and compelling reason.
- A 2-day late period will be accepted for Homework assignments, but at a reduced 10% per day it is late.
- There will be no late exams.
- Missing the final exam may result in a failing grade for the course.

STUDENT SUCCESS:

- Technology Support: https://www.reedleycollege.edu/campus-life/technology-help.html
- Tutoring Services: https://www.reedleycollege.edu/academics/tutoring-services/index.html
- COVID-19 information is uploaded to the Reedley College site: https://www.reedleycollege.edu/covid-19/index.html
- DSPS contact information:
  - Hours: Monday – Friday 8:00 am – 5:00 pm
  - Phone: 559-638-0332
  - See more DSPS information here: https://www.reedleycollege.edu/student-services/disabled-student-programs-and-services/index.html

GRADING:

Weighted Grades:

Object	Weighted Grades
Participation/Problem Solving	20%
Homework	5%
Laboratory	20%
Exams	30% (10% each exam)
Final Exam	25%
Total	100%

Grading Scale:

Grade	Percentage
A	90.0 – 100.0%
B	80.0 – 89.99%
C	70.0 – 79.99%
D	60.0 – 69.99%
F	<60.0%

Week	Dates	Giancoli	OpenStax	Lecture - Tuesdays in PHY 70	Lab - Thursdays in PHY 70
Week 1	1/9 – 1/15	Ch. 27	Ch. 11	Introduction, Magnetic Forces and Fields	Review
Week 2	1/16 – 1/22	Ch. 28	Ch. 12	Sources of Magnetism; ***Martin Luther King, Jr. Day (1/16) No Classes Held***	Lab 1 - Capacitors Simulation
Week 3	1/23 – 1/29	Ch. 28, 31	Ch. 12, 16	Sources of Magnetism (cont.); Electromagnetic Waves	Lab 2 - Magnetism Simulation
Week 4	1/30 – 2/5	Ch. 31	Ch. 16	Electromagnetic Waves (cont.)	Study for Exam 1
Week 5	2/6 – 2/12	Ch. 32	Ch. 1	The Nature of Light	**Exam #1 (Ch. 11 – 16, OpenStax Vol. II)**
Week 6	2/13 – 2/19	Ch. 33	Ch. 2	Geometric Optics and Image Formation; ***Lincoln Day (2/17) No Classes Held***	Lab 3 - Ray Optics
Week 7	2/20 – 2/26	Ch. 34	Ch. 3	Interference; ***Washington Day (2/20) No Classes Held***	Lab 4 - Geometric Optics
Week 8	2/27 – 3/5	Ch. 34	Ch. 4	Diffraction	Study for Exam 2
Week 9	3/6 – 3/12			Study for Exam 2	**Exam #2 (Ch. 1 – 4, OpenStax Vol. III)**
Week 10	3/13 – 3/19	Ch. 36	Ch. 5	Relativity	Lab 5 - Relativity Documentary and Questions
Week 11	3/20 – 3/26	Ch. 37	Ch. 6	Photons and Matter Waves	Assign & Begin Working on Project
Week 12	3/27 – 4/2	Ch. 38	Ch. 7	Quantum Mechanics	Work on Project
Week 13	4/3 – 4/9			***SPRING BREAK (4/3 – 4/7)***	**NO CLASS**
Week 14	4/10 – 4/16	Ch. 39	Ch. 8	Atomic Structure	Work on Project
Week 15	4/17 – 4/23	Ch. 41	Ch. 10	Nuclear Physics	Present
Week 16	4/24 – 4/30	Ch. 43-44	Ch. 11	Particle Physics and Cosmology	Study for Exam 3
Week 17	5/1 – 5/7			Study for Exam 3	**Exam #3 (Ch. 5 – 10, OpenStax Vol. III)**
Week 18	5/8 – 5/14			Final Exam Review	Study Session
Week 19	5/15 – 5/19			Finals Week	**Final Exam (Cumulative)**