PHYS 308: Modern Physics

Zoom/BC, Tue and Thu 3:00 - 4:15 pm

Course Description

This course provides an introductory survey of key developments in the 20th century physics that shaped the modern era. Topics include special theory of relativity, historic development and principles of quantum mechanics, the basis of atomic and molecular physics, lasers, electrical, thermal and magnetic properties of solids.

Prerequisite: Phys 260

Textbook

- *Modern Physics* (4th edition), Kenneth S. Krane (Wiley). This text is required, meaning that you will be assumed to have access to this text to complete reading and homework assignments.

Other books and resources

- *Modern Physics* (2nd edition), Randy Harris (Pearson/Addison-Wesley)
- *Modern physics for scientists and engineers* (2nd edition), J. Taylor, C. Zafiratos and M. A. Dubson (Prentice-Hall).
- *The Physics Hypertextbook.* This is a basic online reference book for all basic physics, including several topics in modern physics.

Instructor: Nirmal Ghimire
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Office: Krasnow Institute, Rm 104
Lectures: Tuesday and Thursday 3:00 – 4:15 pm. The lectures will be on Zoom (primarily) and blackboard collaborate (back up)

Office Hours

Tuesday and Thursday 4:15 - 5:15 pm or by appointment, virtual via Zoom or blackboard collaborate

Grading

Class participation 10%, homework 25%, midterm exams 20% each, final 25%

Class participation

- Class participation is based on active participation e.g., asking questions and taking part in the class discussion. A random class participation work will be assigned during the lecture. Students are responsible to note the work and submit it in blackboard within the specified deadline to earn the credit.

Homework

- Assigned roughly once a week. The homework sets will include the deadline (one week typically). Homework should be scanned into Blackboard by the due date. Each homework can have different grade points. These grade points will be averaged over all the assigned homework, making 25% of the final total grade. The lowest homework grade will be dropped.
- A proper derivation and/or proper steps are required to earn the full credit. A correct answer without proper derivations and/or steps counts as nil. Only a subset of the problems will be graded that will not be disclosed in advance. You must turn in work for all problems.
- Late homework policy: Homework turned in after the due day will pay a penalty at 50% of the original grade. Homework late by more than one day will earn no credit. Late homework can be allowed only if you have a valid cause, such as illness or family emergency, AND if you contact the instructor in advance (an email will do indicating your reason and the date when the homework will be expected).
- Working in study groups of 2-3 persons is allowed and encouraged. Any tool for collective work can be utilized. I also encourage students to exchange their personal information in the first class in order to facilitate working together. This said, simply copying someone else's solution is not acceptable and will be considered an Honor Code violation.

Exams

- Three exams: Two midterms and a final. A proper derivation and/or proper steps are required to earn the full credit. A correct answer without proper derivations and/or steps counts as nil.
- It is the responsibility of each student to attend class during scheduled examinations as listed in the syllabus regardless of work of family considerations. Make-up exams will be given only to students with a VALID medical excuse and they should contact the instructor as soon as they return to school.

Website

Blackboard. Homework, reading assignment, lecture notes, and homework solutions will be posted here. Students should upload their homework and exams to the Blackboard.

Course Content

We will follow the text quite closely. A detailed tentative schedule will be posted in blackboard.

- Some deficiencies of classical physics (Chapter 1)
- The special theory of relativity (Chapter 2)
- The particle-like properties of electromagnetic radiation (Chapter 3)
- The wave-like properties of particles (Chapter 4)
- The Schrödinger equation (Chapter 5)
- The Rutherford-Bohr model of the atom (Chapter 6)
- The hydrogen atom in wave mechanics (Chapter 7)
- Many-electron atoms (Chapter 8)

- Solid-state physics (Chapter 11)

Important Dates:
Feb 12: last day to drop classes with 100% tuition refund
Feb 16: last day to drop classes with 50% tuition refund
Feb 17–Mar 11: unrestricted withdrawal period
Mar 02–Apr 1: selective withdrawal period (100% tuition liability)
Apr 30: Last day of classes

Accommodations for Disabilities
If you are a student with a disability and you need academic accommodations, please see me and contact the Office for Disability Services (ODS) at 993-2474, http://ods.gmu.edu. All academic accommodations must be arranged through the ODS.

GMU Diversity Statement
GMU does not tolerate racism, sexism, and bigotry, and encourages diversity. The full GMU diversity statement can be read here: http://ctfe.gmu.edu/professional- development/mason-diversity-statement/

Academic Integrity
GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely.

Privacy
Students must use their MasonLive email account to receive important University information, including communications related to this class. I am not allowed to respond to messages sent from or send messages to a non-Mason email address.

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking
As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.