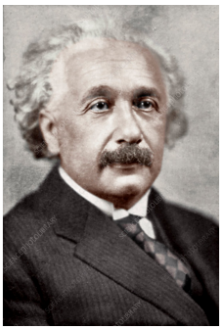
PHYS 221: Introduction to Modern Physics

January 18, 2021



Syllabus and Summary Information:

Content: **Sophmore-level Modern Physics:**

Special Relativity, Quantum Physics, and Applications as follows:

The Kinetic Theory of Gases, Waves and Particles,
The Atomic Theory of Matter, Special Theory of Relativity,
The Michelson-Morley Experiment, Einstein's Postulates,
The Lorentz Transformation, Time Dilation and Length Contraction
Twin Paradox, Spacetime, Equivalence of Mass and Energy,
Discovery of the X-Ray and the Electron,
Blackbody Radiation, Photoelectric Effect,
Structure of the Atom, Rutherford Scattering,
The Correspondence Principle,
Wave Properties of Matter, Wave Motion, Uncertainty Principle,
Probability, Wave Functions, and the Copenhagen Interpretation;
Particle in a Box, The Schrödinger Wave Equation,
Simple Harmonic Oscillator, Barriers and Tunneling, Alpha-Particle Decay,
Solution of the Schrödinger Equation for Hydrogen,
Quantum Numbers, Magnetic Effects on Atomic Spectra,
Intrinsic Spin, Selection Rules,
Statistical Physics, Maxwell Velocity Distribution,
Fermi-Dirac Statistics, Bose-Einstein Statistics,
Quantum Entanglement, Teleportation, and Information,
Superconductivity, Band Theory of Solids, Semiconductor Devices,
Nuclear Physics, Radioactive Nuclides, Fission, Fusion,
Pareticle Physics, Symmetries, Quarks, Leptons,
Neutrino Oscillations, Matter-Antimatter,
Cosmology, The Big Bang, The Age of the Universe

Syllabus and Summary Information Continued:

Prerequisites: PHYS 122 (calculus-based E&M) or equivalent

Modality: Lectures: In-person (all lectures will be video recorded).
Exams: In-person. Homework submitted via Canvas.

Schedule: **Lectures:** MWF 3:20 to 4:10 PM in Rockefeller 301.
All lectures will be video recorded for asynchronous access.

Recitations: Thursdays; 10AM and 1PM

Primary Instructor: Carlos A. Cardona, Rockefeller 222A (2nd floor)
Phone: 216-4579565 (mobile), E-mail: `cac316@case.edu`

Office Hours: MWF 4.30PM to 5.30PM , or reach me by email, or popup at my office

Secondary Instructor: Corbin Covault, Rockefeller 207 (2nd floor)
Phone: 216-368-4006 (office) or 216-339-3861 (mobile), E-mail: `cec8@case.edu`

Recitation Instructor: Pip Peterson E-mail: `sxp1171@case.edu`
Office Hours: To-be-determined.

Recommended Text: *Modern Physics* by Randy Harris, 2nd Ed.
(or any functional equivalent textbook)

Homework: Worth **20%** of your grade, assigned weekly,
usually due Fridays, 11.59 PM submitted and graded via ***Canvas***.

Written Homework solutions by instructor, will be posted online.
The lowest homework score ***will be dropped***.

Grade Breakdown:

Homework	20% (lowest HW score dropped)
1st hour exam (Mon Feb 20)	15%
2nd hour exam (Mon Mar 27)	25%
Final exam (Tue May 9)	40%

PHYS 221: Anticipated Typical Weekly Workload:

At CWRU the "rule of thumb" is that a three credit hour course should correspond to a total average weekly time commitment of about 9 to 12 hours per week. Here's how this breaks down for Physics 221:

Hours per Week	Weekly PHYS 221 Activities:
3	In-class lecture hours
1	Recitation
2	Readings and study
3	Homework
(3)	Optional: additional practice, study, office hours,
9 to 12	**Total Average Hours per week workload**

Disability Policy: In accordance with federal law, if you have a documented disability, you may be eligible to request accommodations from Disability Resources. In order to be considered for accommodations, you must first register with the Disability Resources office. Please contact their office to register at 216.368.5230 or go to https://case.edu/studentlife/disability/getting-started to get more information on how to begin the process.

Academic Integrity Policy: Students at Case Western Reserve University are expected to uphold the highest ethical standards of academic conduct. Academic integrity addresses all forms of academic dishonesty, including cheating, plagiarism, misrepresentation, obstruction, and submitting without permission work to one course that was completed for another course. Please review the complete academic integrity policy at https://bulletin.case.edu/undergraduatestudies/ academicintegrity/. Any violation of the policy will be reported to the Dean of Undergraduate Studies and the Office of Student Conduct & Community Standards.