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PHYS 341.01: Fundamentals of Modern Physics

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FUNDAMENTALS OF MODERN PHYSICS

- LECTURES: MWF 1:10-2:00, tentatively in Journalism 307
- INSTRUCTOR: Dr. Carla Riedel
Office: SC 122 / 243-5179 / riedel@selway.umd.edu
Office hours: M 11:10, T 8:10, W 3:10, R 2:10, F 10:10,
and by appointment
- DESCRIPTION: Includes historical background for development of modern physics, and an introduction to special relativity, quantum mechanics, atomic physics, and subatomic physics.
- PREREQUISITES: One year of general physics (preferably Phys 221/222);
One year of differential and integral calculus (Math 152/153).
- TEXT: *Modern Physics*, 3rd ed., Tipler & Llewellyn (Freeman 1999).
Your introductory physics textbook is undoubtedly a gold mine.
- ONLINE: Class website: <http://www.physics.umd.edu/phys341>
Textbook website: <http://www.whfreeman.com/modphysics>
- HOMEWORK: Plan to spend 6–10 hours on homework each week.
Homework will be assigned one to three times a week.
Working with others on homework is strongly encouraged,
but the work you turn in must be your own.
Due at beginning of class on due date.
20% per day late-homework fee.
- EXAMS: Closed book. Calculator required.
Three in-class midterms (one 3"×5" note card allowed).
One two-hour, comprehensive final (one 8.5"×11" sheet allowed).
Help sessions will be scheduled outside class prior to each exam.
Make-up exams allowed only in extreme situations, and
only when arranged in advance.
- GRADING: Midterms 40%
Homework 35%
Final Exam 25%
All grading will be based on correctness, completeness, and clarity.

TENTATIVE SCHEDULE

Week	Section	Topic
9/5	1-1	Introduction, The Experimental Basis of Relativity
9/7	1-2	Einstein's Postulates
9/10	1-3	The Lorentz Transformation
9/12	1-4	Time Dilation and Length Contraction
9/14	1-4	
9/17	2-1	Relativistic Momentum
9/19	2-2	Relativistic Energy
9/21	2-3	Mass/Energy Conversion and Binding Energy
9/24	2-4	Invariant Mass
9/26	13-1	Particles and Antiparticles
9/28	13-2	Fundamental Interactions and the Classification of Particles
10/1	13-3	Conservation Laws and Symmetries
10/3	13-4	The Standard Model
10/5		Review
10/8		Exam 1
10/10	3-1	Quantization of Electric Charge
10/12	3-2	Blackbody Radiation
10/15	3-3	The Photoelectric Effect
10/17	3-4	X Rays and the Compton Effect
10/19	4-1,2	Atomic Spectra and Rutherford's Nuclear Model
10/22	4-3	The Bohr Model of the Hydrogen Atom
10/24	4-4,5,6	Confirmation and Critique of Bohr
10/26	5-1,2,3	de Broglie Waves
10/29	5-4,5	Probabilities and Uncertainties
10/31	5-6,7	Consequences of Probabilistic Interpretations
11/2		Review
11/5		Exam 2
11/7	6-1	The Schrödinger Equation in One Dimension
11/9	6-2	The Infinite Square Well
11/14	6-3	The Finite Square Well
11/16	6-4	Expectation Values and Operators
11/19	6-5	The Simple Harmonic Oscillator
11/26	7-1	The Schrödinger Equation in Three Dimensions
11/28	7-2	Quantization in the Hydrogen Atom
11/30	7-3	The Hydrogen Atom Wave Functions
12/3		Review
12/5		Exam 3
12/7	7-4	Electron Spin
12/10	7-5	Total Angular Momentum and the Spin-Orbit Effect
12/12	7-6	Ground States of Atoms: The Periodic Table
12/14		Review
12/18		FINAL 1:10–3:10

Subject coverage may vary, but exam dates are firm.

Reminder: September 24 is No Penalty Drop Deadline.