

Introduction to Modern Physics

PHY330: Syllabus

The Syllabus shows reading from the main textbook (HRW) and the additional source (t&z). The required reading is from HRW. All of the numbered problems are assigned from HRW. t&z provides extra reading for those of you who want to study the material a bit deeper. Some of the text problems are considered in t&z. All Homework assignments (HW) are due on the days indicated (due times are TBA). Please, note that the timetable/topics are subject to change and lecturer can go slightly faster or slower.

Lecture Date	Study Guide	SUBJECT	Textbook, Section	HW due dates	Quizzes
Aug. 27	1	Course Introduction: Logistics, Rules of the Game, Classical Relativity : Speed of Light, c , Galilean Transformations, <i>Michelson Interferometer</i> Binomial Approximation, Student Assessment Quiz	hrw: 37.1-2 (t&z: 1.1-5)		
Aug. 29	1	Special Relativity, It's Consequences: Postulates of Relativity, Relativity of Space and Time, Time Dilation, Length Contraction, γ, β <i>Michelson Interferometer</i>	hrw: 37.2-6 (t&z: 1.6-10)		Quiz 1 (due Sep 4)
Sep. 5	1 2	Problem Solving Session (DSS): Study Guide 1 <i>Lorentz Transformations</i>	hrw: 37.7-8 (t&z: 1.11)	HW #1	
Sep. 10	2	<i>Lorentz Transformations</i> Relativistic Velocity Addition, <i>Doppler Effect</i>	hrw: 37.8-10 (t&z: 1.11-14)		Quiz 2
Sep. 12	2 3	DSS: Study Guide 2 Relativistic Momentum, $\mathbf{p}=\gamma\mathbf{mu}$ and Energy, $E=\gamma mc^2$	hrw: 37.11-12 (t&z: 2.1-4)	HW #2	
Sep. 17	3	Relativistic Mechanics: Relativistic p and E , Two Useful Relations, Conservation of Mass-Energy Massless particles, Force in Relativity	hrw: 37.11-12 (t&z: 2.4-9) lecture notes		Quiz 3
Sep. 19	3 4	DSS: Study Guide 3 <i>Black-body radiation</i>	hrw: 38.1-2 (t&z: 4.1-2)	HW #3	Quiz 4 (due Sep 21)
Sep. 24	1,2,3	DSS: Review for Exam 1		HW #4	
					EXAM 1
Sep. 26	4	Quantization of Light: Quantum of Light, <i>Black-body radiation</i> ; <i>Photoelectric Effect</i> Particle-Wave Duality	hrw: 38.1-3 (t&z: 4.1-3,7)		
Oct. 1	4	Bragg Diffraction, X-rays, <i>Compton Effect</i> , DSS: Study Guide 4	hrw: 38.4-5 (t&z: 4.4-7)	HW #5	

Oct. 3	5	Quantization of Atomic Energy: Atomic Spectra, <i>The Bohr Model</i> , Hydrogen Atom Hydrogen-like Ions	hrw: 39.8/40.10 (t&z: 5.1-9) lecture	Quiz 5
Oct. 8		Columbus Day (NO CLASSES)		
Oct. 10	5 6	DSS: Study Guide 5 Matter Waves: <i>de Broglie relations</i> , Wave Function Two-Slit Experiment	hrw: 38.6-7 (t&z: 6.1-4)	HW #6
Oct. 15	6	<i>Heisenberg Uncertainty Principle</i> , Tunneling Stationary States, Standing Waves	hrw: 38.8-9 (t&z: 6.5-9)	Quiz 6 (due Oct 16)
Oct. 17	7	DSS: Study Guide 6 Schrodinger's Equation (1D): The Equation An Electron in 1D Rigid Box and in a Finite Well	hrw: 39.1-5 (t&z:7.1-6)	HW #7
Oct. 22	7	Quantum Dots, Corrals, and Electron Traps Schrodinger's Equation for Hydrogen Atom	hrw: 39.5-7,9 (t&z:8.1-3,7,8)	Quiz 7
Oct. 24	7	A Free Particle, Simple Harmonic Oscillator DSS: Study Guide 7	(t&z:7.7,9)	HW #8
Oct. 29	4,5,6,7	Review for Exam 2 EXAM 2 (cumulative)		HW #9
Oct. 31	8	Atoms, Angular Momentum and Electron Spin: Properties of Atom, Electron Spin, Magnetic Moments The Stern-Gerlach Experiment, H-atom	hrw: 40.1-5 (t&z:9.2-3,8.6)	
Nov. 5	8	Zeeman Effects, Magnetic Resonance, MRI DSS: Study Guide 8 (part 1)	hrw: 40.5-6 (t&z: 9.4-6,8)	HW #10
Nov. 7	8	Multielectron Atoms: Independent Particle Approximation, Pauli exclusion principle, Periodic Table	hrw: 40.7-9 (t&z:10.2-4,6-8)	Quiz 8 (due Nov 9)
Nov. 12		Veterans Day (NO CLASSES)		
Nov. 14	8	DSS: Study Guide 8 (part 2) Emission & Absorption of Radiation: Stimulated and Spontaneous Emission, LASERs, Applications of Lasers	hrw: 40.11-12 (t&z:11.2,3,9,10)	HW #11 Quiz 9
Nov. 19	9	Nuclear Physics: Rutherford's model of Nucleus, Properties of Nuclides, Radioactivity	hrw: 42.1-4 (t&z:16.2,17.2)	
Nov. 21	9	Exponential Decay Law, Radioactive Dating Alpha Decay, Beta Decay, Radiation Dosage DSS: Study Guide 9	hrw: 42.5-8 (t&z:17.3,4,10)	HW #12 Quiz 10

Nov. 26 7,8,9 **DSS: Review for Exam 3** **EXAM 3 (cumulative)** **Quiz 11***
(due)

Nov. 28 9 Nuclear Fission, Nuclear Reactor hrw: 43.1-8 **HW #13**
Thermonuclear Fusion (t&z: 17.6-9)

Dec. 3 **Fundamental particles:** Fermions, Bosons, Leptons, hrw: 44.1-9 **Quiz 12**
Particle-Antiparticle annihilation, Particle Decay,
Conservation Laws, The Quark Model, Basic Forces

Dec. 5 **DSS: Fundamental Particles** **HW #14**
Cosmology: Big Bang, Universe Expansion, Dark hrw: 44.10-14
Matter and Dark Energy

Dec. 7 **Review for the Final (tentatively: 4pm-5:50pm in SI 147)**

Dec. 10 **FINAL EXAM (CUMULATIVE) 4:00-6:00 pm**

Dec. 12 Individual Lab Projects are Due **Summary HW**

***NOTE:** Quiz 11 is a take-home quiz. You are asked to: a) attend one of the Society of Physics Students (SPS) Colloquia (not counting the pizza party), b) find relevance of Modern Physics to the talk, c) describe the talk's content in the form of the three short paragraphs that relate the talk to specific ideas of Modern Physics learned in class.

The Due Date for the Quiz #12 will be announced later!

For the schedule of SPS meetings check <http://www.csuohio.edu/physics/spsseminar.htm>