

PRE-CLASS READINGS FOR 2020FA

Week	Class: date	Sections of Pedrotti ³ for pre-class reading	Contents of the assigned readings
0	Fri Sep 11	Course syllabus	Introduction to course, and to WeBWorK: (hopefully) an effective in-class learning tool
1	Weds Sep 16	1.1 – 1.4	1. Light: An Introduction. Some History; Particles and Photons; The Electromagnetic Spectrum; Radiometry
	Fri Sep 18	2.1 – 2.4	2. A Ray Perspective Huygens' Principle; Fermat's Principle; Principle of Reversibility; Reflection From Plane Mirrors
2	Weds Sep 23	2.5; 4.1 – 4.5	Refraction Through Plane Surfaces; 3. A Wave Perspective. One-Dimensional Wave Equation; Harmonic Waves; Harmonic Waves as Complex Functions; Plane Waves
	Fri Sep 25	4.6 – 4.7; 5.1 – 5.3	Spherical Waves; Other Harmonic Waveforms 4. Superposition of Waves
3	Weds Sep 30	5.4 – 5.6; 7.1	Standing Waves; The Beat Phenomenon; Phase and Group Velocities; Two-Beam Interference
	Fri Oct 2	7.2 – 7.3; 7.8	5. Interference as a concept; Young's Double-Slit Experiment; Double-Slit Interference with Virtual Sources; Stokes Relations
4	Weds Oct 7	7.4; 8.1 – 8.3	Interference from Dielectric Films; The Michelson Interferometer; Applications of the Michelson Interferometer
	Fri Oct 9	8.10	Gravitational Wave Detectors
5	Weds Oct 14	7.9; 8.4	6. Interference including multiple reflections; Multiple-Beam Interference in a Parallel Plate; The Fabry-Perot Interferometer
	Fri Oct 16	8.5 – 8.8	Fabry-Perot Transmission; Scanning Fabry-Perot Interferometer; Variable-Input-Frequency F-P Interferometers; Lasers and the F-P Cavity
6	Weds Oct 21	9.1 – 9.4	7. Coherence: Fourier Analysis; Fourier Analysis of a Finite Harmonic Wave Train; Temporal Coherence and Line Width; Partial Coherence
	Fri Oct 23	9.5 – 9.6	Spatial Coherence; Spatial Coherence Width
-	Oct 26–30	Reading Week	Reading Week
7	Weds Nov 4	Midterm Exam	Midterm Exam
	Fri Nov 6	–	Review of midterm
8	Weds Nov 11	6.4 – 6.8	8. Laser Operation; Einstein's Theory; Essential Elements of a Laser; Simplified Description of Operation; Characteristics of Laser Light & Types
	Fri Nov 13	26.1	Rate Equations
9	Weds Nov 18	26.2 – 26.3	Absorption; Gain Media
	Fri Nov 20	26.4	Steady-State Laser Output
10	Weds Nov 25	26.5 – 26.8	Homogeneous Broadening; Inhomogeneous Broadening; Pulsed Operation
	Fri Nov 27	26.9 – 26.10	Some Important Laser Systems; Diode Lasers
11	Weds Dec 2	Presentations: Miscellany of Applications	9. Miscellany of Applications - Fiber Optics; Ray Tracing Software (3Dwin, Optical Design etc.); CMOS Image Sensors; Solar energy/ photovoltaics; Laser-induced fusion; Lasers in medicine; Metamaterials and photonic crystals
	Fri Dec 4		
12	Weds Dec 9	Review	Review