

COURSE NUMBER: Ve334		COURSE TITLE: Principles of Optics	
CREDIT: 4		PREREQUISITES: Vp240 or Vp260	
TEXTBOOKS/REQUIRED MATERIAL: Hecht, E.: Optics, 4th ed		PREPARED BY: Jigang Wu DATE OF PREPARATION: Oct. 8, 2012 DATE OF UC APPROVAL: Oct. 30, 2013	
INSTRUCTOR(S): Jigang Wu		SCIENCE/DESIGN: n/a	
CATALOG DESCRIPTION: Basic principles of optics: light sources and propagation of light; geometrical optics, lenses and imaging; ray tracing and lens aberrations; interference of light waves, coherent and incoherent light beams; Fresnel and Fraunhofer diffraction. Overview of modern optics with laboratory demonstrations.		COURSE TOPICS: 1. The nature of light 2. Image formation, aperture and stops, lens system, ray tracing 3. Aberrations, example optical systems 4. Wave motion, EM theory, photons, and light 5. The propagation of light 6. Superposition of waves 7. Coherence 8. Polarization 9. Birefringence 10. Propagation of light in crystal 11. Interference: general considerations 12. Interference: interferometer systems and applications 13. Diffraction: Huygen's principle, Fraunhofer and Fresnel diffraction, zone plates 14. Diffraction: diffraction gratings, holography 15. Introduction to Fourier optics 16. Introduction to laser 17. Selected topics on modern optics	
COURSE STRUCTURE/SCHEDULE: Lecture: two times per week			
COURSE OBJECTIVES [Course Outcomes in brackets]	<ol style="list-style-type: none"> To provide students with overviews of basic and modern (ultrafast and fiber-optics) optics; To teach students the basics of geometrical optics, microscopes, telescopes, magnifiers, ray tracing; To teach students basics of Fresnel & Fraunhofer diffraction & how to compute diffraction patterns; To teach students the basics of interferometers (Michelson, Mach-Zehnder and Fabry-Perot). 		
COURSE OUTCOMES [Program Outcomes in brackets]	<p>After completing Ve334, students should be able to:</p> <ol style="list-style-type: none"> Ability to use ray tracing to compute the location and magnification of an image; [a] Ability to compute simple diffraction patterns (fringe profile and localization; periodicity); [a] Ability to measure spectra using diffraction gratings, and interference for other measurements; [a] Ability to measure polarization using polarizers; to determine coherence of a light beam; [a] 		
ASSESSMENT TOOLS [Course Outcomes in brackets]	<p>Weekly homework 50%. Midterm exam 20% Final exam 30%.</p>		