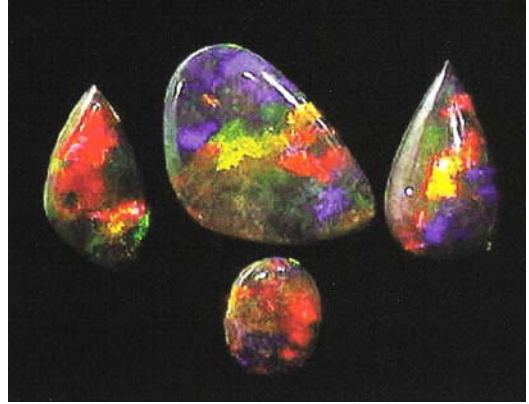




# Physics 3232: Optics I

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Office hours: after class; call my cell phone anytime!  
Download the lectures: [www.physics.gatech.edu/frog](http://www.physics.gatech.edu/frog)  
Or: <http://public.me.com/ricktrebino>  
Required texts: Eugene Hecht, *Optics*, 4<sup>th</sup> ed.  
J.F. James, *A Student's Guide to Fourier Transforms*

<u>Topic</u>	<u>Reading</u>
1. Why Optics is cool; a short history of Optics	Hecht 1.1 - 1.5
2. Waves: the wave equation; phase velocity	Hecht 2.1 - 2.8
3. Maxwell's equations; the wave equation and plane waves	Hecht 3.1 - 3.3, Appendix 1
4. The electromagnetic spectrum	Hecht 3.3 - 3.6
5. Lasers	Hecht 13.1
6. Absorption and the refractive index	Hecht 3.5
7. Superposition: standing waves; beats; and group velocity	Hecht 7.1 - 7.2
8. Fresnel's equations of reflection and refraction	Hecht 4.6 - 4.7
9. Polarization I; polarized light; birefringence; polarizers	Hecht 8.1 - 8.6
10. Polarization II: wave plates; unpolarized light; optical activity	Hecht 8.7 - 8.11
11. Optical activity; Jones vectors and matrices	Hecht 8.13
12. Geometrical optics: ray matrices and ray tracing	notes
13. Fourier series and the Fourier transform	James, Hecht 7.3 - 7.4
14. Fourier transform examples, theorems, and concepts	James, Hecht 11.1 - 11.2, 11.3.4
15. Instantaneous frequency and chirp	James, notes
16. Convolution and correlation	James, Hecht 11.3.1, 11.3.2, 11.3.4
17. Coherence and interference: the Michelson interferometer	Hecht 9.1 - 9.3, 12.1 - 12.3
18. Interferometers and anti-reflection coatings	Hecht 9.4 - 9.8
19. Light scattering; reflection; refraction; coherence; light bulbs	Hecht 4.1 - 4.4.1
20. Diffraction and the Fourier transform	Hecht 10.1, 11.3.3
21. Diffraction gratings and lenses as Fourier transformers	Hecht 10.2, 10.4
Other topics (if we have time):	
23. Nonlinear optics and holography	Hecht 13.3, 13.4
24. Ultrafast optics	notes
25. Ultrafast Optics Research Lab tour	notes

For additional details, see Lecture 0, Details