

## Syllabus, Fall 2016

### OSE 5115: Interference, Diffraction and Coherence

**Catalog description:** Interference of light, optical interferometry, Fraunhofer and Fresnel scalar diffraction, diffraction gratings, temporal coherence, spatial coherence, and partial coherence.

#### Recommended reading:

1. B. E. A. Saleh and M. C. Teich, *Fundamentals of Photonics*
2. J. W. Goodman, *Introduction to Fourier Optics*
3. M. Born and E. Wolf, *Principles of Optics*
4. A. Papoulis, *Systems and Transforms with Applications in Optics*
5. G. O. Reynolds, J. B. Develis, G. B. Parrent, B. Thompson, *The New Physical Optics Notebook: Tutorials in Fourier Optics*
6. J. W. Goodman, *Statistical Optics*
7. J. D. Gaskill, *Linear Systems, Fourier Transforms, and Optics*
8. E. Hecht, *Optics*
9. F. L. Pedrotti, S. J.; L. M. Pedrotti, and L. S. Pedrotti, *Introduction to Optics*
10. A.N. Matveev, *Optics*
11. M.V. Klein and T. E. Furtak, *Optics*

#### Syllabus:

- 1a. Review of the Fourier transform
- 1b. Review of electromagnetic, wave propagation, and the plane-wave angular spectrum
- 2a. Scalar diffraction theory
- 2b. Rayleigh-Sommerfeld diffraction
- 2c. Fresnel and Fraunhofer diffraction
- 2d. Diffraction limited optical imaging
- 2e. Diffraction gratings
- 3a. Interference and optical path difference (Double slit interference)
- 3b. Two-Beam Interference (Mach-Zehnder interferometer, Michelson interferometer, Sagnac interferometer)
- 3c. Multiple-beam interference
- 4a. Introduction to coherence theory
- 4b. Spatial and temporal coherence
- 4c. Effect of coherence on optical imaging