

OSE 5115: Interference, Diffraction and Coherence
Spring 2018

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

Class Time: Mondays and Wednesdays, 1:30 PM – 2:45 PM

Room: CREOL 102

Instructor: Dr. Xiaoming Yu

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Office Hour: Fridays, 3 PM – 4:15 PM (CREOL 273)

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

Grading Policy:

Homework: 25%

Exam 1: 20%

Exam 2: 20%

Final Exam: 35%

A: 91-100	A-: 86-90	
B+: 81-85	B: 76-80	B-: 71-75
C+: 66-70	C: 61-65	C-: 56-60
D+: 51-55	D: 46-50	D-: 41-45
F: ≤ 40		

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. S. Pedrotti, and L. M. Pedrotti, Introduction to Optics
10. A. N. Matveev, Optics
11. M.V. Klein and T. E. Furtak, Optics