

OEPE 526 – Nanophotonics

Semester: Fall 2010
Lecture Hours: Tu, Th B3 – 12:30 – 13:45
Room: SCI 126

Instructor:	Alper Kiraz	TA:	M. Yavuz Yüce
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Off. Hr:	We, B1 9:30 – 10:45 or by appointment	Prob. Sess.:	To be announced

Course Description: Propagation and focusing of optical fields; spatial resolution and position accuracy; techniques used for nanoscale optical microscopy; light emission and optical interactions in nanoscale environments; quantum emitters; quantum photonics; dipole emission near planar interfaces; optical resonators; surface plasmons; forces in confined fields; fluctuation-induced interactions.

Textbook: *Principles of Nano-Optics*, Lukas Novotny and Bert Hecht, 2006, Cambridge University Press, ISBN: 978-0521832243

Supplementary Textbooks:

Advanced Optical Imaging Theory, M. Gu, Springer-Verlag (2000)

Introduction To Fourier Optics, Joseph W. Goodman, McGraw-Hill (1996)

Nanophotonics, Paras N. Prasad, Wiley-Interscience (2004)

Single-Molecule Techniques: A Laboratory Manual, Paul R. Selvin and Taekjip Ha, Cold Spring Harbor Laboratory Press (2007)

The Quantum Theory of Light, Rodney Loudon, Oxford University Press (2000)

Fluorescence Correlation Spectroscopy, R. Rigler and A.S. Elson, Springer (2001)

Grading: 1st Midterm 30 %
Final 30 %
Laboratory 30 %
Homework 10 %
Final 30% (to be announced)

Lecture Schedule:

Week	Subject
1	27 Sep. Review of diffraction theory (Ch. 2, Gu)
2	4 Oct. Diffraction by a lens (Ch. 3, Gu)
3	11 Oct. Focusing of optical fields by high NA microscope objectives (Ch 3, Novotny & Hecht)
4	18 Oct. Spatial resolution and position accuracy (Ch 4, Novotny & Hecht)
5	25 Oct. Dipole emission near planar interfaces (Ch 10, Novotny & Hecht)
6	1 Nov. Confocal microscopy
7	8 Nov. Techniques used for nanoscale optical microscopy (Chs 5, 6, 7 Novotny & Hecht, Selvin & Ha)
8	22 Nov. Light emission and optical interactions in nanoscale environments, (Ch 8, Novotny & Hecht)
9	29 Nov. Light emission and optical interactions in nanoscale environments, (Ch 8, Novotny & Hecht)
10	6 Dec. Quantum emitters, quantum photonics (Ch 9, Novotny & Hecht, Loudon)
11	13 Dec. Quantum emitters, quantum photonics (Ch 9, Novotny & Hecht, Loudon)
12	20 Dec. Fluorescence correlation spectroscopy (R. Rigler and A.S. Elson)
13	27 Dec. Fluorescence correlation spectroscopy (R. Rigler and A.S. Elson)
14	3 Jan. Surface plasmons, (Ch 12, Novotny & Hecht) / forces in confined fields, (Ch 13, Novotny & Hecht)