Biomedical Imaging EE M217 Winter 2016

Time and Location: Tuesdays and Thursdays 4PM – 5:50PM; BH 5252

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Instructor Office Hours and Location: Fridays 5-7PM; ***14-128B Engr. IV Building. Please email in advance.***

Grading: 5 HWs 29%, 1 Final Report 35%, 1 Final Presentation 35%, Web Survey 1%

Homework Due Time and Location: Thursday Class Time (as changes are made, you will get announcements)

Topics:
General introduction to optical imaging modalities in bio-medicine
Introduction to spatial Fourier Transform theory and sampling theorem
Introduction to imaging and microcopy
Coherent and incoherent imaging systems
Near-field imaging vs. far-field imaging – evanescent waves (NSOM, super-oscillations)
Non-imaging diagnostic applications of evanescent waves
Structured illumination microscopy
Stimulated emission depletion microscopy
Fluorescent super-resolution imaging modalities (STORM, PALM)
Super-lens, plasmonic imaging
Digital holographic microscopy
Lensfree on-chip imaging (OFM, LUCAS)
High-throughput imaging, Scanning optical microscopy, mirror-tunnel imaging
Phase microscopy

SCHEDULE OF TOPICS

Week #	Topic
1 (1/5)	Introduction to EE M217
(1/7)	Introduction to Optical Imaging and Microscopy in Bio-medicine Fourier Theory of Imaging
2 (1/12) (1/14)	Coherent vs. Incoherent Imaging Systems
3 (1/19)	Fluorescent super-resolution imaging systems: PALM, STORM, STED, Structured Illumination Microscopy
(1/21)	Sensing applications of evanescent waves, SPR, photonic crystals Super-lens, plasmonic imaging
4 (1/26)	High-throughput imaging, Scanning Optical Microscopy (micro-array scanners etc.), Mirror-tunnel Microscopy, LUCAS
(1/28)	Lensfree on-chip imaging (Holographic Digital Microscopy, Opto-fluidic microscopy, LUCAS), Phase microscopy
5 (2/2)	Mobile microscopy and sensing modalities
(2/4)	Overview of Technical Presentation and Writing Skills
6 (2/9)	*CNSI Microscopy Facility Field Visit*
(2/11)	Final Class Presentations and their Evaluation & Discussion in class
7 (2/16) (2/18)	Final Class Presentations and their Evaluation & Discussion in class
8 (2/23) (2/25)	Final Class Presentations and their Evaluation & Discussion in class
9 (3/1) (3/3)	Final Class Presentations and their Evaluation & Discussion in class
10 (3/8) * (3/10)	Final Class Presentations and their Evaluation & Discussion in class