

**EE 4328-006/ EE 5389-001**  
**Optical Biosensors: Instrumentation and Techniques**  
(Tentative syllabus subject to change, Fall 2014)

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**Class Meetings:** Tu/Th 3:30-4:50 pm, WH 210  
**Office Hours:** 4:50 – 5:50 pm Thursdays or by appointment, NH 532  
**Credits:** 3

**Course Description and Objectives**

This course will provide students with an overview of modern biological and chemical sensing for in-vivo or in-vitro disease diagnosis and molecular analysis based on photonics and nanotechnology. Considerations in bio/chemical sensor design will be described; applications and limitations of each sensing technology will be discussed.

Through lectures, recent literature review papers, classroom discussion, and a course project, students will be familiar with the research frontiers in the bio/chemical sensing field, obtain a detailed understanding of underlying sensing principles, the cutting-edge optical sensing techniques, and the related instrumentation. The course will prepare students to apply acquired knowledge in their own research projects in the bio/chemical sensor development as well as in their future academic/industrial career.

**Textbooks:** No textbook is required but relevant references on each topic will be specified.

**Grading:** Homework 30%, Final exam 20%, and Course Project 50% (course project proposal 25% and project presentation 25%).

**Course Project:** A list of topics and related reading materials will be provided. Each student chooses one topic of his/her interest. Each student is required to write a report and do an in-class presentation.

**Tentative Topics:**

1. Overview of biosensors
2. Optics review
3. Optical sensing/detection techniques and instrumentation
4. Photonic structures in sensing
  - a. Optical label-free detection
  - b. Optical fluorescence detection
  - c. Surface enhanced Raman spectroscopy
5. Microfluidics and optofluidics
6. Overview of nanotechnology in bio/chemical sensing
7. Gas sensing
8. Optical manipulation and sorting