

EE 4328-006/ EE 5389-002
Optical Biosensors: Instrumentation and Techniques
(Tentative syllabus subject to change, Fall 2013)

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Class Meetings: Tu/Th 3:30-4:50 pm, WH 308

Office Hours: 4:50 – 5:50 pm Thursdays or by appointment

Credits: 3

Pre-requisites: For senior standing undergraduates or graduate students.

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%, Exam I (midterm) 10%, Exam II (final) 10%, 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 (30 min plus 10 min Q&A).

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

	Date	Topic	Note
Week 1	8/22	Course overview; Biosensor Intro	
Week 2	8/27	Introduction on optics	
	8/29	Cont'd	
Week 3	9/3	Cont'd	HW1 posted
	9/5	Label-free Biosensing	
Week 4	9/10	Cont'd	HW1 due
	9/12	Cont'd	
Week 5	9/17	Cont'd	HW2 posted
	9/19	Fluorescence-based Biosensing	
Week 6	9/24	Cont'd	HW2 due
	9/26	Cont'd	
Week 7	10/1	Cont'd	
	10/3	Cont'd	Exam I in class
Week 8	10/8	SERS	Course project topics posted; HW3 posted
	10/10	Cont'd	
Week 9	10/15	Cont'd	HW3 due
	10/17	Bio-Nanotechnologies	
Week 10	10/22	Cont'd	HW4 posted
	10/24	Microfluidics	
Week 11	10/29	Cont'd	HW4 due
	10/31	Cont'd	
Week 12	11/5	Chemical vapor sensing	
	11/7	Cont'd	
Week 13	11/12	Optical manipulation and sorting	Exam II in class
	11/14	TBA	
Week 14	11/19	Project presentation	
	11/21	Project presentation	
Week 15	11/26	Project presentation	
	11/28	Thanksgiving	
Week 16	12/3	Project presentation	Proposal due in class

Grading Scale: A ($\geq 89\%$); B ($\geq 79\%$ to $< 89\%$); C ($\geq 60\%$ to $< 79\%$); F ($< 60\%$).

Class Attendance and Drop Policy: Attendance is required. Students are responsible for all materials covered in class. Drop policy: As per University guidelines. See the Registrar's Bulletin or the University Calendar in the front part of the UTA catalog for drop dates.

Academic Dishonesty

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, and the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or

the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)

Americans With Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 -- The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.