

Introduction to Bio-Sensing Technology

SEMESTER: available on demand

CLASS TIME/LOCATION: available on demand

INSTRUCTOR: Yu-Lin Song, Ph.D.

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PREREQUISITES: Undergraduate course in Circuit Theory and the Electronics

REQUIRED TEXT BOOK: Textbook of Chemical Sensors and Biosensors:

Fundamentals and Applications, Florinel-Gabriel Banica, ISBN: 978-0-470-71066-1, John Wiley & Sons, Inc., 2012.

GOALS:

This course developed to present a basic understanding of bio-sensor principles and applications. The research and development in the bio-sensors is an extremely dynamic area of current science and technology. This course is divided into two main categories—(1) theoretical understanding of various physical and chemical phenomena behind the operation of different types of sensors and micro-systems, (2) designing of sensors with appropriate electronic interface as a complete system. To enable students to understand the biomedical sensing technologies currently used in the biological medicine, and have basic concepts for these theoretical foundations. To teach students to understand how to get these sensing data via the introduction of this course, and have complete and correct concepts for these technologies. To teach many kinds of medical sensing technologies for arousing students learning interest in biomedical detection technology.

GRADING:	Project report	30%
	Midterm exams	30%
	Final exam	30%
	(exams will be in class, and closed book and closed notes)	
	Class Participation	10%

OFFICE HOURS: available on demand

TOPICS & SCHEDULES:

Week	Topic	Type
1.	GENERAL BIOMEDICAL OPTICS THEORY	Lecture
2.	Review of Optical Principles: Fundamental	Lecture
3.	Electromagnetic Theory and Description of Light	Lecture
4.	Review of Optical Interaction Properties	Lecture
5.	Review of Optical Interaction Properties	Lecture
6.	Light-Tissue Interaction Variables	Lecture
7.	Light-Tissue Interaction Theory	Lecture
8.	Numerical and Deterministic Methods in Light-Tissue Interaction Theory	Lecture
9.	Midterm	
10.	Light-Tissue Interaction Mechanisms and Applications: Photophysical	Lecture
11.	Light-Tissue Interaction Mechanisms and Applications: Photochemical	Lecture
12.	Light-Tissue Interaction Mechanisms and Applications: Photobiological	Lecture
13.	Therapeutic Applications of Light: Photobiological	Lecture
14.	Therapeutic Applications of Light: Photobiological	Lecture
15.	Diagnostic Methods Using Light: Photophysical	Lecture
16.	Diagnostic Methods Using Light: Photochemical	Lecture
17.	Diagnostic Methods Using Light: Photochemical	Lecture
18.	Final Exam	

CLASSROOM POLICIES:

Waiting for Instructor

If the instructor for the class does not show up within 15 minutes of the scheduled beginning of class, students are free to leave and the class should be considered to be canceled for that class period.

Attendance Policy

Students are expected to attend every class. Students are expected to notify the instructor of any planned absence from class. In the event that a student misses a class period, he/she is responsible for obtaining the information that was covered in class from one of the other students in class. Handouts that are missed due to classroom absence may be obtained from the instructor.