

COURSE SYLLABUS

MAR 567

Chemical Sensors in Oceanography (2 credits)

Stony Brook University

School of Marine and Atmospheric Sciences

Instructor: Dr. Qingzhi Zhu

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Office hours: TBA

Class time and location: TBA

COURSE DESCRIPTION

This course will introduce the basics of chemical/biochemical sensor principles and their applications in marine and environmental sciences. The study of chemical species in the ocean, especially at the seafloor, is a challenge because most of their distribution patterns vary both spatially and temporally. The traditional manual sampling methods for marine sediments can significantly disturb the physical, chemical and biological characteristics during sampling and the following transport, processing and analysis. In-situ observations and measurements using chemical/biochemical sensors provide an increased understanding for conceptualizing and modeling heterogeneous biogeochemical reactions in marine sediment. There has been a rapid development of new chemical/biochemical sensor systems in recent years. This course will cover the topics of chemical/biochemical sensors for dissolved oxygen, carbon system, nitrogen system, sulfur system, and trace metals.

COURSE OBJECTIVE

The objective of this course is to provide the students with a solid foundation of chemical/biochemical sensors and their applications in marine sciences.

Upon completion of this course the student will be able to:

1. Understand the principle and design of each kind of modern chemical sensors and their applications in environmental and marine sciences.
2. Understand the basic operation of chemical and biochemical sensors.
3. Develop abilities to choose suitable sensors for particular problems and correlate the sensor responses with biogeochemical processes.

TEXTBOOK AND REFERENCE BOOK (not required)

1. Principles of Chemical and Biological Sensors, D. Diamond Editor, John Wiley & Sons, 2000.
2. Chemical Sensors in Oceanography, Mark Varney Editor, Gordon and Breach Science Publishers, 2000.

HOMEWORK

Homework will be assigned and collected throughout the course.

COURSE SCHEDULE

Introduction to principles of chemical sensors and their use

Electrochemical sensors

Dissolved oxygen sensors

Optical sensors

pH sensors

pCO₂ sensors

Nitrogen sensors, nitrate

Nitrogen sensors, ammonia

Trace metal sensors

Biochemical sensors

Student Topic Presentations

CLASS PROTOCOL

No cell phones are allowed, but computers and tablets are allowed.

COURSE REQUIREMENT

1. Attendance

Attendance at lectures is strongly advised for those seeking a satisfactory grade in the course. Class participation and discussion is strongly encouraged.

2. Project papers

Each student will select a sensor topic of his/her choice that is most closely related to his/her own research (with instructor approval), review at least 10 primary scientific papers related to the sensor and its application, and then prepare a short review manuscript on the topic. The review paper should be at least 10 pages long with text of 12 point, Times New Roman font, double space. The review paper should be prepared and written in a professional format including title, authors, abstract, introduction, experimental section, results, discussion, conclusions, acknowledgement and references. Figures and Tables can be imbedded in the text.

3. Student Lecture

Each student is required to give one short lecture (30~ 40 min) to the class covering topics from the regular course material or from a special topic acceptable to the instructor. All topics and outlines will be discussed with the instructor prior to presentation. It is anticipated that students will select lecture topics that fit well with their existing research or is of particular interest for future study.

GRADING POLICY

No examinations will be given in this course. Students will attain grades based on the following criteria:

Class Participation 10%

Homework 10%

Project paper 50%

Oral Presentation 30%

Total 100%

A (95% score or better), A- (90%-95%), B+ (85%-90%), B(80%-85%), B- (75%-80%), C (below 75%)

DISABILITY SUPPORT SERVICES (DSS) STATEMENT (must be the following language)

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

[In addition, this statement on emergency evacuation is often included, but not required: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>]

ACADEMIC INTEGRITY STATEMENT (must be the following language as approved by the undergrad council):

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

CRITICAL INCIDENT MANAGEMENT (must be the following language as approved by the undergrad council):

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

