

SIO202B: Fundamentals of Wave Physics: Ocean Optics Part

INSTRUCTOR:

Dariusz Stramski

Office: UCSD/SIO, Spiess Hall Rm 456

Office phone (858) 534 3353

Email: dstramski@ucsd.edu

Office hours: Immediately after each course meeting for 1 hour and by appointment

PREREQUISITES:

Students admitted to the SIO graduate program or permission of instructor

COURSE DESCRIPTION:

Units: 4 (combined with SIO202B: Seismic Part); Grade: Letter grade only; Required a passing score on midterm and final exams and participation in lectures.

This course is an introduction to physics of light as it pertains to the study of propagation of light within the ocean, interactions of light with seawater constituents, and applications of optical methods in oceanography. Course meetings will consist of lectures by instructor (see Lec on Schedule).

COURSE GOALS:

- (1) To gain basic understanding of light and mechanisms by which light interacts with matter
- (2) To become acquainted with concepts and methods in the areas of radiative transfer theory, radiometry, and characterization of inherent and apparent optical properties as applicable to the study of ocean optics
- (3) To appreciate the links and interactions between underwater light and various constituents of seawater and processes within the ocean
- (4) To identify topics at the frontier of ocean optics and optical applications in oceanography.

READING:

Recommended textbooks:

C. Mobley "Light and Water. Radiative Transfer in Natural Waters" Academic Press, 1994. A comprehensive text on radiative transfer in aquatic environments. Includes excellent chapters (Part I) that can serve as standard reference work on basic ocean optics. Required reading: Chapters 1 and 3.

J.T.O. Kirk "Light and Photosynthesis in Aquatic Ecosystems", Cambridge Univ. Press, 1994. The first part of the book is a very good introductory text on ocean optics. Recommended reading: Part I.

N.G. Jerlov "Marine Optics", Elsevier, 1976.
Classic text in ocean optics.

Example textbooks covering basic topics of electromagnetic theory and light:
Hecht, E., Physics, Brooks/Cole Publishing Co, 1994.
Hecht, E., Optics, Addison-Wesley, 1998.

GRADING:

Midterm exam: 40%
Final exam: 60%

ASSIGNMENTS:

Students will receive take-home problem sets for midterm and final exams. Students must work on these exams alone and must return the problem sets with solutions by the deadline.

SCHEDULE:

Course meetings will include lectures by instructor (Lec) and will take place twice a week of 1 hr 20 min duration each during a 5-week period of the quarter. Days will be determined in consultation with students at the beginning of the quarter.

Week	Type of Activity	Topic
1	Lec	Basic physics of light: The nature of light and its properties
2	Lec	Interaction of light and matter (absorption and scattering)
3	Lec	Radiometry and light fields within and leaving the ocean
4	Lec	Inherent and apparent optical properties of the ocean
5	Lec	Radiative transfer equation
