جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Optical Oceanography - MarS 332

Division	Biological and Environmental Sciences & Engineering Division
Course Number	MarS 332
Course Title	Optical Oceanography
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	08:00 AM - 04:00 PM | Sun Mon Tue Wed Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Burton Harold Jones	burt.jones@kaust.edu.sa	+966128082512		To be determined

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	The purpose of the course is to provide the students with a fundamental and practical understanding of the processes that affect the propagation of light in the ocean and how optical properties can be used to characterize biogeochemical properties and processes within the ocean environment. The course will address in situ measurements of both inherent and apparent optical properties (IOPs and AOPs, respectively) and how these relate properties of particulate and dissolved components in seawater. It will also include an overview of the relationship between in situ properties and ocean color remote sensing. The course will include both lectures and student led discussions of recent papers dealing with theory and application of ocean optics, biogeochemistry and remote sensing.
Course Description from Program Guide	This course in ocean optics is intended to be a practical introduction to the theory and use of ocean optics. Ocean optics spans the areas of radiative transfer within seawater, the role of particles and dissolved organic matter in modifying the inherent optical properties, and the use of remotely sensed ocean color to measure biogeochemical properties and processes within the ocean. The course will include theory of inherent and apparent optical properties, the use of modeling tools to propagate light within seawater, and the practical use of in situ instrumentation to make measurements of inherent and apparent optical properties within the ocean.
Goals and Objectives	1. Provide a fundamental understanding of light transfer in water and how is affected by water and the constituents (particulate, dissolved, biological, abiotic) in water. 2. Understand the relationship between in situ optical properties and in situ biogeochemical and mineral constituents so that optical measurements can be used to study various biogeochemical or hydro-geological processes that might otherwise be difficult to study. 3. Understand the relationship between in situ optical properties and remotely (satellites and aircraft) sensed ocean color and how remote sensing is used to study biogeochemical processes in the ocean.
Required Knowledge	A background in either physical sciences or biological sciences that provides an understanding of basic light theory, or of the interaction of organisms with light (e.g. photosynthesis and photoadaptation, phototaxis, etc.) is useful.
Reference Texts	Reference Text: Kirk, J.T.O., 1994. *Light and Photosynthesis in Aquatic Ecosystems, Second Edition*. Cambridge University Press. Mobley, C., 1994. Light and Water. Academic Press. Selected journal publications that are relevant to the course.

Method of evaluation	**50.00**% - Active participation **50.00**% - Oral presentation
Nature of the assignments	Student assignments include review and discussion of relevant papers. The students will be presented with some example data sets to demonstrate methods of data analysis and interpretation.
Course Policies	Students are expected to attend at least 16 of the 20 sessons. If absences are known in advance (e.g. fieldwork or professional meetings) please discuss with the instructor in advance.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 02/19/2017 Mon 02/20/2017 Tue 02/21/2017 Wed 02/22/2017 Thu 02/23/2017	Introduction In the water optics – overview: 1) Introduction to AOPs and IOPs, 2) In the water light transfer / propagation Inherent Optical Properties Apparent Optical Properties Relationship to in situ particulate properties - 1) Phytoplankton and photosynthesis, 2) Non-algal particles, 3) Bacteria & viruses, 4) Inorganic particles
2	Sun 02/26/2017 Mon 02/27/2017 Tue 02/28/2017 Wed 03/01/2017 Thu 03/02/2017	In situ properties - Dissolved components How do we measure in situ optical properties – instrumentation Remote sensing 1 – Characteristics of water leaving radiance and relationship to subsurface field Using satellite remote sensing data Large scale applications of remote sensing and optics - Global productivity estimates, Assumptions, models, results
3	Sun 03/05/2017 Mon 03/06/2017 Tue 03/07/2017 Wed 03/08/2017 Thu 03/09/2017	Validation of remote sensing data – how do we know it is true or accurate? What does it tell us or not tell us? Student led discussion
4	Sun 03/12/2017 Mon 03/13/2017 Tue 03/14/2017 Wed 03/15/2017 Thu 03/16/2017	Student led discussion
5		NA
6		NA
7		NA
8		NA
9		NA
10		NA
11		NA
12		NA
13		NA
14		NA
15		NA
16		NA
17		NA
18		NA

Note

The instructor reserves the right to make changes to this syllabus as necessary.