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

Course Syllabus: Oceanography - MarS 335

Division	Biological and Environmental Sciences & Engineering Division
Course Number	MarS 335
Course Title	Oceanography
Academic Semester	Fall
Academic Year	2018/2019
Semester Start Date	08/26/2018
Semester End Date	12/11/2018
Class Schedule (Days & Time)	01:00 PM - 04:00 PM | Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Burton Harold Jones	burt.jones@kaust.edu.sa	+966128082512		Afternoons after 2 pm.

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	**Course Goals**: The fluid environment of the marine domain sets the background within which the biological and chemical processes within the marine system function. This course will provide a fundamental understanding of the physical structure and processes within the ocean with an emphasis on the relevance of those processes to biological and chemical systems. The course will cover major ocean processes and include discussions of regional seas, especially the Red Sea. Instrumentation, sensor measurement, field measurements, and ocean observation will be addressed in the latter part of the course.
Course Description from Program Guide	This course is an introduction to oceanography that focuses on the interaction between organisms and their physical environment. The course incudes discussions of ocean basins, major currents and water property distributions; properties of seawater: equation of state, temperature and salinity analysis; basic dynamical ideas: hydrostatic balance, Coriolis force, geostrophy, turbulence; forcing of the ocean: solar radiation, winds, heat and freshwater fluxes; Ekman transport; the observed ocean: major currents, gyres, meridional overturning, eddies, sill flows, upwelling, monsoons, equatorial motions, El Nio, marginal seas; time dependence: inertial oscillations, long gravity waves, Rossby waves; tides: astronomical forcing, basin modes, local resonances, tidal mixing. The course includes a practical portion focusing on oceanographic measurements and will include a small field effort. Analysis and reporting of the results from this effort is a requirement of the course.
Goals and Objectives	Specific goals: 1. A fundamental understanding of physical processes and their scales of influence – how not to be intimidated by the math 2. A grasp of the processes as they relate to important biological processes and their variability in time and space
Required Knowledge	Students should have a basic knowledge from undergraduate biology, chemistry and physics. Basic background in math and statistics are useful for understanding concepts that will be discussed.

Reference Texts	**TEXT** Mann, K. H., and J. R. N. Lazier (2006), *Dynamics of Marine Ecosystems*, 512 pp., Wiley-Blackwell. Talley, L. D., G. L. Pickard, W. J. Emery, and J. H. Swift (2011), *Desriptive Physical Oceanography: An Introduction*, 6th ed., 560 pp., Academic Press, London, UK. **REFERENCE TEXTS** Brown, J., A. Colling, D. Park, J. Phillips, D. Rothery, and J. Wright (1997), *Waves, Tides and Shallow-Water Processes*, 187 pp., Butterworth Heinemann, Linacre House, Jordan Hill, Oxford, OX2 8DP, England. Glover, D. M., W. J. Jenkins, and S. C. Doney (2011), *Modeling Methods for Marine Science*, Cambridge University Press, Cambridge, UK. **Literature** The class will incorporate recent scientific literature to illustrate examples of processes that are discussed.
Method of evaluation	**33.33**% - Research Project **33.33**% - Homework /Assignments **33.33**% - Exam 1
Nature of the assignments	There will be some homework related to topics presented in class. Students will be asked to present a recent scientific paper that relates to oceanographic "current events" and pertains to material that will be taught in the class. During the last month of the class all of the students will work on a project of their choosing. Preferably, this will be a project that is relevant to their expected dissertation research. Ideally, the student can build on material that has been taught in the class using various resources that include online databases for satellite, atmospheric and oceanographic data. They can also utilize data sets that have been obtained through KAUST and are now open data sets that can be used to study various aspects of the Red Sea. They are expected to generate a report in the format of a science publication and provide a presentation of the research at the end of the class. This aspect of the class accounts one third of the final grade and is in place of a final exam.
Course Policies	Students are expected to attend at least 80% of the classes. It is understood that students may attend conferences, or participate in field research that may take them away for short periods of time. Lecture material will be available through Blackboard to enable students to review any material that was missed. Late material will have 10% deducted from the grade, unless the student has discussed the reason for the lateness prior to the assignment due date and has legitimate reason for the late submission.
Additional Information	Class Communications outside of class will be handled through Blackboard. **HONOR CODE** In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Academic dishonesty will result in reductions in grades and/or expulsions from this class and/or the University.

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Thu 08/30/2018	Introduction Structure of the Ocean
2	Thu 09/06/2018	Properties of Seawater Physical, Chemical, Optical
3	Thu 09/13/2018	Biology and Boundary Layers - Phytoplankton - Zooplankton
4	Thu 09/20/2018	Benthic Boundary Layers Vertical Structure of the Ocean - Biology of the Mixed Layer
5	Thu 09/27/2018	Vertical Structure - Integerated View and Secondary Production Coastal Vertical Structure
6	Thu 10/04/2018	Coastal Vertical Structure 2 Coastal Upwelling Regions 1
7	Thu 10/11/2018	Coastal Upwelling Regions 2 Fronts in Coastal Waters - Physical Characteristics of Fronts and Tidal Fronts
8	Thu 10/18/2018	Fronts in Coastal Waters - Shelf Break, Upwelling, and Estuarine Fronts Tides and Tidal Mixing
9	Thu 10/25/2018	Internal Waves, Tides and Topography Large Scale Processes
10	Thu 11/01/2018	Mid-term Observing the Ocean - Methods of observing
11	Thu 11/08/2018	Observing the Ocean - Methods of Analysis Mini Cruise - tentative
12	Thu 11/15/2018	Red Sea Processes / Data Analysis - Student Projects
13	Thu 11/22/2018	Red Sea Processes / Data Analysis - Student Projects
14	Thu 11/29/2018	Red Sea Processes / Data Analysis - Student Projects
15	Thu 12/06/2018	Red Sea Processes / Data Analysis - Student Projects

Note

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