SEMESTER AT SEA COURSE SYLLABUS

Voyage: Fall 2014
Discipline: Environmental Science
EVSC 2050: Introduction to Oceanography
Lower Division
Faculty Name: Falk Huettmann

Pre-requisites:
This class requires the successful completion of basic ecology, physics, chemistry and mathematic classes. Students must be fluent in written and oral English. Having a basic understanding of global ecosystems, marine biology and informatics would be an asset, but is not required.

COURSE DESCRIPTION

Two-thirds of the globe are covered with water. The oceans include the largest habitats in the world and drive the global climate and well-being. This class will provide for a unique hands-on experience in oceanography. This class covers the foundations of modern oceanography (physical, chemical and biological oceanography). Further, it features specific topics like the ecological food chain, upwellings and tidal systems, biodiversity, the ocean-atmosphere interface, global fisheries, climate change and large marine ecosystems (LME). This class is hands-on and inquiry-based. It uses lectures, labs and field projects, and leads towards computational aspects of oceanography and marine biodiversity explicit in space and time. This course trains students in the use of ocean data such as the World Ocean Atlas (WOA) and the Ocean Biogeography Information System (OBIS).

COURSE OBJECTIVES

This class has the objective to teach modern concepts of oceanography to students. Secondly, it uses inquiry-based methods and digital data opportunities to understand science-based management of the vast ocean resources.

REQUIRED TEXTBOOKS

AUTHOR: Harold V. Thurman and Elizabeth Burton
TITLE: Introductory Oceanography
PUBLISHER: Prentice Hall
ISBN #: 0131438883
DATE/EDITION: 2003, 10th edition

TOPICAL OUTLINE OF COURSE

Note: itinerary is subject to change.

Depart Southampton- August 23:

A1- August 25: Lecture 1: Introduction to Oceanography

A2-August 27: Lecture 2: Physical Oceanography (Properties of salt water)

St. Petersburg: August 29- September 2 **Lab 1: Describing the Ocean with Museum Data**

A3- September 3: Lecture 3: Physical Oceanography (Moving Waters)

Gdansk: September 5-7 **Lab 1 ongoing**
Rostock: September 8-9 **Lab 1 ongoing**

A4- September 10: Lecture 4: Physical Oceanography (Water Temperature)

A5-September 12: Lecture 5: Chemical Oceanography (Water Chemistry)

Antwerp: September 14-16 **Lab 2: Describing the Ocean with Geo-referenced Data**
Le Havre: September 17-19 **Lab 2 ongoing**

A6- September 20: Lecture 6: Chemical Oceanography (Sediments in the Oceans)

A7-September 22: Lecture 7: Chemical Oceanography (Dimethylsulfid (DMS)

Dublin: September 24-27 **Lab 3: Ocean Mapping (Google Earth and GIS)**

A8- September 28: Lecture 8: Biological Oceanography (Plankton)

A9- September 30: Lecture 9: Biological Oceanography (Benthos)

Lisbon: October 1-3 **Guest Lecture and Oral Presentation**
Cadiz: October 4- 5 **Student-led Discussions**

A10- October 7: Lecture 10: Biological Oceanography (Fishes)

Casablanca: October 8-11 **Student-led Discussions**

Study Day: October 12 **Mid-term Exam**

A11- October 13: Lecture 11: Biological Oceanography (Sea mammals)

A12- October 15: Lecture 12: Biological Oceanography (Sea birds)

Dakar: October 16-19

A13- October 21: Lecture 13: Ocean interfaces (Upwelling Systems)

A14- October 23 Lecture 14: Ocean interfaces (Ocean Currents)

Takoradi October 25-26

Tema: October 27-28

A15- October 29 Lecture 15: Ocean interfaces (Tidal Systems)

A16-October 31 Lecture 16: Ocean interfaces (Atmospheric Coupling)

Study Day: November 2 **Lab 4: Ocean Models (Open Office, Excel and R)**

A17-November 3 Lecture 17: Ocean seafloor geography

A18- November 5 Lecture 18: Ocean resources (Seafloor)

Rio de Janeiro: November 7-9 **Final field project ongoing**

Salvador: November 12-14 **Final field project ongoing**

A19- November 15: Lecture 19: Ocean resources (Biodiversity)

A20- November 17: Lecture 20: Ocean resources (Fisheries)

Study Day- November 19 **Final field project ongoing**

A21- November 20: Lecture 21: Ocean management

Bridgetown- November 22-24 **Final field project ongoing**

A22- November 25: Lecture 22: Climate Change in the Ocean

A23- November 27: Lecture 23: Ocean Conservation & Policy

Havanna- November 29 - December 2 **Student-led discussions**

December 3: study day **Presentations of Final field project**

A24-December 4 (A Day Finals): Final Exam

FIELD WORK

Field lab attendance is mandatory for all students enrolled in this course. Please do not book individual travel plans or a Semester at Sea sponsored trip on the day of our field lab.

This class makes use for ship-based data collection projects. The field-based project will allow students to collect oceanography-related data and analyze them for a final project presentation. Projects could include the use of data collected by the vessel, and in concert with student-collected data, e.g. marine mammals, birds or plankton.

Port visits can be used to obtain additional data and information on specific or latest oceanographic information sources. In addition, some ports house well-renowned museums and research institutions with collections, and for students to visit and to report on, e.g. St. Petersburg, Hamburg, Cape Town.

FIELD LAB (*At least 20 percent of the contact hours for each course, to be led by the instructor.*)

- Students will collect vessel-based data (e.g. sea surface temperature, salinity, ship speed, location, wind speed etc) and link it up in-time with data they collect themselves (e.g. plankton, fish, sea mammas, sea birds). This class devotes lab time learning to analyze such data and in a modern fashion (machine learning, open access and open source code in R etc).

FIELD ASSIGNMENTS

- Students are expected to visit the outlined museums and collections in port, and report on what they learned, weaknesses and strength, and for pedagogic and scientific value

Field Laboratory

The discipline of modern Oceanography is inherently based on collection trips and research vessels. This lab will introduce students to the important role of nationally-maintained research collections and central museums. Here we will visit a world-leading museum facility, with a global legacy and history of research vessels worldwide. Students are given the opportunity to see such a facility first-hand, get access to the huge taxonomic and ocean-related collection and interpreted tours, and have face-time interviewing researchers and experts on global oceanography subjects. This lab will enable students to get familiar with such settings and introduces them to such leading oceanography research workplaces. The lab includes to write a report about this unique trip, and where each student pursues a specific oceanography research question (approved *a priori* by the instructor). Lectures before and after the lab will elaborate on these topics in more detail and provide guidance.

- These experiences will be evaluated based on a short PPT and is part of the participation grade.

METHODS OF EVALUATION / GRADING RUBRIC

Letter grades will be determined from the performance in lectures (60%), labs (20%) and two oral presentations (20% A, B). Lecture

performance will be determined from two exams (mid-term 20 % and final 30%), participation (10%), reading assignments (15%) and student-led discussions (25%). Labs require 4 lab assignments and one fieldwork outdoors project assignment (20 % each). For marking thresholds A = 100-91%, B = 90-81%, C = 80-71%, D = 70-61%, F < 61%. I do offer extra credit opportunities, and follow the latest SAS marking scheme.

RESERVE LIBRARY LIST
The lecturer will provide research articles PDFs on specific subjects.

ELECTRONIC COURSE MATERIALS
The lecturer will provide research data and materials as ASCII data, Open Office and PDFs on specific subjects.

ADDITIONAL RESOURCES
This class will make use of some online data sets and software (provided by instructor and when in port).

HONOR CODE
Semester at Sea students enroll in an academic program administered by the University of Virginia, and thus bind themselves to the University's honor code. The code prohibits all acts of lying, cheating, and stealing. Please consult the Voyager's Handbook for further explanation of what constitutes an honor offense.

Each written assignment for this course must be pledged by the student as follows: "On my honor as a student, I pledge that I have neither given nor received aid on this assignment." The pledge must be signed, or, in the case of an electronic file, signed "[signed]."

Introductory Dynamical Oceanography, S. Pond and G.L. Pickard, University of British Columbia, Vancouver, Canada, 1983, Page-349, Paper Back, ISBN 13:978 0 7506 2496 1 and ISBN 10: 0 7506 2496 5, Price 4033 INR($63.70), Elsevier, Butterworth-Heinemann, The Boulevard, Kidlington, Oxford OX5 1GB, 30 Corporate Drive, Burlington, MA 01803.Â Pond, S. and Pickard, G.L. Introductory Dynamical Oceanography, Burlington: Elsevier Butterworth-Heinemann, 1983. Advertisement. Recommendations. Oceanography contains peer-reviewed articles that chronicle all aspects of ocean science and its applications. Oceanography is published in March, June, September, and December in online and paper format. Visit Online Archive. Submit an Article. Introductory Oceanography, 10th Edition. Harold V. Thurman. Alan P. Trujillo.Â For introductory courses in Oceanography found in department of Geology or Oceanography. The 10th edition of this popular text continues to provide carefully developed content examining the vast body of oceanic knowledge. Its interdisciplinary approachâ€”spanning geology, chemistry, physics, and biologyâ€”allows students to have a fundamental understanding of how oceans work. 'Introductory Dynamical Oceanography' 2nd ed provides an introduction to Dynamical Physical Oceanography at a level suitable for senior year undergraduate students in the sciences and for graduate students entering oceanography. It aims to present the basic objectives, procedures and successes and to state some of the present limitations of dynamical oceanography and its relations to descriptive physical oceanography. Dobson F. (1983) Introductory Physical Oceanography. In: Liss P.S., Slinn W.G.N. (eds) Air-Sea Exchange of Gases and Particles. NATO ASI Series (Series C: Mathematical and Physical Sciences), vol 108. Springer, Dordrecht. DOI https://doi.org/10.1007/978-94-009-7169-1_2. Publisher Name Springer, Dordrecht. Print ISBN 978-94-009-7171-4.