

DEREE COLLEGE SYLLABUS FOR:

OC 1000 OCEANOGRAPHY: PHYSICS AND GEOLOGY OF THE OCEAN BASINS (Updated Spring 2012) 3/1½/4

PREREQUISITES: None

**CATALOG
DESCRIPTION:**

Principles of oceanography with emphasis on geological and physical processes: history of oceanography as a modern scientific field, the formation of Earth and the solar system, ocean floor topography, continental drifting, plate tectonics, sediments, atmospheric processes, ocean currents, waves and tides.

RATIONALE:

Oceanography is a science course with laboratories that fulfils the general education requirement in science. It is designed for students with little background in the natural or physical sciences and aims at giving them an understanding of the scientific study of seas and oceans. Recent developments in the field of geological and physical oceanography are discussed, such as the plate tectonics theory and the origin of earthquakes, hydrothermal vents, deep ocean floor exploration, surface currents like the gulf Stream and deep currents like the Great Conveyor Belt, waves and tides.

LEARNING OUTCOMES:

As a result of taking this course, the student should be able to:

1. Acquire a foundation in the science of Oceanography. **(Knowledge)**
2. Demonstrate knowledge of the scientific method, core oceanography concepts and principles. **(Knowledge)**
3. Acquire knowledge on plate tectonics **(Knowledge, Analysis, Evaluation)**
4. Understand scientific issues and concerns as they apply to students, their environment, society and health, and to understand how to use their knowledge responsibly. **(Knowledge, Analysis, Evaluation, Application)**
5. Demonstrate detailed understanding of the various ocean basins and the distribution and classification of marine sediments **(Knowledge, Analysis, Evaluation, Key transferable skills)**
6. Develop the necessary analytical tools to understand the nature of scientific inquiry by practicing inquiry in the laboratory and in the field and by addressing the right questions and applying the appropriate methodology. **(Key transferable skills, Practical skills)**

**METHOD OF TEACHING
AND LEARNING:**

In congruence with the learning and teaching strategy of the college, the following tools are used:

- Class lectures, interactive learning (class discussions, group work) film and video presentations

- Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class
- Class discussion of selected topics.
- Research through the Internet
- CD-ROMs and physical models.
Laboratory experiments and/or demonstrations, reports.
- Field trips and/or visits.
- Information Course Center-Course Link:
<http://highered.mcgraw-hill.com/sites/0073376701/>
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.
- Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

ASSESSMENT:

Multiple "diagnostic" tests – formative (on-line)	0	Multiple choice/short answers/ /essay questions combination
In-class midterm examination (2-hour) - summative	30	Multiple choice/short answers/ /essay questions combination/ problem solving
Final examination (2-hour) - summative	45	Multiple choice/short answers/ /essay questions combination/ problem solving
Lab Reports	25	Data analysis and evaluation of all lab activities
Total of all Exams	100	

The formative on-line tests aim to prepare students for the examinations. Students are expected to submit feedback on their performance.

The lab reports assess the practical component of the course Learning Outcome 6.

The midterm examination tests Learning Outcomes 1, 2, 3

The final examination tests Learning Outcomes 4, and 5

REQUIRED MATERIAL:

Text Book
 Sverdrup, Keith A., An introduction to the worlds Oceans 10/E or latest edition. McGraw Hills, ISBN: 139780073376707
 Source book
 K. Stowe Exploring Ocean Science ISBN 0-471-54376-4
 2th ed John Wiley & Sons Inc.

SOFTWARE REQUIREMENTS:

Word, Excel, PowerPoint, Internet

WWW RESOURCES:
(OC 1000)

www.sciam.com

www.nature.com
www.ncmr.gr
www.imbc.gr
www.hhoi.edu/oceanus
www.jbpub.com/oceanlink
www.scibib.ucsd.edu
www.aquanet.com
www.nodc.noaa.gov

CONTENT OUTLINE:

1. Introduction
 - 1.1. History of oceanography; oceanographic research in Greece
 - 1.2. Oceanographic techniques
2. Earth
 - 2.1. The shape of Earth
 - 2.2. Internal structure
 - 2.3. Seismic and gravity studies
3. Plate Tectonics
 - 3.1. Wegener and continental drift
 - 3.2. Hess and geopoetry
 - 3.3. Trenches and ridges
 - 3.5. Plate boundaries
4. Sediments
 - 4.1. Grain size
 - 4.2. Sediment sources
 - 4.3. Lithogenous sediments
 - 4.4. Biogenous sediments
 - 4.5. Sedimentation processes
5. The Atmosphere
 - 5.1. Heat budget
 - 5.2. Heat transfer
 - 5.3. Coriolis force
 - 5.4. Prevailing winds
 - 5.5. Weather and climate
6. Ocean Currents
 - 6.1. Geostrophic flow
 - 6.2. Density contours
 - 6.3. Surface circulation
 - 6.4. Deep water currents
 - 6.5. The Great Conveyor Belt
7. Waves and Tides
 - 7.1. Reflection, refraction and diffraction
 - 7.2. Wind-driven waves
 - 7.3. Tsunamis
 - 7.4. Astronomical cause of tides

LAB OUTLINE:

1. Laboratory Safety. Rules and Regulations. Use of the Microscope
2. Marine Charts & Positioning
Geographical Coordinates (Latitude. & Longitude), Contours, Understanding the sea floor morphology, Find your position & Navigation
3. Sediments Analysis
Sorting & Classification Analysis of Marine Sediments
4. Ocean Floor & Plate Tectonics
Identification of plate tectonics and description of the main features of the Atlantic ocean sea floor on a 3D model
5. Sedimentary Rocks Recognition
Identify the nature of sedimentary rocks
6. Coriolis Effect
Practising the forces on a rotating system
7. Temperature Gradient of Sea Water
8. Field Activities:
 - Beach Profiling
 - Sediment Collection & Classification
 - River Current Measurements,
 - Seawater Salinity & Surface Temperature Measurements & Distribution in Estuarine Environment
 - Coastal Swash and Backwash recognition
 - Position Finding with Compass and GPS
9. Field Data Processing and Interpretation
10. Analysis and Evaluation of Field Trip Activities
11. Video-Documentary Presentation