Introduction to Oceanography

OCE K101. Three sem. hrs. credits
CRN #10670
Spring 2007
Three Rivers Community College
Mohegan Campus
Norwich, CT 06360

Instructor: Bill Dopirak
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Office Hours:
M - 9:30-10:00am, T – 5:00-6:00pm
R 5:00-6:00pm
F 12:00-1:00pm (Or by appointment)

Required Text:

Trujillo, A. P. and H. V. Thurman. 2005. *Essentials of Oceanography* 8th edition. Pearson/Prentice Hall Publishing. 532p.

Catalog Description:

This course covers the following topics: properties of seawater, marine ecology, waves, tides, meteorology, oceanic circulation, origin of Long Island Sound, chemical oceanographic processes, life in the sea, and environmental modification and control. Some field work will be involved.

Primary Objectives:

Students should expect to learn the fundamentals of oceanography and understand biogeochemical principles that govern marine systems. Also, emphasis will be placed on various marine systems such as: seafloor dynamics, seawater chemistry, the ocean-atmosphere relationship, energy transfer, organism adaptations to seawater, and oceanic circulation.

Attendance Policy:

Students are expected to attend class regularly, as in accordance with TRCC attendance policy. If a class is missed due to circumstances beyond your control, **please**, be sure to notify your instructor and make the necessary arrangements for obtaining the lecture notes. **You will be responsible** for the material. If you **miss three** or more classes your **final grade** will be dropped by **half a letter grade**. A five point bonus will be implemented to your final grade if **100%** attendance is noted.

Grade Evaluation:
Although the subject matter does tend to build on itself, there will be three non cumulative examinations. The third exam will be given during Final Exam week. There will be twelve weekly quizzes. The lowest quiz grade will dropped. Exam and quiz questions will consist of multiple choice, matching, and short answers. Some questions will come directly from the Review questions and Questions and Exercises section following every chapter.

Add/Drop Procedures:
Please consult the TRCC catalog for this policy.

Suggestions for the course:
To gain a better understanding be sure to read the required reading sections **before** coming to class. Also, be prepared to participate in classroom discussions.

Final Grade:

100-98 = A	79-77 = C+
97-93 = A	76-73 = C
92-90 = A-	72-70 = C-
89-87 = B+	69-65 = D+
86-84 = B	64-60 = D
83-80 = B-	59-00 = F

A ten minute group oral presentation is expected. Selections for your presentation could be taken from a list of topics below, or from your own interests. More will be said pertaining to your presentations through the semester.

Research Presentation Topics

01) Hydrothermal vents
02) Estuarine circulation
03) Primary production in the sea
04) Marine mammology
05) Marine ornithology
06) Oceanic pollution
07) Biogeochemical cycling within the sea
08) Physical properties of seawater
09) Oceanic circulation
10) Marine organismal biology
11) El Nino effect
12) Sedimentation and sorting
13) Reproduction and larval ecology
14) Modes of reproduction
15) Organismal energy allocation
16) Origin of Earth's oceans
17) Estuarine productivity
18) History of Oceanography
19) Long shore currents and rip tides
20) Hypoxia and 'Red Tides'

Grading:

Final grade will based on the following:

Examinations	70%
Quizzes	15%
Oral Presentation	05%
*Class Participation	10% +
	100%

*Includes attendance and a voluntary research paper can be handed in for extra credit.

OCE K101- Introduction to Oceanography W: 12:30-3:30p.m. MO 205
Tentative Schedule
Spring 2007

Required Reading Trujillo & Thurman:

Week	Topic	Chapters:
1	Introduction	1
2	**Quiz 1:** Plate Tectonics	2
3	**Quiz 2:** Oceanic Zonation	3
4	**Quiz 3:** Seafloor & Sediments	4
5	**Exam I** Chemical properties of seawater	5
6	**Quiz 4:** Meteorology	6
7	**Quiz 5:** Oceanic circulation	7
8	**Quiz 6:** Waves	8
9	**Quiz 7:** Tides & Intertidal zonation	9
10	**Quiz 8:** Coastal environments, **Review for Exam II**	10 & 11
11	**Exam II**	
12	**Quiz 9:** Marine life	12
13	**Quiz 10:** Oceanic productivity	13
14	**Quiz 11:** Pelagic biota	14
15	**Quiz 12:** Benthic biota, **Review for Final Examination**	15
	Final Examination	

Syllabus Revisions:
This schedule may be subject to change as the instructor sees fit. Any changes will be announced by the instructor in advance.

College Withdrawal Policy:
A student who finds it necessary to discontinue a course once class has met must provide written notice to the registrar. Withdrawal forms are available at the Registrar's office on both campuses and the office at the Subase. Nonpunitive "W" grades are assigned to any withdrawal requested before the various unrestricted withdrawal deadlines, **See Registrar for dates.** After that period, a student wishing to withdraw must obtain written authorization of the instructor to receive a "W" grade on their academic record, non-punitive grade indicating termination of class participation. Students who do not withdraw, but stop attending **will recieve** a grade of "F" for the final grade. Students are advised that withdrawl from 50% or more of their classes will result in being placed on **Progress Probation** for the following semester Eligibility for refund of tuition is based upon date of withdrawal when received by the Registrar. **Verbal withdrawals cannot be accepted**.

Academic and Classroom Misconduct:

The instructor has the primary responsibility for control over classroom behavior and maintenance of academic integrity, and can order the temporary removal or exclusion from the classroom, and/or laboratory, of any student engaged in conduct that violates the general rules and regulation of the institution. Extended or permanent exclusion from classroom, and/or laboratory, or further disciplinary action can be effected only through appropriate college procedure. Plagiarism, cheating, or any form of academic dishonesty is **prohibited**. Students guilty of academic dishonesty directly or indirectly will receive a **zero** for an exercise or exam and may receive an **F** for the course in addition to other possible disciplinary sanctions, which maybe imposed through the regular institutional procedures. Any student that believes he or she has been erroneously accused may appeal the case through the appropriate institutional procedures if their grade was affected.

Detailed Course Objectives:

After completing this course, the student will be able to:

01) Understand the scientific method and be able to formulate and test a hypothesis.
02) Know the sub-disciplines of oceanography (physical, biological, chemical, geological).
03) Understand distribution of the World's Oceans, movements of large water masses, and estuarine circulation.
04) Identify the properties of water and components of seawater.
05) Understand pH and key chemical reactions in the ocean.
06) Discuss the various biogeochemical cycles within the ocean.
07) Classify living organisms of major phyla.
08) Be able to use a taxonomic key to identify species.
09) Be able to identify common organisms of Long Island Sound and the New England coast.
10) Discuss adaptations and strategies of marine organisms for survival, reproduction, growth, mobility, defense, and competition.
11) Identify and characterize pelagic, coastal, benthic, estuarine, and intertidal habitats.
12) Understand ongoing ecological processes associated with oceanic habitats.
13) Have a broad understanding of the relationship of the World's Oceans to the global ecosphere.
14) Know the geological origins and present morphology of Long Island Sound.
15) Explain the economic and ecological importance of algae in aquatic environments.
16) Be aware of environmental threats to oceans, Long Island Sound, and coastal wetlands.
17) Be aware of negative impacts on coastal and marine systems (i.e. pollution, overfishing, overpopulation, wetland destruction).
18) Be aware of how choice lifestyle can minimize marine systems degradation.
19) Discuss possible solutions for currently arising problems within marine systems.
20) Gain a deep seeded respect and admiration for marine systems.

Detailed Course Outline

I Introduction to the World's Oceans and Marine Science

- **A.** Disciplines within oceanography
  - **1)** Biology and ecology
  - **2)** Physical oceanography
  - **3)** Chemical oceanography
  - **4)** Geological oceanography
  - **5)** Biological oceanography

- **B.** Historical timeline of oceanographic milestones
- **C.** Distribution of the World Ocean
- **D.** Physical and chemical properties of seawater
- **E.** The ocean in motion
  - **1)** Tides
  - **2)** Currents
  - **3)** Circulation

II Processes of Plate Tectonics & Formations of Oceanic Basins

- **A.** Three universal forces acting on plate movement
  - **1)** Compressive forces
  - **2)** Tensional Forces
  - **3)** Shearing Forces

- **B.** Types of Plate Boundaries
  - **1)** Convergent (subduction zones)
    -Oceanic trench formation
  - **2)** Divergent (sea-floor spreading centers)
    -Mid-Atlantic Ridge
  - **3)** Transform (lateral slippage)
    -San Andres Fault
  - **4)** Ring of Fire

- **C.** Paleomagnetism
  - **1)** Pole wandering
  - **2)** Magnetic Reversals

- **D.** Continental Drift
- **E.** Divisions of solid earth
  - **1)** Crust
  - **2)** Lithosphere
  - **3)** Asethenosphere
  - **4)** Outer Core
  - **5)** Inner Core

III Marine Provinces

- **A.** Horizontal zonation
  - **1)** Littoral zone
  - **2)** Neretic Zone
  - **3)** Pelagic Zone

III Marine Provinces (cont.)

B. Vertical Zonation

1) Photic Zone
- -Euphotic
- -Dysphotic
- -Aphotic

2) Batyl Zone

3) Abyssal Zone

4) Hadal Zone

C. Seafloor Provinces

1) Continental Margin
- -Continental Shelf
- -Continental Slope
  - -Submarine Canyons
- -Continental Rise

2) Topographic Features of the seafloor
- -Abyssal plain
- -Abyssal hill
- -Seamount
- -Guyot
- -Atoll
- -Rift systems
- -Trenches

IV Sediments at the Bottom of the Ocean

A. Marine Sedimentology

1) Origin

2) Grain Size

3) Chemical Composition

B. Terrigenous Sediments

C. Biogenous Sediments

D. Hydrogenous Sediments

E. Cosmogenous Sediments

F. Geographic Distribution of Marine Sediments

G. Natural Resources

V Chemical Properties of Seawater

A. Composition of seawater

B. Heat Capacity

C. Thermostatic Effects

D. Density

1) Pycnoclines
- -Thermocline
- -Halocline

E. Salinity

F. pH

VI Biogeochemical Cycling in the Sea
- **A.** Hydrologic cycle
- **B.** Carbon cycle
- **C.** Nitrogen cycle
- **D.** Phosphorus cycle
- **E.** Silica cycle

VII Meteorology and the Sea
- **A.** Winds
- **B.** Currents
- **C.** Pressure systems
- **D.** Fronts
- **E.** Heat sink
- **F.** Ocean Conveyor Belt

VIII Ecological and Biological concepts
- **A.** General nature of marine life
- **B.** Adaptations of marine life
- **C.** Basis ecological concepts
  - **1)** Laws of thermodynamics and energy laws
  - **2)** Food Webs
  - **3)** Energy transfer

IX Overview of Marine Organisms
- **A.** Systematic and taxonomic classification
- **B.** Plants: Primary Producers
  - **1)** Phytoplankton
  - **2)** Macroaglae
  - **3)** Vascular plants
- **C.** Animals: Secondary producers + primary consumers
  - **1)** Protozoans
  - **2)** Porifera
  - **3)** Cnidaria and Ctenophores
  - **4)** Annelids and other wormlike phyla
  - **5)** Mollusks
  - **6)** Arthropods
  - **7)** Echinoderms
  - **8)** Chordates

XI Oceanic Habitats
- **A.** Benthic Communities
  - **1)** Seafloor characteristics
  - **2)** Deep-sea vents
- **B.** Coral Reefs
- **C.** Pelagic Communities
- **D.** Estuaries

XII Coastal Habitats
- **A.** Salt Marshes
- **B.** Mangroves
- **C.** The intertidal Zone
  - **1)** Sandy shores
  - **2)** Rocky shores
  - **3)** Mudflats

XIII Humans and the sea
- **A.** Oceanic Resources
  - **1)** Food from the sea: fisheries + fish farming
  - **2)** Mining from the sea
- **B.** Coastal Management
- **C.** Oceanic Pollution
  - **1)** Sewage
  - **2)** Toxins
  - **3)** Oil spills
  - **4)** Floatables

XIV Special topics TBA