General Education Course Proposal

Proposed Course: GEOL (Prefix) 167 (No.) Oceans and Atmosphere (Title) Units 3

Department: Geology School: Natural Sciences

GE Category (Indicate one category only):

Foundation: A1___; A2___; A3___; B4___

Breadth: B1___; B2___; C1___; C2___; D___; E___

Integration: B X; C___; D___; International/Multicultural___

Existing Course___; Revised Course___; New Course X

Course Included in Current GE Program No

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

Proposed catalog description: Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

Prerequisites: General Education Quantitative Reasoning and Area B Breadth Requirements. Integrated introduction to sciences of oceans and atmosphere; their origin and evolution; plate tectonics; ocean currents, waves, and tides; atmospheric circulation and El Nino; production and life; environmental issues and concerns. (3 lecture hours)

Enrollment limit per section: 50

Expected number of sections per semester – Year 1 1 **; Year 3** 1

Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

Approval for Inclusion in General Education

Department Chair	4/24/98 Date	School Curriculum Committee	9/21/98 Date
School Dean	9/22/98 Date	General Education Subcommittee	12/15/98 Date
Associate Provost	12/22/98 Date		

1/14/98

e. **Include discussions of ethical issues.**

The ethics of ocean pollution and resource extraction, both living and non-living, as well as atmospheric pollution and climate change issues will be explicitly discussed.

f. **Strive to develop a lasting curiosity and sense of wonder in the universe by actively engaging students in the scientific process.**

Presentation of information dealing with the evolution of the oceans and the atmosphere as integral components of the earth on time scales of millions of years as well as over time scales of human activity will hopefully engender a sense of the majesty and elegance of the complex, interdependent, and dynamic systems of Earth as represented by the oceans and the atmosphere.

Common Course Elements:

Common Course Format

Geology 167 is a 3 unit course consisting of 3 lecture hours. There is no laboratory component to the course.

Common Course Content

Geology 167, Oceans and Atmosphere, coveres the principles of oceanography and the interactions between the ocean and the atmosphere by addressing fundamental principles, of geology, chemistry, physics, and biology, and current topics of broad societal relevance. Though these topics will vary from semester to semester, the primary concepts and priciples will not vary significantly. A short description of each major theme is provided to indicate the depth of coverage of each that will be common to all offerings of the course. Individual course offerings may cover some topics in more detail than presented here, and may cover additional topics not mentioned.

* History of Oceanography: Ancient civilizations, Middle Ages, Voyages of Discovery, Charts and Navigation, the Challenger Expedition, Oceanography as a modern science.

* The water planet: Geologic time, early Earth evolution, hydrologic cycle, reservoirs and residence times.

* Plate Tectonics: Seafloor spreading and continental drift, rifting and subduction, hot spots, the shape of the ocean basins.

* Seafloor Sediments: Rates and patterns of deposition, sediment-water chemical reactions, calcite compensation depth, seabed resources, international laws and treaties

* Physical properties of seawater: water molecule, heat capacity, cohesion, surface tension and viscosity, density, transmission of acoustic energy.

* Chemistry of seawater: Ocean salinities, carbon dioxide cycle, oxygen balance, nutrients and organic matter.

* Structure of the oceans: Solar radiation and heat capacity, evaporation and precipitation patterns, density structure and vertical mixing, temperature/salinity curves and measurement techniques, water masses.

* The Atmosphere: Atmospheric pressure, atmospheric gasses, ozone issues, role of sulfer compounds.

* The Atmosphere in motion: effects of rotation, seasonal changes, the topographic effect, El Nino, hurricanes and typhoons, storm tides and storm surges.

* Ekman spiral and Ekman transport: ocean currents, convergence and divergence, upwelling, global circulation patterns.

* Wave motion and velocity: water transport and energy release, equilibrium tidal theory, dynamic tidal analysis.

* Coastal Processes: Anatomy of a beach, beach dynamics, coastal circulation, estuaries.

* Environmental Issues and Concerns: water and sediment quality, plastic trash, oil spills, overfishing.

* Environment for Life: Osmotic processes, light, color, and bioluminescence, classification of organisms, Gaia hypothesis.

* Production and life: Food chains and webs, phytoplankton and zooplankton, marine toxins.

Typical Course Grading Format

The structure and weighting of assignments in Geology 167 will generally be:

Quizzes	10%
Term Paper	30%
Three Mid-term Exams	45%
Final	15%

Matrix relating common course elements to course syllabus and Area B1 Specifications:

WEEK	TEXT CHAPTER	TOPIC	AREA B1 SPECS.
1	Prologue	History of Oceanography: Ancient civilizations, Middle Ages, Voyages of Discovery, Charts and Navigation, the Challenger Expedition, Oceanography as a modern science.	1, 2, 3, 5b, 5d, 5f
2	Chapter 1	The water planet: Geologic time, early Earth evolution, hydrologic cycle, reservoirs and residence times.	1, 2, 3, 4, 5c, 5f
3	Chapter 2	Plate Tectonics: Seafloor spreading and continental drift, rifting and subduction, hot spots, the shape of the ocean basins.	1, 2, 3, 4, 5a, 5d, 5f
4	Chapter 3	Seafloor Sediments: Rates and patterns of deposition, sediment-water chemical reactions, calcite compensation depth, seabed resources, international laws and treaties.	1, 2, 3, 4, 5a, 5c, 5e
5	Chapter 4	Physical properties of seawater: water molecule, heat capacity, cohesion, surface tension and viscosity, density, transmission of acoustic energy.	1, 2, 3, 4, 5a
6	Chapter 5	Chemistry of seawater: Ocean salinities, carbon dioxide cycle, oxygen balance, nutrients and organic matter.	1, 2, 3, 4, 5a
7	Chapter 6	Structure of the oceans: Solar radiation and heat capacity, evaporation and precipitation patterns, density structure and vertical mixing, temperature/salinity curves and measurement techniques, water masses.	1, 2, 3, 4, 5a
8	Chapter 7	The Atmosphere: Atmospheric pressure, atmospheric gasses, ozone issues, role of sulfer compounds.	1, 2, 3, 5a, 5b, 5c
9	Chapter 7	The Atmosphere in motion: effects of rotation, seasonal changes, the topographic effect, El Nino, hurricanes and typhoons, storm tides and storm surges.	1, 2, 3, 4, 5a, 5d, 5f
10	Chapter 8	Ekman spiral and Ekman transport: ocean currents, convergence and divergence, upwelling, global circulation patterns.	1, 2, 3, 4, 5a

11	Chapter 9, Chapter 10	Wave motion and velocity: water transport and energy release, equilibrium tidal theory, dynamic tidal analysis.	1, 2, 3, 4, 5a
12	Chapter 11	Coastal Processes: Anatomy of a beach, beach dynamics, coastal circulation, estuaries.	1, 2, 3, 5b, 5c
13	Chapter 12	Environmental Issues and Concerns: water and sediment quality, plastic trash, oil spills, overfishing.	3, 5b, 5c, 5d, 5e, 5f
14	Chapter 13	Environment for Life: Osmotic processes, light, color, and bioluminescence, classification of organisms, Gaia hypothesis.	1, 2, 3, 4, 5a
15	Chapter 14, Chapter 15	Production and life: Food chains and webs, phytoplankton and zooplankton, marine toxins.	1, 2, 3, 5b, 5c, 5e, 5f

Representative texts:

Duxbury, A. C., and Duxbury, A. B., 1997, An Introduction to the World's Oceans, 5th Edition, Wm. C. Brown, 504 pp.

4000 Word Writing Requirement

Geology 167 will require a significant writing assignment. An original term paper on a topic jointly agreed to by the instructor and the student will comprise 30% of the final course grade. The minimum length of the paper is 4000 words. The paper must be written with a word processing program on a computer, and will include a list of references using a format specified by a recognized professional journal, and figures and figure captions where appropriate.

Oceans and Atmosphere

Geology 167
MWF 10:10 - 11:00; Rm. McL 280
Fall, 2000

Instructor: Dr. Sea Floor
Office: McL 284
Phone: 278-3086 **E-mail:** sfloor@csufresno.edu
Office Hours: MWF 10:10 - 11:00; 2:10 - 3:00

Course description:

The course is designed to introduce the sciences of oceans and atmosphere. It includes the study of the earth at the sea's edge and below its surface, and the history of the processes that formed the ocean basins. It investigates why and how oceans evolve; the study of heat transfer, water cycles, and the interaction of atmosphere and oceans. Marine organisms and the relationship between these organisms and their environment are discussed. Items of current interest and practical concern are integrated with a topic's basic information.

Text (required): An Introduction to the World's Oceans (5th edition) by Alyn C. Duxbury and Alison B. Duxbury

Course objectives:

- to stimulate interest and curiosity by blending contemporary information and research with basic principles to form an integrated introduction to the sciences of the oceans and atmosphere
- to emphasize the role of basic scientific principles in the processes that govern the oceans, atmosphere, and earth

Grading: Grades are based on your performance on examinations (3 mid-term and a final), quizzes and a term paper.

Quizzes	10%
Term paper	30%
Three mid-term exams	45%
Final	15%

Final grades in the course will be assigned on the following basis:

88 - 100% = A 78 - 87% = B 65 - 77% = C
58 - 64% = D below 58% = F

Assignments: There is no makeup for missed assignments. Late assignments will not be accepted.

Term paper: An original term paper on an approved topic will comprise 30% of your final course grade. The minimum paper length is 4000 words (a requirement for upper division general education courses). The paper should be written with a word processing program on a computer.

Schedule of lecture topics and reading assignments

Week 1	History of oceanography	Prologue, p. 1 - 25
Week 2	The water planet; geologic time; early planet earth; hydrologic cycle; reservoirs and residence time	Chapter 1, p. 27 - 33 p. 40 - 50
Week 3	Plate tectonics; sea floor spreading and crustal motion; rifting and subduction; hot spots	Chapter 2, p. 65 - 76 p. 82 - 89
Week 4	Sea floor sediments; rates and patterns of deposition; seabed resources; laws and treaties	Chapter 3, p. 94 - 122
Week 5	Physical properties of water; water molecule; heat capacity; cohesion, surface tension, and viscosity; density; transmission of energy	Chapter 4, p.124- 146
Week 6	The chemistry of sea water; ocean salinities; carbon dioxide cycle; oxygen balance; nutrients and organic matter	Chapter 5, p.148- 166
Week 7	Structure of the oceans; solar radiation and heat capacity; evaporation and precipitation patterns; density structure and vertical circulation; T-S curves and measurement techniques	Chapter 6, p.168- 196
Week 8	The atmosphere; atmospheric pressure; atmospheric gases; ozone problem; role of sulfur compounds	Chapter 7, p.197- 204
Week 9	The atmosphere in motion; effects of rotation; seasonal changes; the topographic effect; El Nino; hurricanes; storm tides and storm surges	Chapter 7, p.204- 223
Week 10	Ekman spiral and ekman transport; ocean currents; convergence and divergence; global circulation patterns	Chapter 8, p. 224-245
Week 11	Wave motion and speed; water transport and energy release; equilibrium tidal theory; dynamic tidal analysis	Chapter 9, p.247- 269 Chapter 10,p.275-286

Week 12	Anatomy of a beach; beach dynamics; coastal circulation; estuaries	Chapter 11,p.298-326
Week 13	Environmental issues and concerns; water and sediment quality; plastic trash; oil spills; overfishing	Chapter 12,p.328-352
Week 14	Environment for life; osmotic processes; light, color, and bioluminescence; classification of organisms	Chapter 13,p.354-366
Week 15	Production and life; food chains and webs; phytoplankton and zooplankton; marine toxins	Chapter 14,p.368-385 Chapter 15,p.387-391 p.404-409

Cheating and Plagiarism: Each student is expected to perform his or her own work throughout the course. Cheating and plagiarism will not be tolerated and will be dealt with according to university policy. Please refer to the CSU Fresno catalog for further information.

Disabled Students: It is the responsibility of students with disabilities to identify themselves to the university and the instructor so reasonable accommodation for learning and evaluation within the course can be made.