

## SEMESTER AT SEA COURSE SYLLABUS

Discipline: Environmental Sciences

Semester and Year: Summer 2007

Course Number and Title: EVSC 250: Weather and Climate

Faculty Name: Jose D Fuentes

Pre-requisites: None

### COURSE DESCRIPTION

Weather events such as thunderstorms, hailstorms, hurricanes and tornadoes are introduced and discussed in this course. Physical laws governing the motions of the atmosphere and the flows of energy are presented to learn how the Earth's atmosphere behaves. Long-term global climatic controls and short-term severe events which severely impact upon human behavior are discussed. The course topics will be presented and discussed in the context of the South American regions to be visited during the Semester at Sea. For example, the topic of El Niño will be introduced while the ship navigates the water of the equatorial region near Peru. Throughout the semester, students will participate in the gathering and interpretation of local weather and climate information to enhance the learning of the material to be covered in class. Also, local experts will be invited to provide guest lectures or participate in class discussions. The course is ideally suited to science students desiring to learn both how the main weather features form and the climate of the Earth's atmosphere.

### COURSE OBJECTIVES

The goals of this course are to learn how weather events are formed, and to study how weather and climate varies along the coast of the eastern Pacific Ocean.

**COURSE OUTLINE**

<b>TOPIC</b>	<b>BOOK CHAPTER</b>
THE EARTH AND ITS ATMOSPHERE	1
Composition of the atmosphere	
Atmospheric structure and composition	
Atmospheric pressure, weather maps	9
ENERGY: WARMING THE EARTH AND THE ATMOSPHERE	2
Energy, Temperature, and heat	
Temperature scales	
Heat transfer	
SEASONAL AND DAILY TEMPERATURES	3
Basic principles of radiation	
Daily temperature variations	
Seasonal temperature variations	
Global radiation: Balancing the books; the "Greenhouse Effect"	
Global warming and climate change	
MOISTURE IN THE AIR	5
Phases of water	
Absolute humidity	
Specific humidity	
Vapor pressure	
Relative humidity	
Weather and human comfort	
Measuring atmospheric humidity	
WHY DO CLOUDS FORM?	6, 7
Cloud formation	
Strange clouds	
A tutorial on cloud identification	
WET STUFF THAT FALLS FROM THE SKY	8
Rain	
Snow	
Sleet and freezing rain	
Measuring rainfall	
Weather symbology	Appendix B
WINDS	9, 10, 11
Principles of atmospheric motion	
Cyclones	
Anticyclones	
Local winds	
Global winds	
AIR MASSES AND FRONTS	12, 13
Source of air masses	
Classification of air masses	
Warm and cold fronts	

SEVERE WEATHER	15, 16
Thunderstorms	
Lightning	
Tornados	
Squall lines	
Hurricanes	
AIR POLLUTION	17
History of air pollution	
Types and sources of pollutants	
Principal pollutants	
Ground-level ozone	
Stratospheric ozone	
WORLD CLIMATE AND CLIMATE CHANGE	18, 10
Climate classification	
Global climate patterns	
Past climates	
Causes of climate change	
Global warming	

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FIELD COMPONENT: Students will participate in data gathering and interpretation. The weather-related information will be obtained on the ship and off the ship to learn how weather and climate varies along the coast of the eastern Pacific Ocean. In addition, students will participate in gathering data to learn how the air composition changes along the coast of Central and South America.

## METHODS OF EVALUATION:

The class will meet two times a week. Attendance to all classes is expected. Although the instructor will closely follow the textbook, there is absolutely no substitute for attending the lectures in order to do well in the course. The course covers considerable ground, and the material will add up deceptively quickly over the term. Students are strongly encouraged to participate in class. Exams will draw heavily upon the topics and material covered in the lectures, a substantial portion of which may not be adequately covered in the textbook. Only by attending class students will obtain a firm understanding of what the course will cover, be able to ask questions about topics difficult to understand, and get a better sense of what material is truly central to the course.

There will be three exams during the semester. The exam questions will be based almost entirely on the material presented in class. Therefore, class attendance is essential if students are to obtain the information necessary for the exams. Several problem sets will be assigned over the course of the semester and included in the final grade of the course. Some problem sets will be based on local weather data to be obtained by students taking the course. The instructor will provide the necessary instruments to make the required measurements. The problem sets are designed to help students put to practice the concepts and principles covered in the course. Cooperation among students is permitted while working on assignments, but the submitted work must represent the individual effort made by each student. Assignments submitted past the due date will not be accepted for grading. Three exams are scheduled during regular class hours. No make-up exams will be given. If students have any conflicts (i.e., officially sanctioned by the Semester at Sea program) with the exam dates, then students must immediately bring them to the attention of the instructor so that alternative arrangements can be made. Marks for the course will be allocated as follows:

Problem Sets:	25 %
Exam 1:	25 %
Exam 2:	25 %
Exam 3:	25 %

The final grade will be determined according to the following scale:

A+: Above 95	A: 90-94	A-: 85-89
B+: 80-84	B: 75-79	B-: 70-74
C+: 65-69	C: 60-64	C-: 55-59
D+: 50-54	D: 45-49	D-: 40-44

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ORDER FORM FOR REQUIRED TEXTBOOKS

**AUTHOR:** C. Donald Ahrens

**TITLE:** Meteorology Today

**PUBLISHER:**

**ISBN #:**

**DATE/EDITION:** 2006, 8th Edition

**COST:** \$104.95

RESERVE LIBRARY LIST

You may suggest a maximum of four books per course for the Reserve Collection. Our librarian will consult the library collection to see if we already have these books.

If we do not have the books, the librarian will purchase them for the permanent collection.

If you are listing more than four books, please indicate those books to which you place top priority, and the librarian will do her best to acquire those. If those you indicate are not available, she will try to acquire additional books that are on your list.

You may also bring books and materials from your own collection to be placed on Reserve.

**AUTHOR:**

**TITLEy**

**PUBLISHER:**

**ISBN #:**

**DATE/EDITION:**

**COST:**

ELECTRONIC COURSE MATERIALS

In addition to course texts and reserve library materials, each faculty member will have an electronic course folder housed on the ship's intranet. The University of Virginia library will scan articles and chapters identified by the faculty member as needed supplementary materials for the courses they are teaching. These supplementary materials will be placed in the faculty member's intranet folder for students to access from their own computers or from the computer lab.

**AUTHOR:**

**ARTICLE/CHAPTER TITLE:**

**JOURNAL/BOOK TITLE:**

**VOLUME:**

**DATE:**

**PAGES:**

ADDITIONAL RESOURCES

**Do you anticipate that students will be expected to locate and employ resources beyond required texts, reserve library reading and intranet resources? If yes, please identify these resources.**