

GEOLOGY 117 Class #1: Intro to the Course (Rev. 1/14/08)

- Why study the Oceans?
- Why study science?
- Course Objectives and 4 segments

Why study the oceans?

The oceans affect life on earth, human life impacts the oceans, and the oceans contain fascinating physical and biological features. Examples:

- 1- The earth's climate is strongly linked to ocean currents, ocean surface temperatures, and moisture given off by the oceans
- 2- Coral Reefs seem to be endangered- "bleaching" episodes (cause unknown- pollution, global warming?)
- 3- Trenches, ridges and other features of the oceans bottom are huge compared to canyons and mountains on the continents and tell us much about the movements of the plates making up the earth's outer skin.

Another emphasis in this course: An intro to science and its role in our society and our environment.

What is Science?

A collection of facts about nature?

...It's much more than just facts in a textbook!!!

A process or method used to decide what is "true" and what is not?

It is that, too.

Sometimes science may seem like a collection of ideas dreamed up by scientists that keeps changing and is never really reliable. Example: Suggestions for how much cholesterol one can safely consume have changed strongly over the last ten years. Is most of science like that?

New theories are tested and refined, or even discarded.

This does not mean that all theories are unreliable

-I will emphasize at times in this course an understanding how science progresses, succeeds, and fails:

-Some scientific theories are well established and reliable

-Newer theories are subjected to debate and testing until they are accepted as the best explanations

-Many theories are revised or overturned

-This does not mean that science is haphazard- it is part of the normal process

-We will examine the development of the theory of plate tectonics in this class. This historical context shows a bit about science progresses (or doesn't in some cases).

Overall Objectives in this course:

- Basic knowledge about the oceans
- Appreciation for the way science progresses
- Appreciation for the INTERCONNECTEDNESS of all things and processes on earth

4 Areas of Oceanography (= the 4 parts of the course)

1. Marine geology:
Nature and origin of ocean basins and sediments.
2. Chemical oceanography:
Dissolved salts, gases, and nutrient elements in the sea.
3. Physical oceanography:
The physical properties and dynamics (currents, waves, tides) of the oceans and seawater.
4. Biological oceanography:
Marine organisms, their environments, and adaptations to those environments.

Discussion of **Hurricane Katrina (August, 2005)**

Questions:

- Why do winds spiral so violently in hurricanes?
- Why do hurricanes only form in certain areas?
- Why was it so strong?
- Why was this year the worst year ever for Hurricanes?
- Will hurricane damage continue to increase?

Answers to these questions draw from understanding of:

- How winds work on earth, and what drives them.
- Strong connections between ocean temperatures and storms.
- Strong connections between the oceans and weather in general (like El Niño)
- How water vapor influences storms.
- Global warming and its effects on ocean temperature and weather. For example, see:

<http://www.time.com/time/nation/article/0,8599,1099102,00.html>

Discussion of the **Asian Tsunami of December, 2004.**

Questions:

- What caused it?
- What happens as a tsunami hits?
- How could it travel so far across the ocean?
- Will this happen again?
- Could this happen to the U.S.?
- How can warning systems be set up to save lives?

Answers to these questions draw from understanding of:

- The geology of the ocean basins- where these earthquakes occur and how often
- Seismological methods for locating and characterizing earthquakes
- Wave motion and the peculiar characteristics of tsunami waves
- Wave dynamics as waves move into shallow water from deep