GEOS 110 The Earth –Ocean – Atmosphere System

Winter 2005 Course Outline

1. Instructor

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2. Intended Learning Outcomes

After successfully completing all components of this course students will be able to:

1. Describe and interpret short-term and long-term Geologic, Oceanic and Atmospheric processes and their interactions.
2. Make meaningful scientific observations and collect, analyze and interpret quantitative data with reference to Geologic, Oceanic and Atmospheric processes.
3. Understand orbital motion and wave motion and apply standard equations to compute wave velocity.
4. Understand basic concepts of fluid motion.
5. Plot and interpret relationships among temperature, salinity and density of seawater, and how these properties vary over time.
6. Draw and discuss the global pattern of continents, oceans and currents
7. Understand current transport and assess the role of currents in global heat transfer.
8. Identify relationships among surface ocean currents and atmospheric circulation.
9. Analyze grain size of sediment samples and interpret current environment and sedimentary environment of deposition from sediment data.
10. Determine salinity of water samples and the relationship of salinity to temperature, density and dissolved gases.
11. Describe the energy budget of the atmosphere, and its short-term and long-term variability.
12. Describe the chemical evolution of the atmosphere.
13. Identify coastal processes at the land-sea interface
14. Relate ocean distribution, ocean-floor topography and ocean depth data to processes of sea-floor spreading, plate tectonics and the age of ocean basins.

3. Required Materials

(a) Texts

GEOS 110 custom text, Thurman, Trujillo, Tarbuck, Lutgens
Prentice Hall

(b) Other

Hand lens, pencils, coloured pencils, drawing compass, ruler.

4. Course content and schedule

Instruction **Classroom** 3 hours, **Lab** 3 hours

14 weeks

5. Assessment

(a) Lab exercises 10 X 2.5%
(b) Lab quiz 10%
(c) Written exams 20, 20, 25%

6. Grading system

Letter grades will be assigned according to the A&S system.

7. Major topics to be discussed

1. A brief history of Earth-, Ocean-, and Atmospheric Science.
2. The Universe, the Solar System, Early Earth processes.
3. Plate tectonics, continents, ocean basins.
4. The "Systems" approach to Earth, Oceanic and Atmospheric interactions.
5. Geochemical cycles, Global energy balance.
6. Marine sediments and the record of past environments.
7. Ice, water, water vapour and sea water.
8. Chemistry of seawater – dissolved ions and gases, inorganic carbon and carbonates.
9. Ocean-atmosphere interaction.
10. Oceanic circulation.
11. Atmospheric circulation.
12. Waves, water dynamics and tides.
13. The land-sea interface; coastal processes.
14. Introduction to nutrients and life in the ocean.
15. Climate variability, global warming, ozone depletion, sea-level change.
16. Other planets and moons.
17. The future??

8. Labs

Labs will be of several types:
local field trips,
"hands-on" labs to study thermal properties and motion of fluids
"paper" labs dealing with distribution of earth materials, plate tectonics, ocean currents, atmospheric circulation
a student project involving local fieldwork, data collection and analysis