

Survey
UAH ESS

Course Description
ES 103—Earth System Science

For many years the Earth has been studied by studying its component parts: the solid earth (geology), the ocean (oceanography), the atmosphere (atmospheric science), the biosphere (biology), and the solar system (astronomy). This course concentrates on the *interactions* between the components, those fundamental processes which constitute the inner workings of the Earth System. Among the topics to be discussed are the energy cycle, the rock cycle, the hydrologic cycle, the carbon cycle, the nitrogen cycle, glaciation, volcanism, population pressures, mass extinctions, and global change.

Tentative Outline
ES 103—Earth System Science

- I. Origin and History of Earth's Components
 - A. Solar System
 - B. Solid Earth
 - C. Ocean
 - D. Atmosphere
 - E. Biosphere

- II. Structure and Dynamics of the Components
 - A. Solar System
 - 1. Solar radiation
 - 2. Moon and planets
 - 3. Asteroids and comets
 - B. Solid Earth
 - 1. Minerals and matter
 - 2. Origin of igneous rocks
 - 3. Weathering and soils
 - 4. Sedimentary rocks
 - 5. Volcanism
 - 6. Continental drift
 - C. Ocean
 - 1. Large-scale wind-driven circulations
 - 2. Thermo-haline circulations (bottom water formation)
 - 3. Coastal and open ocean upwelling
 - 4. Western intensification (Gulf Stream)
 - D. Atmosphere
 - 1. Radiative properties
 - 2. Dynamical properties
 - 3. Thermodynamic properties
 - 4. Chemical properties
 - 5. Weather systems
 - 6. Climate
 - E. Biosphere
 - 1. Life forms
 - 2. Ecosystems
 - 3. Evolution

- III. Interactions Between the Components
 - A. Energy cycle
 - B. Rock cycle
 - C. Hydrologic cycle
 - D. Carbon cycle
 - E. Nitrogen cycle
 - F. Glaciation
 - G. Volcanism
 - H. Population pressures
 - I. Mass extinctions
 - J. Global change

- IV. Earth System Modeling
 - A. Introduction to modeling
 - B. Stella models
 - C. SimEarth