SCHOOL OF EARTH SCIENCES

EARTH SCI 580 *Standards-based Earth Science for Educators* U G 1-5

Course Description (summary)

Earth science integrates geology, oceanography, meteorology and other physical and biological disciplines to understand Earth's processes using an integrated system concept. Teaching Earth science at the K-12 level requires knowledge over a range of different and very dynamic fields of sciences. This course will use Ohio Department of Education's Academic Content Standards on Earth sciences to expose students (current and future teachers) to some of the most recent developments in the field, focusing on the theme "Earth as a dynamic interactive system". A mixture of lectures, seminar presentations, and hands-on lab activities will be used throughout the course. Many free resources and supplemental materials available through the internet (such as Google Earth and ArcGIS Explorer) will be tested. Real datasets will be used to explore some of the most pressing issues of our time, including climate change and mankind's growing need for energy.

Objectives (Student Learning Outcomes)

The main goal of this course is to improve instructional practices of prospective and practicing teachers of Earth sciences at the pre-college level. It will achieve this goal by: (1) providing essential and updated Earth science content through the perspectives and methods of inquiry, focusing on the theme "Earth as a dynamic interactive system" (interactions between Earth's geospheres: lithosphere, atmosphere, hydrosphere, and biosphere, including the anthroposphere); and (2) exposing the students to dynamic teaching resources such as field projects (using GPS or other field equipments, performing a hands-on project in environmental monitoring, visit to dedicated science museums, or working with real datasets) and visualization activities (using satellite images, aerial photographs, GIS, and other databases of visual information such as Google Earth, TerraScope, TerraExplorer, NASA's World Wind, ArcGIS Explorer and others).

The course will focus on science as "an inquiry method to better understand the natural world", rather than "a collection of facts to be memorized". We will emphasize decision-making, theory formulation, and reasoning, rather than technical skills. This will require active participation of students and plenty of opportunities will exist for students to build their knowledge, understanding, and ability. A mixture of lectures, seminar presentations, hands-on lab activities and field trips will be used throughout the course.

Relationship to Other Courses/Curricula

Earth science, by nature, is a multidisciplinary endeavor. It was born from the realization that, to properly understand Earth processes, elements from different disciplines within the physical and life sciences had to be brought together. As such, this course and its content relates to other courses in various academic units in different colleges. These include:

- ⇨ College of Biological Sciences:
    - EEOB 656 Ecosystems of the World U G 3
    - EEOB 661 Conservation Biology U G 5
    - EEOB 700 Principles of Biogeography U G 5
    - EEOB 785 Stream Ecology for Teachers U G 3

- ⇨ College of Education and Human Ecology:
    - EDU T&L 489.02 Science Education Elementary School Program U 3-5
    - EDU T&L 489.05 Science Educ. Secondary School Science Class and Labs U 3-5
    - EDU T&L 614 Marine and Aquatic Education U G 3
    - EDU T&L 636 Practicum in Science for Teachers
    - EDU T&L 715 Integration of Science & Math Learning Using Real Data Sets U G 3
    - EDU T&L 752 Science in the School Curriculum U G 4

- ⇨ College of Engineering:
    - CIVIL EN 410 Environmental Pollution and Control U 3
    - CIVIL EN 516 Water Resources Engineering U G 4

- ⇨ College of Food, Agricultural, and Environmental Sciences:
    - ANIM SCI 360 Global Food and Agriculture U 5
    - ENR 203 Society and Natural Resources U 5
    - ENR 355 Water Quality Management U 3
    - ENR 400 Natural Resources Policy U 5
    - ENR 531 Environmental and Natural Resources Economics U G 5
    - ENR 606 Natural Resources Management U 5
    - ENR 617 Aquatic Environmental Science for Teachers U G 3
    - ENR 660 Soil Chemical Processes and Environmental Quality U G 5
    - ENR 715 Community Education for Environmental Issues U G 3

- College of Mathematical and Physical Sciences (MAPS):
    - PHYSICS 103 The World of Energy I U 5
    - EARTH SCI 110 History of Life on Earth-Global Change in the Biosphere U 5
    - EARTH SCI 203 Environmental Geoscience U 5
    - EARTH SCI 204 Exploring Water Issues U 5
    - EARTH SCI 411 Water Security for the 21st Century U 5
    - EARTH SCI 583 Field Geology for Educators
    - EARTH SCI 584 Principles of Oceanography for Educators U G 3
    - EARTH SCI 663 Global Change and Sustainability in the Earth System U G 5
    - EARTH SCI 717 Critical Issues in World Freshwater Resources U G 5

- College of Social and Behavioural Sciences:
    - ATMOS SC 629 Climate System Modeling: Basics and Applications U G 5
    - GEOG H410 Global Climate and Environmental Change U 5
    - GEOG 490 Introduction to Biogeography U 5
    - GEOG 520 Climatology U G 5
    - GEOG 622 Microclimatology U G 5
    - GEOG 635 Globalization and Environment U G 5
    - GEOG 821 Dynamic Climatology G 5
    - GEOG 823 Applied Climatology G 5