

SCI 2234/SCI L234 - Earth Science/Earth Science Lab

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Course Description:

Earth Science introduces the students to all the sciences that collectively seek to understand the Earth and its neighbors in space. Its subject matter borrows heavily from astronomy, geology (physical and historical), geography (meteorology, climatology and geomorphology), oceanography, and pedology (soil science). This course evaluates the origin of the universe, the development of our solar system and the relationship of the solar system to our dynamic earth system, and the patterns that result from this relationship. Its major focus, however, is the earth itself and the processes that contributed to the present patterns of the physical landscape and other environmental phenomena.

The course starts by introducing the student to the four interrelated and interconnected components (the environmental spheres) of the earth system and the vital role these parts play in sustaining life on earth. It explores the human population growth in relation to the physical environment, resources and their utilization and the ensuing concerns of environmental degradation. After evaluating the position of the earth and its relationship to other bodies in the universe, the course, then focuses on a systematic analysis of the composition, characteristics, development, processes, transformation, and classification (if appropriate) of the lithosphere, the hydrosphere, the atmosphere, and the biosphere, their phenomena, and the transformation that man has made on the natural environment through resource development and usage.

Textbooks:

1. Earth Science by Edward J. Tarbuck and Frederick K. Lutgens. New Jersey: Pearson Publishing, 2003
2. Handouts.

Prerequisites:

Earth Science (SCI 234) has no prerequisites. It is open to non-science majors to satisfy the science component of the general education requirement. It may also be taken as an elective.

COURSE OBJECTIVES:

The objectives of Earth Science are to:

1. Contribute to the overall intellectual development of students by providing them with an introduction to the study of the Earth System and its environmental components, and to the tools used to describe and examine such systems;
2. Foster the student's understanding of basic Earth Science principles and the environmental systems;
3. Examine selected environmental hazards, problems and issues relating to local and global systems.

Attendance Policy:

Attendance is required of all class and lab sessions in this course. There will be absolutely no make-ups for quizzes, since they will be unannounced. Make-ups will only be given for examinations and labs for only those students with verifiable excuses {university authorized and sponsored events and family/personal emergencies (serious illness and dead of closed relative)}, and must be completed within one week of the said missed assignment, and **must be done only in my office at 106 Trenholm Hall, Alabama State University.** **No make-up will be given after the one-week grace period.** Students with excessive absences will receive a failing grade (F) in this course. Therefore, make sure your schedule permits you to take this course at this time.

Dishonesty of all sorts (cheating, copying, or plagiarism) in academics is a very serious offense and would be dealt with severely.

Course Evaluation

This course requires the student to participate in three written examinations and at least two unannounced quizzes, totaling 700 points (See point distribution). Some of the laboratory experiences will also be tested with the examinations and quizzes.

Two Quizzes	100 points
Examination One	200 points
Examination Two	200 points
Final Examination	200 points
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Total	700 points

Grading

Each student will be evaluated on the above listed items.

630 -700 points or 90 - 100 percent	A
560 - 629 points or 80 - 89 percent	B
490 - 559 points or 70 - 79 percent	C
420 - 489 points or 60 - 69 percent	D
Under 420 points or 60 percent	F

STUDENTS WITH DISABILITIES:

Student meeting Americans with Disabilities Act criteria must contact Students Affairs (241-9532 - Room 431 Whitley Hall) for information regarding documentation of disability and with respect for special services and accommodations

SCI 234 - Earth Science COURSE OUTLINE

1. Introduction - pages 1-17
 - What is Earth Science?
 - The Earth's Environmental Spheres and their significance
 - Resources, Population, and Environment
 - The Nature of Scientific Investigation and its utility
2. The Earth's Location in the Universe - Chapters 20-23
 - Interstellar System
 - The Solar System and its bodies
 - The four major Movements of the Earth and other Bodies of the Universe and their Effects
3. Composition of the Solid Earth (Lithosphere) -
 - Minerals, Rocks and Soils - Chapter 1, 2 and 3 (74-84)
 - Kinds of Minerals, Structure and their Properties Chapter 1
 - Groups of Rocks - Chapter 2
 - Soil Development, Types, and Characteristics Chapter 3 pp. 74-84
 - The History of the Earth and the Geologic Time Scale Chapter 10-11

FIRST EXAMINATION

4. Land-Shaping Processes - Chapters 3-5 and 8-9
 - Introduction to Land-Shaping Processes
 - Tectonic Processes and Mountain Building - Chapters 8-9
 - Vulcanism - Chapter 8
 - Diastrophism - Chapter 9
 - Gradational Processes - Chapters 3-5
 - Weathering, Erosion and Mass Wasting and Deposition Chapter 3
 - Running Water and Groundwater - Chapter 4
 - Glaciers, Deserts and Wind - Chapter 5
5. Continental Drift Theory and Plate Tectonics - Chapter 7
 - Alfred Wegener's Continental Drift Theory
 - Concept of one Super Continent
 - Plate Tectonic Theory and Reality
 - Plate Boundaries
 - Earthquakes and Volcanoes - Chapter 6 and 8
6. Oceanography - Chapters 12-14
 - Extent of the Oceans
 - Nature of Sea water - Composition of Sea water
 - Structure of the Ocean Floor
 - The Restless Ocean - Chapter 14
 - Currents, Tides and Waves and their Effects
 - Waves Actions and Shoreline Features

SECOND EXAMINATION

7. The Atmosphere - Chapter 15

- Earth-Sun Relationships
- Earth's Rotation and Revolution and their effects
- Seasonal Changes and the Earth's Axis
- Insolation and Temperature
- Mechanisms of Heat Transfer
- Agents of Heat Transfer
- Thermal Layers of the Atmosphere
 - Composition of the Atmosphere
 - Weather and Climate - their Elements and Controls

8. Atmospheric Moisture - Chapter 16

- Humidity
- The Hydrologic Cycle
- Evaporation, Transpiration, Condensation and Precipitation
- Global distribution of precipitation and Variability

9. Atmospheric Pressure and Wind - Chapters 17-18

- Global Pressure Belts and Wind Systems - Chapter 17
- Factors Affecting Wind –
 - Cyclones and Anticyclones
- Local Winds
- Measurement of Pressure and Wind
- Transient Air Flow and Weather Patterns - Chapter 18
 - Air Masses
 - Frontal Activities
 - Atmospheric Disturbances (Hurricanes, Tornadoes and Thunderstorms)

10. Climates and their Classification - Chapter 19

- Insolation Zones and Global Climatic Patterns
- Koppen's Classification of Climates
- Climates and the Distribution of Living Things
- Human Impact on Global Climate.

11. Addressing Environmental Issues and Concerns

Deforestation - The Tropical Rainforest, Mid-latitude Forest

Desertification - The problem of the advancing desert conditions and the concerns

Pollution - Air, water, and land - the case of acid rain

Greenhouse Effect

Global Warming and its possible effects on the ice, sea level and heavily populated coastal areas of the world

The Ozone Problem

The issues of human population Growth and the Carrying Capacity of the Earth

FINAL EXAMINATION

LABORATORY EXERCISE

Sci. 234 - Earth Science Laboratory

Earth Science 234 requires weekly laboratory exercises. These weekly laboratory exercises will be graded separately and will be counted as a separate course grade. Most of the laboratory exercises will be given as take-home assignments. These weekly, hand-on laboratory exercises include the following representative topics: No late laboratory assignment will be graded..

Lab 1 - Determining Geologic Time Scale, living things and geologic events.

This exercise involves the understanding of the Geologic Time Scale and relating different Eon, Era, periods, and epochs to the existence of living things and other geologic events on the earth's surface.

Lab 2 - Common rocks and minerals and their identifications.

The student will use the different properties as described in the text to identify common rocks and minerals.

Lab 3 - Field Work on weathering, erosion and mass wasting for designated sites in the Montgomery Area (to be done on a Saturday).

This will be an in situ field evaluation of how gradational processes modify the land surface. Emphasis will be placed on soil erosion and its universal scientific applicability. During the lab session there will be a video tape session on land-shaping processes to include tectonism.

Lab 4 - Earth-Sun Relationships - seasonal changes, insolation and temperature and its measurements.

In this exercise the student determines the seasonal changes, the relationship between insolation and temperature as dictated by the angle of incidence and latitudinal variations. The exercise will also engage the student in temperature measurements and their conversions.

Lab 5 - Adiabatic processes, temperature, precipitation (orographic and convectional) with changes in elevation and climatic control.

This laboratory exercise allows the student to determine the temperature characteristics of a parcel of air that is moving vertically and to relate the adiabatic processes to cloud formation and the resulting precipitation or the lack of it.

Lab 6 - Atmospheric pressure, its measurement, and its pattern with changes in elevation.

This exercise allows the students to determine the pressure characteristics in an increasing or decreasing altitude in a mountainous setting.

Lab 7 - Daily weather map\data collection over a seven-day period for interpretation (to be assigned at least eight days prior to the day of the lab).

This lab session requires the students to collect daily weather data from weather maps as represented in selected daily newspaper(s) over a seven-day period for analysis and interpretation.

Lab 8 - Interpreting available data in identifying climates and their classification.

This exercise will involve the students to be able to:

- a) determine monthly average temperatures and range of temperatures critical for plant growth;
- b) calculate the monthly average precipitation and total precipitation requirements for plants;
- c) classify temperature and precipitation data using the Koppen System and identify the climate and possible location of each climate and the dominant climatic control or controls; and
- d) construct climographs using the data available.

Grading The Laboratory Exercises

Each student will be evaluated on the above laboratory exercises, totaling 200 points:

180 -200 points or 90 - 100 percent	A
160 -179 points or 80 - 89 percent	B
140 -159 points or 70 - 79 percent	C
120 -139 points or 60 - 69 percent	D
Under 120 points or 60 percent	F