Learning Objectives

Observations

- Students will develop the basic observational skills needed to function as geoscientists.
- Students will make quantitative measurements of various physical, chemical and biological properties of the Earth system.
- Students will develop mapping skills and use such (topographic and geologic) maps to estimate distances, visualize landforms, and locate / identify geographic and geologic features.
- Students will identify the common forms of igneous, metamorphic, and sedimentary rock in hand samples and in field exposures using observations of mineral composition and texture.
- Students will be given the opportunity to acquire essential laboratory skills through internships in various research laboratories within the Department. Depending on their interest, these experiences will teach them the basic geological, geochemical, geophysical, analytical and modeling skills to function as professionals in the geosciences.

Scientific Method

- Students will apply skills such as inductive, deductive, and mathematical reasoning to solve Earth science problems.
- Students will integrate data from field work, laboratory measurements, library research, and / or their coursework to formulate or evaluate a geoscientific hypothesis.
• Students will apply mathematical models and analysis to quantitatively describe and predict the behavior of Earth phenomena.
• Students will acquire a solid foundation in statistical analysis and learn how to apply probabilistic reasoning to the Earth system, learning to discriminate between competing hypotheses based on factual evidence.
• Students will learn how to critically evaluate scientific information in visual and written forms.

Scientific communication

• Students will demonstrate the ability to acquire and communicate scientific data, ideas, and interpretations through written, oral, visual, and digital means.
• Students will demonstrate the ability to accurately report on and draw conclusions from careful readings of works of scientific journalism and research literature.
• Students will use the USC library and online databases to locate and retrieve publications relevant to a research question or project.
• Students will produce written reports that clearly and accurately describe and illustrate the background, methods, data, and interpretations relevant to a particular project.
• Students will produce and present oral reports based on posters or digital media (e.g. Power Point, Keynote) that clearly and accurately describe and illustrate the background, methods, data, and interpretations relevant to a particular project.
• Students will demonstrate proficiency in the visual display of quantitative information and associated plotting and editing software.
• Students will demonstrate the ability to accurately and ethically incorporate and cite a variety of scholarly sources in their written reports and oral presentations, and will evaluate the relative reliability of sources of information and discriminate between peer-reviewed, edited, and “wiki” publishing.
• Students who have elected to participate in research will be given opportunities to communicate their results at regional, national and international research conferences.

Geosystems

• Students will develop an understanding of the Earth through the study of complex geosystems that interact across a wide range of spatial and temporal scales.
• Students will learn the essential properties of Earth’s components, including its core, mantle, asthenosphere, lithosphere, cryosphere, hydrosphere, atmosphere and biosphere.

• Earth processes operate over the broadest range of time scales, from billions of years to fractions of a second, and at rates ranging from gradual to sudden. Students will gain a unique understanding of Earth’s place in space and time by studying the chemical, physical, and biological evolution of the Earth system.

• Students will learn how interactions within and between geosystems give rise to emergent behaviors of the Earth system.

• Students will formulate an understanding of the Earth based on exchanges of matter, momentum, and energy among different geosystems.

• Students will recognize human civilization as a geosystem that interacts strongly with other global-scale geosystems.