

Geology Course Descriptions, Spring 2021

GEOL 100 Earth in Action

Are you interested in the Earth's energy, mineral, and water resources? Do you want to learn more about climate change, environmental problems, the Earth's pre-human history, and the causes of earthquakes and volcanic eruptions? GEOL 100 will help you learn more about these topics and more. This class is a 3-credit hour introductory geology lecture that covers a variety of topics about the Earth's physical and chemical processes, including how rocks and minerals form and are used to interpret the Earth's history. Various techniques of active learning and student engagement such as virtual reality field trips (and real field trips for the First Year Seminar section) are used to help reinforce lecture discussions and help students learn to think like a scientist.

GEOL 103 (Geology Laboratory) may be taken with this lecture course to make it an elective with a laboratory section. It is also offered online through Global Campus. K-State 8 tags Historical Perspectives, Natural and Physical Sciences

GEOL 102 Earth through Time

The purpose of this course is to tell you the story about how the Earth came to be, how the planet and life on it evolved from its formation 4.5 billion years ago to the present, and to discuss the interconnectedness of the physical and biological realms. You will also learn how scientists know all that! By the end of the course, you should be able to (1) understand the internal and external processes in the Earth, (2) have a general notion of the techniques applied to historical geology, and (3) have an overall view of the history of the Earth, understanding the interrelationship between major events and the evolution of life, geologic time; plate tectonics and the evolution of continents, oceans; history of life as revealed in the geologic record; and past climates.

GEOL 103 (Geology Laboratory) may be taken with this lecture course to make it an elective with a laboratory section. It is also offered online through Global Campus. K-State 8 tags Historical Perspectives, Natural and Physical Sciences

GEOL 103 Geology Laboratory

This class is a 1 credit hour introductory geology laboratory that meets once a week for 2 hours. In this lab you will learn about basic geology topics in a hands-on active session. The topics include identification of rocks and minerals, geologic maps, topographic maps, streams and groundwater and landforms. During the lab session you will use an augmented-reality sandbox to learn about topographic maps, virtual reality field trips to learn about different landforms, a stream table to learn about evolution of river beds over time and many other hands on activities involving mineral and rock specimens, and different maps.

Prerequisite or co-requisite: GEOL 100, GEOL 102, or GEOL 125. K-State 8 tag Natural and Physical Sciences

GEOL 115 Environmental Geology

This course is intended to provide you with a scientific overview of geology as it relates to human activities and the interaction between human activity and geological processes. In particular, we will investigate (a) the physical constraints imposed on human activities by the near-surface and surface geological processes that are continually shaping the environment that we live in, (b) the resources that we utilize to sustain our lives on Earth, and (c) global environmental issues such as climate change, geologic hazards, natural resources and water use.

This course is also offered online through Global Campus. K-State 8 tag Global Issues and Perspectives, Natural and Physical Sciences

GEOL 125 Natural Disasters

This introductory lecture course introduces you to geological phenomena such as earthquakes, volcanic eruptions, tornadoes, hurricanes and floods, with particular emphasis on their causes, effects and significance as hazards. By enrolling in this course, you will learn about Earth's processes, gain an appreciation for natural forces that impact our lives in very significant ways, and become a better-informed citizen. This course meets natural and physical science and social science requirements of K-State 8.

Geology 103 (Geology Laboratory) may be taken with this lecture course to make it an elective with a laboratory section. It is also offered online through Global Campus. K-State 8 tag Natural and Physical Sciences and Social Sciences. A First-Year Seminar section is offered in the fall.

GEOL 503 Petrology

In Petrology, you will learn to recognize common igneous, metamorphic, and sedimentary rocks in both hand specimen and by using microscope techniques. In addition, you will learn to interpret parts of the geologic history of the rocks. A rock's mineralogy, mineral textures, mineral chemistry, and bulk chemistry provide a language that we can read and ultimately interpret as a way of understanding the geologic history of a particular location or time period on the Earth.

GEOLOGY 510 (Geology of Planets)

We begin with a brief history of space exploration to the current time, followed by an examination of the current state of knowledge about the origin of our universe, galaxy and of our solar system and the origins and evolution of its planets, moons and asteroids. We then review the current state of knowledge concerning the planetary system of other stars, which until a few years ago was completely unknown and where only recently have actual long-distance observations been made. These dynamic and developing areas of scientific research are at the frontier of geologic science, and always capture the interest and imagination of students. The course concludes with a discussion of current thinking concerning life in the universe beyond the Earth, including the possibility of intelligent extraterrestrial life.

GEOL 560 Field Methods

Geology is a field-based discipline that necessitates numerous field investigations either to produce geological maps, estimate natural hazards or to look for natural resources. For this, geologists make observations of the earth at different scales, from satellite imagery to an outcrop or rock. These observations are then plotted on maps using either paper or more sophisticated GIS software. In this class students will have the opportunity to learn different basic field methods and use their knowledge on specific problems. The primary goal of the course is to provide students the basic tools and skills for further field investigations. This class includes two 2-day mapping projects.

K-State 8 tag Natural and Physical Sciences and Empirical and Quantitative Reasoning

GEOL 605 – Intro to Geochem

Knowledge you can gain from this course has a lot of practical value for all areas of Earth and environmental science and engineering. In this course, we will build on the concepts you learned in undergraduate chemistry courses and learn how to apply them to geological environments. From this course you will gain an understanding of controls on the distribution of elements and chemical reactions of significance in geological environments. Furthermore, you will be able to apply geochemistry concepts to evaluate compositions of Earth materials and analyze geochemical processes.

GEOL 611 Hydrogeology

This course focuses on physical and chemical properties of water, principles of the water cycle, surface and ground water hydrology and contemporary global issues such as flooding and others related to water resources. Problems of contamination and pollution will be discussed.

GEOL 625 Introduction to Engineering Geology and Petrophysics

Students learn basic fundamentals to solve real-world problems in the area of geology and petrophysics. A field trip to an onshore oil rig in Kansas helps consolidating course materials with demands.

GEOL 630 Sedimentology and Stratigraphy

Sedimentary rocks cover up to 75% of the Earth's surface, recording the evolution of life and telling the story of how the environments have changed through time. This course will introduce the basic principles of Sedimentology, which deals with how sediments are transported and deposited, and Stratigraphy, the study of the spatial and temporal relations between sedimentary layers that record many of the details of the Earth's history: effects of sea level change, global climate, tectonic processes, and geochemical cycles. By learning about the processes that take place in modern environments, you will be able to interpret and reconstruct past sedimentary environments. In this course, you will develop the skills necessary to describe and interpret sedimentary rocks and stratigraphic successions, so you can understand the geologic history of a region.

GEOL 650 Geomicrobiology

Microorganisms are very small but they have a big impact the world around us. They affect the quality of our water resources, the composition of the atmosphere, the fertility of soils, the abundance and properties of energy resources, and more. This course includes lab and lecture components and will help you learn basic information about microbes and the major biogeochemical cycles, how natural environments influence the activities of microbes, and how microbes, in turn, impact natural environments. Because this course covers basic information about microorganism, you will not need to have much prior experience with microbiology prior to the course. Note that this course satisfies the College of Arts and Sciences Life Science requirement.

GEOL 740 Regional Geology

Interpretations of structural, stratigraphic, igneous, and tectonic history of selected sites in North America.

GEOL 741 Seismic Data Processing

Principles of 3D seismic data processing techniques and the application of industrial software package(s) to process raw field seismic reflection data to rendit it in a form suitable for the seismic interpretation stage. This form of seismic data is utilized in subsurface reservoir characterization.

GEOL 747 Introduction to MatLab

This course will provide you with a general introduction to MATLAB, including data processing (curve fitting, interpolation, statistics, signal processing), data visualization (2D, 3D graphs), programming, and data export/import. It is an introductory course designed for students who are new to MATLAB, including those who have little experience with other programming languages, although students with experience of programming in other languages will benefit from this course.

GEOL 770 Subsurface Methods

Principles and applications of subsurface geology

GEOL 825 Advanced Engineering Geology and Petrophysics

Students learn advanced concepts with broad applications in the oil/gas industry, analyze actual experimental data, and use state-of-the-art software in the areas of unconventional reservoirs.