

# GEOLOGICAL SCIENCES (GEOL)

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## **GEOL 395. Undergraduate Research in Geology. 1-4 Credits.**

Permission of the instructor. Research in geology under the supervision of a selected instructor. Approved learning contract required. May be repeated up to four times for a maximum of 12 credits.

### **Rules & Requirements**

#### **IDEAs in Action Gen Ed: RESEARCH.**

**Making Connections Gen Ed:** EE- Mentored Research.

**Repeat Rules:** May be repeated for credit. 12 total credits. 12 total completions.

**Grading Status:** Letter grade.

## **GEOL 502. Earth Surface Processes. 3 Credits.**

This course will focus on the processes of soil formation, erosion, and landform evolution with an emphasis on the interaction of geomorphic processes with surface hydrology and ecosystems. (EES)

### **Rules & Requirements**

**Making Connections Gen Ed:** PL.

**Requisites:** Prerequisite, GEOG 110.

**Grading Status:** Letter grade.

**Same as:** GEOG 440.

## **GEOL 503. Marine Geology. 4 Credits.**

For graduate students; undergraduates need permission of the instructor. Investigates formation of the oceans, plate tectonics, carbonate reefs and platforms, sediment transport from the land to deep-sea fans, glacial-marine geology, marine records of changes in sea level and climate, and the evolution of barrier islands, estuaries, and deltas. Mandatory weekend field trip to the Southern Outer Banks. Course previously offered as MASC 503.

### **Rules & Requirements**

**Making Connections Gen Ed:** PL.

**Grading Status:** Letter grade.

**Same as:** EMES 503.

## **GEOL 555. Paleobotany: An Introduction to the Past History of Plants. 3 Credits.**

An introduction to the fossil record of plants, investigating how plants originated and changed through geological time to produce the modern flora. Both macrofossils and microfossils will be considered. Three lecture hours a week.

### **Rules & Requirements**

**Making Connections Gen Ed:** EE- Field Work.

**Requisites:** Prerequisites, BIOL 103, BIOL 104, and either BIOL 250 or BIOL 271; or permission of the instructor for students lacking the prerequisites; Corequisite, BIOL 555L; permission of the instructor for students lacking the requisites.

**Grading Status:** Letter grade.

**Same as:** BIOL 555.

## **GEOL 700. Research Seminar. 1 Credits.**

Required of all entering graduate students or permission of the department. A topical seminar in current research topics in the earth sciences. Presentations by selected faculty with an emphasis on in-depth, critical analysis of current research literature. Two hours a week.

### **Rules & Requirements**

**Grading Status:** Letter grade.

## **GEOL 701. Graduate Seminar. 0.5-21 Credits.**

### **Rules & Requirements**

**Grading Status:** Letter grade.

## **GEOL 703. Sedimentary Geology I. 3 Credits.**

Stratigraphic, sedimentologic, geochemical, petrologic, and paleontologic principles will be summarized. Emphasis is placed on both the techniques used in sedimentary geology and on the characteristics and processes that distinguish sedimentary environments.

### **Rules & Requirements**

**Requisites:** Prerequisite, GEOL 402.

**Grading Status:** Letter grade.

## **GEOL 704. Sedimentary Geology II. 3 Credits.**

Continuation of GEOL 703.

### **Rules & Requirements**

**Requisites:** Prerequisite, GEOL 703.

**Grading Status:** Letter grade.

## **GEOL 705. Advanced Petrology I. 3 Credits.**

Application of thermodynamics, phase equilibria, thermobarometry, radiogenic and stable isotope geology, and geochemical modeling to the study of igneous and metamorphic rocks and crustal evolution.

### **Rules & Requirements**

**Requisites:** Prerequisites, CHEM 102, GEOL 304, MATH 233, and PHYS 105.

**Grading Status:** Letter grade.

## **GEOL 706. Advanced Petrology II. 3 Credits.**

Continuation of GEOL 705.

### **Rules & Requirements**

**Requisites:** Prerequisite, GEOL 705.

**Grading Status:** Letter grade.

## **GEOL 707. Stratigraphic Micropaleontology: Mesozoic Calcareous Nannofossils. 4 Credits.**

### **Rules & Requirements**

**Grading Status:** Letter grade.

## **GEOL 708. Stratigraphic Paleontology: Cenozoic Calcareous Nannofossils. 4 Credits.**

### **Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 709. Proposal Writing and Scientific Communication. 3 Credits.**

This course provides a broad view of cutting-edge research across the geo- and marine sciences and develops proposal-writing and scientific communication skills. Proposals follow the NSF Earth Sciences Postdoctoral Fellowships program guidelines and involve peer review and oral presentations. Students will hone their critical thinking and scientific writing skills. They will learn how to craft project objectives and working hypotheses, explain the significance of the problem, outline broader implications, and effectively design a research plan.

**Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 711. Advanced Mineralogy. 3 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 712. Isotope Geochemistry. 3 Credits.**

Survey of isotopic studies in geology; geochronology, crustal evolution, heat flow, paleotemperatures, origin of ore deposits.

**Rules & Requirements**

**Requisites:** Prerequisites, CHEM 102, GEOL 301, 303, and 304.

**Grading Status:** Letter grade.

**GEOL 804. Advanced Igneous Petrology. 4 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 805. Igneous Geochemistry. 4 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 806. Metamorphic Petrology. 4 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 809. Tectonophysics. 3 Credits.**

Fundamental physical processes necessary for an understanding of plate tectonics; stress and strain in solids; elasticity and flexure; heat transfer; gravity; mantle rheology and convection.

**Rules & Requirements**

**Requisites:** Prerequisites, MATH 383, PHYS 201, and 211; Permission of the instructor for students lacking the prerequisites.

**Grading Status:** Letter grade.

**GEOL 851. Seminar in Stratigraphy. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 852. Seminar in Paleoclimatology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 853. Seminar in Paleontology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 854. Seminar in Continental Margins. 0.5-21 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 855. Seminar in Sedimentology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 856. Seminar in Isotope Geology. 3 Credits.**

Introduction to the theory, methods and applications of stable isotopes to low- and high-temperature problems. Primary focus will be on the origin, natural abundance, and fractionation of carbon, hydrogen, and oxygen isotopes.

**Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 857. Seminar in Geochemistry. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 858. Seminar in Petrology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 859. Seminar in Economic Geology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 860. Seminar in Volcanology. 3 Credits.**

All aspects of volcanism will be covered including seismology, geochemistry, deep structure, volcanic products and hazards. Readings of original papers will be stressed.

**Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 861. Seminar in Geophysics. 0.5-21 Credits.**

Develop explanatory and predictive models of the earth's climate. Introductory level and focused on modeling past climate with the hope of understanding its future. A thorough discussion of current global warming/climate change issues, including the science, history, and controversy, are the main topics of the last third of the course.

**Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 862. Seminar in Seismology. 3 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 863. Seminar in Structural Geology. 1-15 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 864. Seminar in Tectonics. 3 Credits.**

The goal of this seminar is to examine the Cretaceous to Eocene tectonics of the western United States to evaluate the putative flat slab processes responsible. Geologic research on the Laramide Orogeny predates plate tectonic theory, and the explosion of subsequent research warrants a reevaluation of existing theory.

**Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 900. Research in Geology. 1-9 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**GEOL 993. Master's Research and Thesis. 3 Credits.****Rules & Requirements**

**Repeat Rules:** May be repeated for credit.

**GEOL 994. Doctoral Research and Dissertation. 3 Credits.****Rules & Requirements**

**Repeat Rules:** May be repeated for credit.