GEOSCIENCES (GEOSC)

GEOSC 500: Issues in Geosciences

3 Credits

Introduction of first year graduate students to issues in geosciences. GEOSC 500

Prerequisite: admission to the Geosciences Graduate Program

GEOSC 502: Evolution of the Biosphere

4 Credits

The geologic history of the co-evolution of life and the surface environment is examined from a systems perspective.

Prerequisite: undergraduate-level coursework in biology and geology

GEOSC 508: Mechanics of Earthquakes and Faulting

3 Credits

An in-depth treatment of fundamental concepts in brittle faulting and earthquake mechanics with emphasis on physical processes. GEOSC 508

Prerequisite: GEOSC465 , GEOSC489 , MATH 251

GEOSC 511B: Transmission Electron Microscopy

1 Credits

Principles and practice of transmission electron microscope operation. Students undertake individual projects.

Cross-listed with: MATSE 511B

GEOSC 514: Data Inversion in the Earth Sciences

3 Credits

This course focuses on how one finds theoretical parameters to explain observed data using discrete inverse theory.

Prerequisite: MATH 220

GEOSC 518: Stable Isotope Geochemistry

3 Credits

Theory of isotope fractionation mechanisms; its application to a wide range of problems in the earth and planetary sciences.

GEOSC 519: Mineral Equilibria

3 Credits

A thermodynamic treatment of minerals and their reactions under geochemically important conditions of temperature and pressure.

Prerequisite: CHEM 450

GEOSC 521: Thermal State of the Earth

2-3 Credits/Maximum of 3

Analytical and numerical solutions to earth-related heat conduction and convection problems; geothermal energy; earth's heat flow and temperature.

GEOSC 522: Geochemistry of Aqueous Systems

2-3 Credits/Maximum of 3

Ionic and molecular equilibria related to stabilities and solubilities of minerals, with applications to ground water, sea water, and hydrothermal fluids.

Prerequisite: CHEM 450 , CHEM 452

GEOSC 523: Sedimentary Geochemistry

2 Credits

Kinetics and thermodynamics of low-temperature processes in sediments. Applications to weathering processes, natural waters, deposition of sediments, and diagenesis.

GEOSC 533: Principles of Geochemistry

3 Credits

A comprehensive treatment of the principles of geochemistry applied to a wide variety of geologic settings and scales.

Prerequisite: CHEM 450

GEOSC 536: Topics in Biogeochemistry

2 Credits/Maximum of 999

This seminar addresses chemical interactions between the biosphere and the physical environment over Earth's history and as impacted by humans. This course will provide a broad survey of biogeochemical principles, and offer a community-building experience for students with biogeochemical interests from diverse departments. Students will complete the course with a synthetic knowledge of the key topics in the field of biogeochemistry. Each week we will focus on a topic within the broad field of biogeochemistry such as: origins of the elements, reactions in the atmosphere, soil development, the distribution of redox reactions and microbial metabolic pathways, and the global cycles of carbon, water, nitrogen, phosphorus, sulfur, mercury, and perhaps other elements. For each topic, we will focus on the questions: What is known or can be observed? How is this information used to understand biogeochemical phenomena and process? How are these processes scaled over time and space? What are emerging and important questions in the subspecialties of biogeochemistry?

Cross-listed with: CE 536, SOILS 536

GEOSC 540: Ore Deposits I

3 Credits

Geochemistry and geology of ore deposits formed by igneous and high-temperature hydrothermal processes.

Prerequisite: GEOSC451

GEOSC 541: Ore Deposits II

3 Credits

Geochemistry and geology of ore deposits formed by low-temperature hydrothermal, sedimentary, and metamorphic processes; continuation of GEOSC 540.

Prerequisite: GEOSC540

GEOSC 542: Quantitative Methods in Hydrogeology

1-4 Credits/Maximum of 4

Investigation of groundwater systems and resources, emphasizing both the practical use and limitations of modeling techniques.

Prerequisite: GEOSC452

GEOSC 545: Glacial Geology

3 Credits

Glaciers: their characteristics, causes, deposits, landforms, effects in periglacial regions.

GEOSC 548: Surface Processes

3 Credits

Principles, application, and interpretation of Quaternary geochronology, surface process studies, and landscape evolution.

Prerequisite: GEOSC340

GEOSC 555: Advanced Structure and Petrofabrics

1-3 Credits/Maximum of 3

Macroscopic and mesoscopic recognition, measurement, and interpretation of small-scale rock structures and mineral orientation patterns in deformed rocks.

GEOSC 558: Multi-channel Seismic Processing and Interpretation

4 Credits

This course covers the basics of seismic energy propagation, modern 2- and 3-D multi-channel seismic data acquisition methods, and data processing.

Prerequisite: GEOSC454

GEOSC 559: Seismology II

3 Credits

Rigorously covers the methods of computing wave fields for point and distributed seismic sources in vertically inhomogeneous elastic media.

Prerequisite: E MCH524A , E MCH524B , or MATH 405 , MATH 406

GEOSC 560: Kinetics of Geological Processes

3 Credits

General development of the kinetic theory of crystal growth, diffusion, irreversible thermodynamics, and heterogeneous reactions needed for geosciences and related fields with applications to current problems.

Prerequisite: CHEM 450 , GEOSC519

GEOSC 561: Mathematical Modeling in the Geosciences

4 Credits

The process of transforming a conceptual geoscience model into a numerical model is presented; students create and solve numerical models.

Prerequisite: undergraduate-level calculus and geology coursework is required; experience in computer programming and coursework in differential equations is recommended; or consent of instructor

GEOSC 565: Tectonic Geomorphology

3 Credits

Tectonic geomorphology examines interactions between tectonic and surface processes, paleosceismology, geodesy, structure, active deformation, and landform evolution.

Prerequisite: GEOSC340 , GEOSC465

GEOSC 572: Field Stratigraphy

1-2 Credits/Maximum of 2

This course introduces students to field techniques used by stratigraphers, with the capstone experience being a field trip during May.

Prerequisite: GEOSC439 , GEOSC472A , GEOSC472B , GEOSC479

GEOSC 585: Sedimentary Geology

3 Credits

An integrated approach to the study of modern and ancient sedimentary environments and their deposits.

Prerequisite: undergraduate coursework in sedimentology or consent of instructor

GEOSC 587: Preparing for an Academic Career in the Geosciences

3 Credits

The course focuses on successful strategies for the academic job market and for launching an academic career. GEOSC 587 Preparing for an Academic Career in the Geosciences (3)This seminar is designed for advanced doctoral students who are ready to launch their own search for an academic position. We will explore important elements of the transition into an academic career, including the application and interview process and strategies to establish teaching and research programs. During the semester students will: (a) learn about roles and responsibilities of faculty members in different educational settings (e.g., community colleges, four-year colleges, universities); (b) Design a teaching and research plan suitable for the next career stage and write teaching and research statements to summarize these plans; (c) Learn strategies for documenting their strengths and accomplishments in teaching and research; (d) Learn "the inside scope" about job searches including how to navigate the application process, interviews, and negotiation; (e) Learn how to give an effective job talk; (f) Discuss strategies for balancing the many demands and expectations they will face in an academic career. Finally, students will develop a self-inventory of preferred options for the next career stage and a personal action plan.

Prerequisite: Students must have passed their comprehensive exam and be within a year from receiving their Ph.D. degree.

GEOSC 589: Seminar in Aqueous Geochemistry

1 Credits

A seminar aimed at reading current articles in aqueous geochemistry and biogeochemistry.

Prerequisite: GEOSC522

GEOSC 590: Colloquium

1-3 Credits/Maximum of 3

Continuing seminars which consist of a series of individual lectures by faculty, students, or outside speakers.

GEOSC 596: Individual Studies

1-9 Credits/Maximum of 9

Creative projects, including nonthesis research, which are supervised on an individual basis and which fall outside the scope of formal courses.

GEOSC 597: Special Topics

1-9 Credits/Maximum of 999

Formal courses given on a topical or special interest subject which may be offered infrequently; several different topics may be taught in one year or semester.

GEOSC 597C: **SPECIAL TOPICS**

3 Credits

GEOSC 597D: **SPECIAL TOPICS**

2 Credits

GEOSC 597E: **SPECIAL TOPICS**

1 Credits

GEOSC 597F: **SPECIAL TOPICS**

1 Credits

GEOSC 597I: **SPECIAL TOPICS**

2 Credits

GEOSC 598: Special Topics

1-9 Credits/Maximum of 9

Formal courses given on a topical or special interest subject which may be offered infrequently; several different topics may be taught in one year or semester.

GEOSC 600: Thesis Research

1-15 Credits/Maximum of 999

No description.

GEOSC 601: Ph.D. Dissertation Full-Time

0 Credits/Maximum of 999

No description.

GEOSC 602: Supervised Experience in College Teaching

1-3 Credits/Maximum of 6

Supervised experience in teaching geosciences courses.

GEOSC 610: Thesis Research Off Campus

1-15 Credits/Maximum of 999

No description.

GEOSC 611: Ph.D. Dissertation Part-Time

0 Credits/Maximum of 999

No description.