

GEOSCIENCE (GEOS)

GEOS 500 Geoscience Research and Literacy 3 Hours

Development of geoscience research skills with emphasis on posing of research problems, documentation, organization, and presentation.

Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

GEOS 501 Seminar in Geoscience 3 Hours

Topical seminar examining current issues and trends of the discipline and related fields, recent research, and the role of science, communication, and technology in society.

Recent Term(s) Offered: None

GEOS 502 Geoscience Research Methods 3 Hours

This course will introduce basic Geoscience methods techniques, provide exposure to lab and field environments, and focus on methods development and synthesizing data for dissemination. The main components will include (1) generating appropriate questions that can be answered with methodical data collection, (2) project planning to focus research efforts, (3) methods and techniques of data collection, (4) processing and analysis of data, and (5) synthesizing and communicating methods and datasets. Field trips and application-based exercises may be required.

Prerequisite(s): GEOS 500 (may be taken concurrently)

Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

GEOS 505 Biogeography 3 Hours

The evolutionary, geographical, ecological, pedological, and edaphic factors involved in the naturalization, acclimatization, and distribution of plant and animal life. Note: Introductory course in geography and/or biology required.

Recent Term(s) Offered: None

GEOS 506 Seminar in Environmental Science and Sustainability 1-3 Hours

Guided seminar-style course focused on major environmental and sustainability issues from an applied, multidisciplinary perspective. Course includes seminars by expert professionals and scientists in their respective fields providing experiential context for the issues being discussed.

Recent Term(s) Offered: None

GEOS 507 Geographic Concepts and Skills for Teachers 3 Hours

Designed for experienced social studies, earth science, and geoscience teachers. Provides up-to-date geographic content, information, and related geographic skills with geography core content for the P-12 classroom.

Equivalent(s): EDU 507

Recent Term(s) Offered: summer 2022

GEOS 510 Selected Topics in Geoscience 1-3 Hours (repeatable max of 6 hrs)

Special topics in applied or basic geoscience topics.

Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024

GEOS 515 Remote Sensing Applications 3 Hours

Applications of remote sensing, analysis of current systems in use globally, and use of data for research and policy. Associated laboratory work and research project includes remote sensing techniques.

Recent Term(s) Offered: spring 2022

GEOS 517 Spatial Databases 3 Hours

Advanced topics in GIS database planning, design and implementation and administration. Covers a variety of GIS data models and their design and use in spatial database engines (SDG) used with database management systems software.

Recent Term(s) Offered: None

GEOS 520 Geoscience Statistical Methods 3 Hours

This course introduces a variety of statistical methods appropriate for the analysis of spatial and temporal data sets commonly used in geosciences.

Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

GEOS 521 Seminar in Geomorphology 3 Hours

Systematic study of the processes that shape and modify Earth's landforms and landscapes in a variety of spatial and temporal scales. Coupling between climatic, biologic, tectonic, and human influences on landscape changes are examined.

Recent Term(s) Offered: spring 2023

GEOS 522 Seminar in Physical Climatology 3 Hours

Addresses the complexity of climatic processes at multiple spatial and temporal scales, and from selected theoretical and practical perspectives.

Prerequisite(s): (METR 324 and MATH 237) or equivalent

Recent Term(s) Offered: None

GEOS 523 Geoprocessing & GIS Applications 3 Hours

Applications of GIS and spatial methods to urban and regional analysis. Students develop analytical capabilities using a variety of GIS operations and spatial methods in urban and regional planning, transportation, location analysis, and business geographics.

Recent Term(s) Offered: fall 2022

GEOS 525 Seminar in Political Geography 3 Hours

This course analyzes the world's geopolitical relationships in a seminar environment. Project-based course structure addresses statehood, society, independence movements, supra-nationalism, nationalism, economy.

Prerequisite(s): permission of instructor

Recent Term(s) Offered: None

GEOS 526 Applied Meteorology and Climatology 3 Hours

This course offers a practical insight into the influence of meteorology and climatology on everyday life. Environmental problems caused by changes in the atmosphere are also examined.

Recent Term(s) Offered: None

GEOS 530 Seminar in Cultural Geography 4 Hours

Seminar-field experience. Covers cultural origins and dispersals, environmental perception and behavior, and resulting consequence upon the geographic landscape.

Recent Term(s) Offered: None

GEOS 531 Seminar in Dynamic Met I 3 Hours

Introduction to large-scale dynamics of the Earth's troposphere focusing on fundamental topics, the basic governing equations of motion in the atmosphere, and dry thermodynamics.

Prerequisite(s): (METR 324 with a minimum grade of C or equivalent) and (MATH 237 with a minimum grade of C or equivalent)

Recent Term(s) Offered: None

GEOS 533 Seminar in Synoptic Meteorology 3 Hours

Seminar addresses the analysis and prediction of large-scale weather systems, such as extratropical cyclones and their associated fronts and jet streams, with an emphasis on a supervised research project.

Prerequisite(s): equivalent and (MATH 237 or equivalent)

Recent Term(s) Offered: None

GEOS 535 Seminar in Dynamic Meteorology II 3 Hours

Phenomena related to large-scale tropospheric dynamics. Topics include moist and dry thermodynamics, applications of balanced flow, boundary layer processes, and vorticity.

Prerequisite(s): GEOS 531 or equivalent

Recent Term(s) Offered: None

GEOS 537 Seminar in Mesoscale Meteorology 3 Hours

Use of mesoscale analysis techniques in the prediction of convective precipitation systems, including severe thunderstorms, tornadoes, and hurricanes.

Prerequisite(s): GEOS 533 or equivalent

Recent Term(s) Offered: None

GEOS 538 Seminar in Physical Meteorology 3 Hours

Microscale analytic techniques related to radiative transfer in the atmosphere, cloud and precipitation processes, and dry and moist thermodynamics.

Prerequisite(s): GEOS 531 or equivalent

Recent Term(s) Offered: None

GEOS 539 Seminar in Atmospheric Modeling 3 Hours

An introduction to numerical weather and climate modeling techniques and models, with focus on modeling fundamentals, including dynamics, physical parameterizations, grids and resolutions, model structures and components. Includes hands-on experience with designing numerical experiments, configuring and running model simulations, post-processing model outputs, and visualization.

Prerequisite(s): CS 245 and METR 324

Recent Term(s) Offered: None

GEOS 543 Environmental Science Problem Solving 3 Hours

Provides students a fundamental understanding of the inter-relationship between the science and technical disciplines that contribute to key concepts in environmental science, along with their methodologies and approaches to knowledge production. Students are exposed to the unique challenges facing environmental scientists, both from a practitioner and researcher perspective. Examines the relationship between environmental science and public policy, both historically and in the present day and encourages critical analysis and evaluation of potential approaches to environmental problem solving, with an emphasis on systems thinking.

Recent Term(s) Offered: fall 2023

GEOS 544 Practical Environmental Ethics 3 Hours

Examination of ethical theory as it relates to environmental issues such as resource allocation, population growth, and technology. Ethical theory is evaluated in terms of its practical contributions to effective environmental understanding, decision-making, and everyday life.

Recent Term(s) Offered: None

GEOS 545 Aqueous Geochemistry 3 Hours

An introduction to geochemical processes of surface and ground water including concentrations of ions and organic compounds, chemical equilibria, and analytical techniques. Carbonate and clay minerals will be studied in detail.

Recent Term(s) Offered: None

GEOS 550 Seminar in Sustainable Economic Development 3 Hours

Examine the modern role of sustainability methodologies and models to the functional interrelationships among economic and business activities in consumption, production, marketing and exchange of goods and services. Students may engage in sustainable economic research and field experiences during the course with an emphasis on innovation through sustainability.

Recent Term(s) Offered: None

GEOS 555 Global Climate Change 3 Hours

Explores the science behind climate change, including how models, observations, and proxies are used to understand and predict past and future climate, international perspectives on global climate change, and mitigation strategies put forth by the Intergovernmental Panel on Climate Change.

Recent Term(s) Offered: fall 2022; fall 2024

GEOS 559 Hydrological Fluid Dynamics 3 Hours

Focus on how fluids respond to the application of forces and their impact on the movement of natural waters within the context of the hydrologic cycle. Note: Field trips required.

Recent Term(s) Offered: None

GEOS 560 Environmental Geology 3 Hours

The interrelationships of geologic processes, earth materials, and human activities. Assessment of geologic factors with respect to site selection, energy production, land use, waste disposal, planning, water resources, engineering practices, and the recognition and control of geologic hazards. Class exercises stress the application of geologic knowledge to specific environmental situations.

Recent Term(s) Offered: fall 2022; fall 2024

GEOS 561 Hydrogeology 3 Hours

Origin, occurrence, and movement of ground water; water wells and aquifer evaluations; exploratory investigations; quality of ground water supplies; legal aspects.

Recent Term(s) Offered: spring 2023; fall 2024

GEOS 563 Geology of Fossil Fuels 3 Hours

Formation of coal, petroleum, and natural gas including depositional setting, source materials, and processes of thermal maturation. Stratigraphic and structural relations, modes of occurrence, exploration techniques, and resource evaluation are emphasized. Field trip required.

Recent Term(s) Offered: None

GEOS 565 Geophysics 3 Hours

The fundamentals of general and exploration geophysics. Topics include the origin of the earth and solar system, the earth's interior, geochronology, gravity and isostasy, seismology, the earth's heat, geomagnetism, upper atmosphere, continents and ocean basins, ridges and island arcs, and plate tectonics. The theory and applications of exploration geophysics are also covered, especially gravity, magnetic, and seismic methods.

Equivalent(s): PHYS 465G

Recent Term(s) Offered: spring 2024

GEOS 566 Karst Geoscience 3 Hours

Focus on the geological, geomorphological, and hydrological processes of karst landscapes, including human-environment interactions over time, with emphasis on the characterization, distribution, and function of various karst systems. Note: Field trips and field-based exercises are required.

Recent Term(s) Offered: None

GEOS 570 Tectonics 3 Hours

A survey of recent and past global tectonic activities and environments, including mantle plumes and processes, rifted continental margins, oceanic ridges, subduction and transform zones, mountain building and landforms, tectonic geomorphology, and interplay between climate and tectonics. Tectonic implications of environmental changes, natural hazards, and natural resources are discussed.

Recent Term(s) Offered: None

GEOS 571 Applied Natural Resource Management 3 Hours

Seminar approach to understanding natural resource management in the United States and internationally through analysis of past and present environmental problems and implemented alternative solutions.

Recent Term(s) Offered: spring 2024

GEOS 575 GIS Analysis and Modeling 3 Hours

Develops expertise with a broad range of spatial analysis functions applied with a cartographic modeling framework.

Recent Term(s) Offered: None

GEOS 576 GIS Programming 3 Hours

Planning and implementing GIS within an organization. Designing and developing GIS applications to support spatial decision making.

Recent Term(s) Offered: None

GEOS 577 Special Topics in Geographic Information Systems 3 Hours

Applications of Geographic Information Systems (GIS) technologies to applied research in urban and regional planning, geology, environmental modeling, transportation, locational analysis, criminology, public health, and internet GIS.

Recent Term(s) Offered: fall 2024

GEOS 580 Seminar in Sustainable Cities 3 Hours

This seminar explores the consequences of urban development and the essentials of sustainable urbanism. Topics include environmental and human costs of urbanization, landscape change, mobility, and urban responses to climate change.

Recent Term(s) Offered: None

GEOS 584 Applied Environmental Planning 3 Hours

Analysis and application of advanced topics and results of recent research in environmental and general land use planning. The course includes a broad examination of mitigation, remediation, and land use planning challenges from an applied perspective, particularly as they relate to problem-solving scenarios in sustainable development.

Recent Term(s) Offered: fall 2022

GEOS 587 Environmental Law, Regulations, and Policy 3 Hours

This is an introductory course on environmental management and law. Environmental Law is comprised of a vast body of legislation and common law, and management and law dominate all aspects of society. It is important to understand that law isn't designed to determine what is 'right or moral,' but rather to enforce what is expedient for society's optimal functioning. This course will include a thorough examination of major legislative, administrative, and judicial management approaches to addressing current environmental conditions related, but not limited to, natural resource consumption and air, water, and hazardous pollutants, in the United States and abroad.

Recent Term(s) Offered: None

GEOS 590 Experimental Design and Data Analysis 3 Hours

Statistical consideration in experimental design including covariance, multiple regression, factorial design, incomplete block designs, etc.

Prerequisite(s): permission of instructor

Recent Term(s) Offered: None

GEOS 595 Geoscience Practicum 1-6 Hours (repeatable max of 6 hrs)

Supervised geoscience teaching, applied research, and/or internship experience in a research center, lab, cooperating government or private agency, business, or community.

Recent Term(s) Offered: fall 2022; spring 2023; fall 2023; spring 2024; summer 2024; fall 2024

GEOS 599 Thesis Writing and Research 1-6 Hours (repeatable max of 6 hrs)

Thesis research and writing directed by faculty advisor and committee.

Prerequisite(s): GEOS 500 with a minimum grade of B and GEOS 502 with a minimum grade of B

Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; summer 2024; fall 2024

GEOS 600 Maintain Matriculation 1-6 Hours (repeatable max of 6 hrs)

Continued enrollment for thesis completion.

Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024