



Environmental Geology Online Programs Elective List (Subject to change based upon availability)

GEOL 481: Earth Systems Modeling

Introduces the fundamentals of python programming as applied to numerical modeling within the earth and environmental sciences. Students will identify key processes and relationships in systems, represent these elements numerically, use models to predict system behavior, and assess the validity of the model predictions. No computing background is required, but a prior course on integral calculus is strongly recommended.

ATMS 517: Data Science for the Geosciences

Build and apply basic-to-intermediate data science tools in Python to weather and climate data, to process, statistically analyze, visualize, and understand patterns, relationships, and changes in the data

ATMS 526: Risk Analysis in the Geosciences

Build and apply statistical models and tools in R to evaluate risk and uncertainty and improve decision-making for high-impact weather and climate events, using probability theory, hypothesis testing, extreme value theory and time series analysis

GEOG 407: Foundations of CyberGIS & Geospatial Data Science

Apply cyberGIS techniques to analyze and visualize geospatial data in Python, using advanced cyberinfrastructure and high-performance computing

GEOG 459: Ecohydraulics

Interactions between hydraulic, ecological, and geomorphic processes in river environments at a wide range of both spatial and temporal scales. Draws upon and synthesize fundamental concepts from biology, ecology, fluid mechanics and morphodynamics, to apply them to truly interdisciplinary problems. Students will apply their knowledge of fundamental processes to assess complex problems involving monitoring, management, conservation and restoration of ecosystems.

GEOG 479: Advanced Topics in GIS

Introduces advanced concepts in Geographic Information Science. Course topics may vary semester to semester.

GEOG 507: High-Performance Geospatial Computing

Intended to introduce students to high-performance geospatial computing using python to resolve computational bottlenecks and produce faster and scalable solutions. By the end of the course, students will have gained solid knowledge of common Python tools for developing high-performance geospatial computing solutions that can be applied to many applications.

GEOG 517: Geospatial Visualization & Visual Analytics

Intended to introduce students to geospatial visualization and visual analytics as well as the state-of-the-art of cartographic mapping and visualization technologies in the context of cyberGIS (cyber geospatial information science and systems) and geospatial data science. Students will learn open-source mapping and visualization libraries such as Leaflet, D3 and Plotly and how to mash up these libraries to create interactive and dynamic visualization tools and GIS applications.. Emphasis is placed on learning the cutting-edge advances of geospatial visualization and visual analytics and practical skills to create geospatial applications based on such advances.