DEPARTMENT OF GEOGRAPHY AND GEOLOGY

Fred Siewers, Department Chair
Environmental Science & Technology 304
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Degree(s)
• Geoscience (MS) (http://catalog.wku.edu/archives/2017-18/graduate/science-engineering/geology-geology/geosciences-ms)
• Geography Education for Teacher Leaders (MAE) (http://catalog.wku.edu/archives/2017-18/graduate/science-engineering/geography-geology/geography-education-teacher-leaders-mae)

Certificate Program(s)
• Geographic Information Science (Certificate) (http://catalog.wku.edu/archives/2017-18/graduate/science-engineering/geography-geology/graduate-geographic-information-science-certificate)

Faculty

Professor
Catherine M. Algeo, PhD (Geography), Louisiana State University AM College, 1998
Margaret M. Gripshover, PhD (Geography), University of Tennessee, Knoxville, 1995
Christopher G. Groves, PhD (Environmental Science), University of Virginia, 1993
David J. Keeling, PhD (Geography), University of Oregon, 1992
Rezaul Mahmood, PhD (Geography), University of Oklahoma Norman, 1999
Michael T. May, PhD (Geological Sciences), Indiana University at Bloomington, 1992
Jun Yan, PhD (Geography), SUNY College at Buffalo, 2004

Associate Professor
Joshua D. Durkee, PhD (Geography), University of Georgia, 2002
Xingang Fan, PhD (Atmospheric Sciences, Synoptic Dynamics), Lanzhou University, 1996
MD R. Gani, PhD (Geosciences), University of Texas at Dallas, 2005
Gregory B. Goodrich, PhD (Geography), Arizona State University Main, 2005
Leslie A. North, PhD (Geography and Environmental Science and Policy), University of South Florida, 2011
Jason Polk, PhD (Geography and Environmental Science and Policy), University of South Florida, 2009
Fredrick D. Siewers, PhD (Geology), University of Illinois Urbana-Champaign, 1995
Andrew H. Wulff, PhD (Geosciences), University of Massachusetts, 1999

Assistant Professor
Nahid Gani, PhD (Geosciences), University of Texas at Dallas, 2006

Instructor I
Patricia N. Kambesis, PhD (Earth and Atmospheric Sciences), Mississippi State University, 2014

Instructor II
Kevin B. Cary, MS (Geoscience), Western Kentucky University, 2001

Geography Courses

GEOG 451G Geography of Kentucky  3 Hours
Regional study assessing the natural and human resources with special attention to current ecological, social and economic problems. Field experience required.
Recent Term(s) Offered: spring 2015

Geology Courses

GEOL 415G 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.
Prerequisite(s): GEOL 111-GEOL 113 or permission of instructor.
Recent Term(s) Offered: fall 2015; fall 2016; fall 2017

GEOL 440G Hydrogeology  3 Hours
Origin, occurrence, and movement of ground water; water wells and aquifer evaluations; exploratory investigations; quality of ground water supplies; legal aspects.
Corequisite(s): GEOL 308.
Prerequisite(s): GEOL 310 or GEOL 310 or permission of instructor.
Recent Term(s) Offered: spring 2016

GEOL 445G 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.
Prerequisite(s): CHEM 120 and CHEM 121.
Recent Term(s) Offered: spring 2017

GEOL 465G 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.
Prerequisite(s): GEOL 111 and one year of college physics or permission of instructor.
Recent Term(s) Offered: spring 2015; fall 2017

GEOL 470G Tectonics  3 Hours
Deformational structure and style of various crustal regions. Regional tectonics of North America is emphasized.
Prerequisite(s): GEOL 308.
Course Fee: $20
Recent Term(s) Offered: fall 2015

GEOL 485G 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.
Prerequisite(s): GEOL 308 or permission of instructor.
Recent Term(s) Offered: spring 2015; spring 2017
Western Kentucky University – 2017-18 Graduate Catalog

Geoscience Courses

GEOS 500 Geoscience Research and Literacy 1-4 Hours (repeatable max of 4 hrs)
Development of geographic research skills with emphasis on posing of research problems, documentation, organization, and presentation.
Grade Mode: Pass/Fail
Recent Term(s) Offered: fall 2015; fall 2016; spring 2017; fall 2017

GEOS 501 Geoscience and Development 3 Hours
Topical seminar examining current issues and trends of the discipline and related fields, recent research, and the role of science in society, technology and culture.
Recent Term(s) Offered: None

GEOS 502 Geoscience Research Methods 1-4 Hours
An introduction to research techniques and methodology appropriate to the thesis project.
Prerequisite(s): GEOS 500.
Recent Term(s) Offered: spring 2015; fall 2015; spring 2016; spring 2017; summer 2017

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.
Prerequisite(s): Introductory courses in geography and/or biology, and permission of the instructor.
Recent Term(s) Offered: None

GEOS 506 Geoscience Environmental Seminar 1 Hour
Designed for future environmental practitioners, this course will provide real world examples of environmental science jobs and research projects. The course will impart a broad understanding of environmental science from a multidisciplinary perspective. Required for the MS Environmental Science emphasis degree.
Recent Term(s) Offered: winter 2015; fall 2015

GEOS 507 Geography 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.
Recent Term(s) Offered: spring 2015; summer 2015; spring 2016; summer 2016; spring 2017; summer 2017

GEOS 510 Geoscience Research Topics 1-3 Hours (repeatable max of 6 hrs)
Supervised independent research in applied or basic geoscience topics.
Recent Term(s) Offered: spring 2015; summer 2015; fall 2015; winter 2016; spring 2016; summer 2016; fall 2016; spring 2017; summer 2017

GEOS 515 Remote Sensing Applications 4 Hours
Applications of remote sensing, analysis of current systems in use globally, and use of data for research and policy. A research project that allows students to apply remote-sensing techniques to an area of investigation is required. Associated laboratory work includes RS techniques.
Prerequisite(s): GISC 317 or Permission of Instructor.
Course Fee: $50
Recent Term(s) Offered: spring 2015; fall 2016

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.
Prerequisite(s): GEOS 575 and GEOS 576 or instructor’s permission.
Course Fee: $50
Recent Term(s) Offered: spring 2015; spring 2016

GEOS 520 Geoscience Statistical Methods 4 Hours
Multivariate statistical methods for analyzing and modeling spatial data and processes. Regression methods, including spatial autoregressive and spatial varying parameter models. Principal components, cluster analysis and other multivariate methods. Applications in an interactive computer-based environment.
Prerequisite(s): GEOG 391 or permission of instructor.
Course Fee: $50
Recent Term(s) Offered: spring 2015; spring 2016; spring 2017

GEOS 521 Seminar in Geomorphology 3 Hours
A review of topics in advanced geomorphology, field and laboratory procedures, and an introduction to research in landform analysis. Research in instructor approved geomorphic topics.
Prerequisite(s): GEOS 420 or equivalent, and 3 hours in upper level physical geography or geology.
Recent Term(s) Offered: spring 2015; spring 2016

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: fall 2015; fall 2017

GEOS 523 Geoprocessing & GIS Applications 4 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.
Prerequisite(s): GEOS 575 AND GEOS 576 or special instruction of the instructor.
Course Fee: $50
Recent Term(s) Offered: fall 2015; fall 2016; fall 2017

GEOS 524 Meteorology Science Teachers 3 Hours
Basic weather course with emphasis on new developments and applications in the classroom.
Recent Term(s) Offered: None

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, supranationalism, nationalism, economy. (spring).
Prerequisite(s): GEOG 425 or the permission of the 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.
Prerequisite(s): Permission of instructor.
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.
Prerequisite(s): GEOG 430, or permission of instructor.
Recent Term(s) Offered: None

GEOS 531 Seminar in Dynamic Meteorology 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 and MATH 237 both with grades of "C" or better, or equivalent.
Recent Term(s) Offered: fall 2017

GEOS 532 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: spring 2016

GEOS 533 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: spring 2015

GEOS 534 Historic Preservation Planning 3 Hours
Field application of historic preservation method and techniques.
Recent Term(s) Offered: None

GEOS 535 Seminar in Dynamic Meteorology II 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: spring 2016

GEOS 536 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 540 Advanced Regional Geography 3 Hours
The regional method as a basic approach to geographic research via one or more major regional units.
Prerequisite(s): Two courses in regional geography and consent of instructor.
Recent Term(s) Offered: fall 2017

GEOS 541 Environmental Science Concepts 3 Hours
Provides students a fundamental understanding of the inter-relationship between the science and technical disciplines that contribute to our understanding of the environment as a whole. Students are exposed to the unique challenges facing environmental scientists, both from a practitioner and researcher perspective. Students learn to utilize their discipline-specific background in conjunction with an understanding of the roles and impacts of other disciplines to solve environmental problems.
Recent Term(s) Offered: summer 2016; summer 2017

GEOS 542 Seminar in Economic Geography 3 Hours
An examination of the major theories in economic geography.
Prerequisite(s): GEOS 530 or permission of instructor.
Recent Term(s) Offered: None

GEOS 543 Environmental Science Concepts 3 Hours
Provides students a fundamental understanding of the inter-relationship between the science and technical disciplines that contribute to our understanding of the environment as a whole. Students are exposed to the unique challenges facing environmental scientists, both from a practitioner and researcher perspective. Students learn to utilize their discipline-specific background in conjunction with an understanding of the roles and impacts of other disciplines to solve environmental problems.
Recent Term(s) Offered: summer 2016; summer 2017

GEOS 544 Practical Environmental Ethics 3 Hours
An 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.
Prerequisite(s): GEOS 280 or equivalent course.
Recent Term(s) Offered: fall 2016

GEOS 550 Advanced Studies in Economic Geography 3 Hours
An examination of the major theories in economic geography.
Prerequisite(s): GEOS 350 and permission of instructor.
Recent Term(s) Offered: None

GEOS 551 Karst Geoscience 3 Hours
Focus on the geological, geomorphological, and hydrological processes of karst systems. Field trips and field-based exercises are required.
Prerequisite(s): GEOS 310 or GEOL 310 and MATH 136 (or equivalent) with a C or better.
Recent Term(s) Offered: fall 2016

GEOS 552 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. (Field trips required.)
Prerequisite(s): GEOS 310 or GEOL 310 and MATH 136 (or equivalent) with a C or better.
Recent Term(s) Offered: fall 2016

GEOS 553 Global Climate Change 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. Field trips and field-based exercises are required.
Prerequisite(s): GEOS 500, or permission of instructor.
Recent Term(s) Offered: spring 2015; fall 2015; fall 2016

GEOS 554 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: fall 2016; spring 2017

GEOS 555 GIS Analysis and Modeling 3 Hours
Develops expertise with a broad range of spatial analysis functions applied with a cartographic modeling framework.
Prerequisite(s): GISC 317 or instructor’s permission.
Recent Term(s) Offered: fall 2016; fall 2017

GEOS 556 GIS Programming 3 Hours
Planning and implementing GIS within an organization. Designing and developing GIS applications to support spatial decision making.
Prerequisite(s): GEOS 575 and CS 146.
Recent Term(s) Offered: spring 2016; spring 2017
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.
Prerequisite(s): GEOS 575 and GEOS 576.
Recent Term(s) Offered: spring 2015

GEOS 580  Seminar Urban Geography  3 Hours
Analysis of problems faced by global cities.
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 planning.
Recent Term(s) Offered: fall 2017

GEOS 585  Advanced Studies in Population Geography  3 Hours
Seminar approach to regional and world problems in human population.
Prerequisite(s): Permission of instructor.
Recent Term(s) Offered: spring 2015

GEOS 587  Environmental Law, Regulations, and Policy  3 Hours
An introduction to major environmental legislation for air, water, toxic and hazardous pollutants; and related legislative, administrative, and judicial developments. The course provides a broad overview of legal practices and focuses on specific regulatory programs.
Recent Term(s) Offered: fall 2017

GEOS 590  Experimental Design and Data Analysis  3 Hours
Statistical consideration in experimental design: Covariance, multiple regression, factorial design, incomplete block designs, etc.
Prerequisite(s): Permission of instructor.
Equivalent(s): AGRI 590.
Recent Term(s) Offered: fall 2015

GEOS 595  Geoscience Practicum  3-6 Hours (repeatable max of 6 hrs)
Supervised geoscience practicum experience in a cooperating government or private agency, business, or community.
Prerequisite(s): GEOS 500, GEOS 502 and GEOS 520.
Recent Term(s) Offered: spring 2015; fall 2015; spring 2016; fall 2016; spring 2017; fall 2017

GEOS 599  Thesis Writing and Research  1-6 Hours (repeatable max of 6 hrs)
Thesis research and writing directed by faculty committee.
Grade Mode: Pass/Fail
Recent Term(s) Offered: spring 2015; fall 2015; spring 2016; fall 2016; spring 2017; fall 2017

GEOS 600  Maintain Matriculation  1-6 Hours (repeatable max of 6 hrs)
Continued enrollment for thesis completion.
Grade Mode: Non-graded
Recent Term(s) Offered: spring 2015; summer 2015; fall 2015; spring 2016; summer 2016; fall 2016; spring 2017; summer 2017; fall 2017