

Graduate Study in Geology

The University of
KANSAS



The graduate program involves 23 full-, part-time, or active emeritus faculty members, 15 adjunct faculty members, one research faculty member, and about 50 graduate students from all parts of the nation and several foreign countries. This allows a great deal of student-faculty interaction in teaching and research. Both M.S. and Ph.D. degrees are awarded. The department places its graduates in academia and industry. It has close ties with research units including the Kansas Geological Survey, the Paleontological Institute, the Natural History Museum and Biodiversity Research Center, the Water Resources Center, the Energy Research Center, the Tertiary Oil Recovery Project, and the KU Center for Research Inc. Some students and faculty members also work closely with the Water Resources Division of the U.S. Geological Survey, a branch of which is in Lawrence.

Geology and Geophysics

KU and the department have a long tradition and international recognition in paleontology. Stratigraphy and quantitative paleontology, study of Paleozoic faunas, paleoecology, biostratigraphy, and regional stratigraphy are emphasized. Colleagues in the Natural History Museum study vertebrate and invertebrate paleontology. The Paleontological Institute publishes the *Treatise on Invertebrate Paleontology* and *The University of Kansas Paleontological Contributions*. The Paleontological Society ranked the Division of Invertebrate Paleontology among the five best university research museums in North America, and *U.S. News and World Report* ranked the paleontology program fifth in the nation.

The program in stratigraphy, sedimentology, sedimentary petrology, and sedimentary geochemistry is one of the strongest in the nation, ranked among the top 10 by *U.S. News*. Especially well respected in the study of carbonate rocks, the program offers extensive research and teaching opportunities. Research includes the geologic controls affecting sequence stratigraphy, evolution of the atmosphere-ocean system, paleoclimate, understanding diagenesis in the context of sequence stratigraphy, diagenesis and fluid flow in foreland basins, and new fluid-inclusion techniques for solving geologic problems. This group is well equipped with laboratory facilities to study fluid inclusions in sedimentary rocks. Long-standing and close interaction with petroleum engineers in the Department of Chemical and Petroleum Engineering and geo-

logists of the Kansas Geological Survey and the Energy Research Center supplements the strength of this group.

A strong research group studies crustal evolution that emphasizes the application of petrology, geochemistry, geochronology, structural geology, and geophysics to solving problems in the evolution of the earth's crust. Facilities include a VG Sector multicollector mass spectrometer for isotopic and geochronological research, an inductively coupled plasma mass spectrometer (ICP-MS), and an inductively coupled plasma-atomic emission spectrometer (ICP-AES) for geochemical analysis. Research focuses on the geochronology and structure of the continents. Field areas include the Midcontinent, the Brazilian Shield, western United States, and Central America.

Ground-water studies include contaminant transport and ground-water remediation, water-rock interaction, weathering, microbial influence on rock weathering and ground-water geochemistry, sources of nutrients to ground water, physical characterization of aquifers and aquitards, well hydraulics, soil processes, unsaturated-zone transport as well as flow and transport modeling. Collaborations with the Kansas Geological Survey, the Department of Civil, Environmental, and Architectural Engineering, other KU departments, the Kansas Water Resources Center, and the U.S. Geological Survey are common. Faculty and students are involved in fundamental ground-water research internationally, most recently in the United States, Canada, and Panama. Essential to the geochemical aspects of these studies are laboratory facilities. Hydrogeology faculty direct the KU Plasma Analytical Lab (with ICP-MS, ICP-AES, and laser ablation microprobe), the Geomicrobiology Lab, and the Organic Geochemistry Lab. The Isotope Geochemistry Lab (high mass, radioactive isotopes) and the Stable Isotope Geochemistry Lab also provide support to hydrogeology research.

Geophysical research and teaching are centered in the Department of Geology. Both M.S. and Ph.D. degrees with emphasis in geophysics are offered. The Kansas Geological Survey, which is part of KU, contributes significantly in research, teaching, and student support. Our graduate geophysics curriculum gives students a strong foundation in geology and physics, as well as advanced education, both in the classroom and in the field, in theoretical and applied geophysics. Most incoming students have undergraduate



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degrees in geology, physics, or geophysics, but we encourage students with backgrounds in mathematics, computer science, and engineering to apply. The department has laboratory facilities for study of regional geophysics and reflection seismology. Pioneering research is in progress in shallow reflection seismology, ground-penetrating radar, structure and dynamics of active orogens, and applications of GIS technology to geological problems.

The department has four endowed, distinguished professorships and an endowed visiting distinguished lectureship. Library holdings in geology are excellent, extending from well before KU's founding in 1865 to the present.

Degree Programs

The department offers programs leading to the M.S. and Ph.D. degrees. Course work spanning a broad range of geology and allied sciences is encouraged. A minimum of 30 graduate-level credit hours is required for the M.S. Of these, at least 24 hours must be in formal course work at the graduate level and graduate seminars. The remaining hours may be in thesis research. Each doctoral student's Ph.D. curriculum is arranged individually in consultation with an advisory committee.

The department cooperates in its doctoral program with the Department of Geology at Kansas State University. Ph.D. students who wish to study under the direction of a faculty member from KSU may be admitted to the program at KU. After one year in residence at KU, the student may do the remaining course work and research at KSU. Interested students also should

contact the Graduate Adviser, Department of Geology, Kansas State University, Manhattan, KS 66506-3201.

Support of Students

The department awards several teaching assistantships. Research assistantships are funded by the department, the Natural History Museum, and the Kansas Geological Survey. For most students, academic-year funding is supplemented by scholarships provided by alumni and industry support. Each year, several students receive research fellowships funded by the petroleum industry and alumni. The department awards fellowships and scholarships each summer to support graduate student research, funds that are contributed by alumni and industry. Students typically obtain additional support from Sigma Xi, the Geological Society of America, the American Association of Petroleum Geologists, and federal and state grant agencies. Teaching assistantships are available each summer at the KU Geology Field Camp near Cañon City, Colorado.

Applications

Request application forms and information on the department, requirements, and assistantships from

**The University of Kansas
Director, Graduate Admissions
Department of Geology
1475 Jayhawk Blvd.
Lawrence, KS 66045-2124**

Web site: www.geo.ku.edu
Online Graduate School application:
www.graduate.ku.edu



GEOLOGY

The University of Kansas

Graduate Faculty

Ross A. Black (Assoc. Prof.) Ph.D., Wyoming, 1990. Geophysics with emphasis on seismic reflection and geophysical data processing. Research: acquisition and analysis of high-resolution seismic data, hydrogeological investigations, seismic interpretation of crustal structure, and regional GIS applications.

J.F. (Rick) Devlin (Asst. Prof.) Ph.D., Waterloo, 1994. Hydrogeology and geochemistry. Research includes investigations into organic transformations and transport in the subsurface, granular iron reactivity for ground-water remediation, hydrogeological assessment of natural attenuation, and bioremediation of chlorinated solvents, petroleum hydrocarbons and nitrate.

Robert H. Goldstein (Haas Distinguished Prof.) Ph.D., Wisconsin, 1986. Sequence stratigraphy, diagenesis and fluid-inclusion. Research: controls on depositional sequence architecture of the Spanish Miocene, fluid history and diagenesis of the Midcontinent, diagenetic significance or brine reflux, Permian paleoclimate, ancient acid ground water, diagenesis in sequence stratigraphy, fluid flow in foreland basins, and new fluid inclusion techniques for solving geologic problems.

Luis Gonzalez (Assoc. Prof.) Ph.D., Michigan, 1989. Stable isotope chemistry, carbonate geochemistry, geology and diagenetic processes. Continental paleoclimatology.

Stephen T. Hasiotis (Asst. Prof.) Ph.D., Colorado, 1997. Paleobiology with emphasis on ichnology and invertebrate paleontology, investigating organism-substrate interactions in continental depositional systems. Research: Linking ichnology, sedimentology, and sequence stratigraphy for interpreting hidden biodiversity, paleoenvironment, paleohydrology, and paleoclimate in continental deposits, with implications for evolution and diversification of terrestrial and aquatic ecosystems.

Roger L. Kaesler (Prof.; Dir., Paleontological Institute; Curator in Charge, Div. of Invertebrate Paleontology, Natural History Museum) Ph.D., Kansas, 1965. Micropaleontology with emphasis on late Paleozoic and Holocene Ostracoda. Editor, *Treatise on Invertebrate Paleontology*. Research: quantitative paleoecology and multivariate morphometrics.

Diane Kamola (Assoc. Prof.) Ph.D., Georgia, 1989. Sedimentology, sequence stratigraphy. Research: sequence stratigraphy of foreland basin sandstones, sequence stratigraphy of shallow marine reservoirs, and sedimentation and tectonics in the Basin and Range province.

Bruce S. Lieberman (Assoc. Prof.) Ph.D., Columbia, 1994. Paleobiology with emphasis on macroevolutionary and biogeographic patterns using trilobites. Research: tempo and mode of evolution, and determining the relationship between major geological events and major episodes in the history of life.

Gwendolyn L. Macpherson (Assoc. Prof.) Ph.D., Texas, 1989. Hydrogeology with emphasis on low-temperature aqueous geochemistry. Research: time series analysis of the chemistry of potable ground water and distribution, sources, and behavior of trace elements in potable ground water and formation water in deep sedimentary basins.

Elizabeth A. McClellan (Assoc. Prof.) Ph.D., Tennessee, 1993. Igneous and metamorphic petrology, structural geology and tectonics, geochemistry. Research: Regional tectonic studies of metamorphic terranes, particularly in the Appalachian and Scandinavian Caledonide orogens; application of geochemical and isotopic techniques to tectonic and stratigraphic problems in metaigneous and metasedimentary rocks.

Carl D. McElwee (Prof.) Ph.D., Kansas (Physics), 1970. Geophysics and geohydrology. Research: theoretical description of flow systems, model studies of ground-water availability in Kansas, sensitivity of ground-water models to variations in transmissivity and storage, modeling of ground-water chemical quality, and methods for hydrogeological site characterization.

Jennifer Roberts (Asst. Prof.) Ph.D., Texas, 2000. Geomicrobiology, organic aqueous geochemistry. Research includes microbial weathering of silicates, mineralogical controls on microbial attachment and transport through porous media, biochemistry of microbial production and utilization of iron-chelating ligands, and the microbial ecology of basalts and its role in nutrient cycling in Hawaiian bogs.

Don W. Steeples (Dean A. McGee Prof. of Applied Geophysics) Ph.D., Stanford, 1975. Geophysics, seismology. Near-surface 3-component seismology; combined shallow seismic and ground-penetrating radar analysis; shallow-seismic reflection for engineering and environmental applications.

Daniel F. Stockli (Asst. Prof.) Ph.D. Stanford, 1999. Thermochronology and geochronology, geochemistry, structural geology, tectonics, and igneous and metamorphic petrology. Research: application of geo- and thermochronological techniques to determine timing and rates of geological, tectonic, and long-term geomorphic processes. Deformation of upper-crustal rocks during continental rifting and break-up and continent-continent collisions. Cenozoic tectonics



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of western North America, Alps, Tibet, Iran, and Saudi Arabia. Development, calibration, and application of new geo- and thermochronological techniques.

George Tsoflias (Asst. Prof.) Ph.D., Texas 1999. Near-surface geophysics, hydrogeophysics, and exploration geophysics. Research: investigation and development of ground-penetrating radar (GPR) and seismic methods for the characterization of fluid flow properties of geologic formations; geophysical characterization of fractures; geophysical characterization of near-surface anisotropy.

W. Randall Van Schmus (Chair, Union Pacific Resources Distinguished Prof.) Ph.D., UCLA, 1964. Geochemistry and regional geology with emphasis on geochronology of Proterozoic orogenic belts. Research: study of the Proterozoic basement rocks of North America and Precambrian shields of Brazil.

J. Douglas Walker (Prof.) Ph.D., MIT, 1985. Research: Late Paleozoic to Early Mesozoic tectonic evolution of the Southwestern United States and on Cenozoic extension and sedimentation in eastern California and southern Nevada. Other interests: mechanics of sediment transport and U-Pb geochronology.

Anthony W. Walton (Assoc. Prof.) Ph.D., Texas, 1972. Research: Sedimentology and Volcanology. Currently: alteration of basaltic glass. Other topics: deposition, diagenesis or alteration, and stratigraphy of sedimentary and volcanic rocks, petroleum geology.

Active Emeritus Faculty

Ernest E. Angino (Emeritus Prof.; Dir., Water Resources Center) Ph.D., Kansas, 1961. Inorganic geochemistry with emphasis on aqueous and trace element geochemistry. Research: origin of hydrogen in the natural environment, with emphasis on isotopic characteristics; environmental geochemistry; trace element speciation in natural water systems; sedimentary geochemistry ore solutions. Trace elements, geochemistry, and health.

Wakefield Dort Jr. (Emeritus Prof.) Ph.D., Stanford, 1955. Quaternary geology, geomorphology, archaeological geology and terrestrial effects of meteorite impacts. Research: Quaternary geology, geomorphology and environmental history of the central Plains and northern Rocky Mountains; fluvial geomorphology of Plains rivers; origin of complex loess columns; pollen and phytolith records in Quaternary sediments; geological interpretation of archaeological sites; cratering by meteorite impact in Nebraska.

Paul Enos (Emeritus Distinguished Prof.) Ph.D., Yale, 1965. Sedimentology; carbonate facies and diagenesis. Research: Development of Triassic carbonate platforms in China. Cyclic carbonates in the Alpine Triassic. Cretaceous carbonates in Mexico Other interests: sediment gravity flow deposits in terrigenous and carbonate rocks, fossil soils, and modern carbonates.

Richard A. Robison (Emeritus Distinguished Prof.) Ph.D., Texas, 1962. Invertebrate paleontology and biostratigraphy with emphasis on early Paleozoic. Research: agnostoid trilobite biostratigraphy of China and Cambrian faunas of the western U.S.

Albert J. Rowell (Emeritus Prof.; Senior Curator Emeritus, Natural History Museum) Ph.D., Leeds, 1953. Invertebrate paleontology with emphasis on Lower Paleozoic faunas and stratigraphy. Research: early evolution of the Brachiopoda, community structure in the Cambrian, early Ordovician, Cambrian sea-level changes, and development of the continental margin of the western U.S. and east Antarctica during the Cambrian.

Adjunct Faculty

M. Lee Allison (Courtesy Prof.; Kansas Geological Survey) Ph.D., Massachusetts, 1986. Structural geology, geophysics, geophysical exploration, and geological policy management. State Geologist, Director, Kansas Geological Survey.

James J. Butler Jr. (Courtesy Prof.; Kansas Geological Survey) Ph.D., Stanford, 1987. Hydrogeology. Research: theoretical and field analyses of well tests in heterogeneous formations; incorporation of formation heterogeneity into deterministic and stochastic models of flow systems; science and technology in the People's Republic of China.

Timothy R. Carr (Courtesy Prof.; Kansas Geological Survey) Ph.D., Wisconsin, 1981. Stratigraphy, Quantitative Geology and Petroleum Geology. Research: integration of surface and subsurface techniques, geostatistical analysis of reservoir scale heterogeneity, sequence stratigraphy, recognition of subaerial exposure surfaces in carbonates and clastics, and application of fluid flow approaches to geologic problems.

John H. Doveton (Courtesy Prof.; Kansas Geological Survey) Ph.D., Edinburgh, 1969. Petrophysics, mathematical geology, petroleum geology, sedimentology. Research: development of new computer methods for log analysis focused on geological applications, using color imaging techniques, and artificial intelligence concepts; integrated geological log analysis studies in the Cretaceous, Permian, Pennsylvanian, Ordovician and Precambrian of Kansas.

Evan K. Franseen (Courtesy Prof.; Kansas Geological Survey) Ph.D., Wisconsin, 1989. Carbonate sedimentology, sequence stratigraphy and diagenesis. Integration of outcrop and subsurface studies, high-resolution and conventional seismic methods, ground-penetrating radar, paleomagnetic methods, petrography and geochemical techniques to discern variables such as global, regional and local sea-level fluctuations, paleo-oceanographic conditions, climate, paleoslope, and autogenic processes that control carbonate depositional systems and reservoir characteristics.

Lee C. Gerhard (Courtesy Prof., Kansas Geological Survey) Ph.D., Kansas, 1964. Petroleum and Carbonate Geology. Research: reef architecture and modeling, basin analysis, global petroleum demand and supply, reservoir classification and anisotropy, and carbonate/evaporite processes.

Leonard Krishtalka (Prof., Ecology and Evolutionary Biology; Dir., Natural History Museum) Ph.D., Texas Tech, 1975. Biology, Vertebrate Paleontology. Research: systematics and paleobiology of fossil mammals, African fossil faunas, geology and human evolution, evolutionary patterns, processes and theories.

P. Allen Macfarlane (Asst. Scientist, Kansas Geological Survey) Ph.D., Kansas, 1993, (Environmental Health Science). Hydrogeologist. Research: ground-water resource evaluation, sedimentary basin hydrogeology, and heterogeneity in porous media and its impact on ground-water flow and mass transport.

Larry D. Martin (Prof., Ecology and Evolutionary Biology; Curator, Natural History Museum) Ph.D., Kansas, 1973. Vertebrate paleontology with emphasis on mammals and birds; continental Cenozoic stratigraphy and paleoecology.

Richard D. Miller (Courtesy Assoc. Prof., Kansas Geological Survey) M.S., Kansas (Physics, Geophysics) 1983. Shallow seismic reflection data acquisition. Seismic data processing and software development. Field equipment design and testing.

Marios A. Sophocleous (Courtesy Prof., Kansas Geological Survey) Ph.D., Alberta, 1978. Quantitative and experimental hydrogeology. Research: unsaturated-saturated flow and mass transport theory, measurement, and numerical modeling; recharge and ground water and interactions between streams and aquifers; and hydrology of watersheds.

Edith L. Taylor (Adjunct Prof., Ecology and Evolutionary Biology; Senior Curator, Natural History Museum) Ph.D., Ohio State, 1983. Paleobotany. Research: fossil tree ring growth and paleoclimate interpretation; paleoclimate models and input from biological data; adaptations of high latitude fossil floras; Permian and Triassic permineralized Antarctic plants, distribution and diversity of Antarctic Permian and Triassic floras; fossil phloem-structure, function and phylogenetic trends of fossil phloem.

Thomas N. Taylor (Roy A. Roberts Distinguished Prof., Ecology and Evolutionary Biology; Senior Curator, Natural History Museum) Ph.D., Illinois, 1964. Paleobotany. Research: biology and interactions of fossil fungi; paleobiology and paleoecology of Antarctic fossil biotas; biostratigraphy in Gondwanaland; ultrastructural studies in living and fossil pollen and spores; cuticle ultrastructure and histochemistry; structure/function in fossil plants; symbioses; interactions of fossil plants and animals; reproductive biology in early land plants; pollen/stigma interactions; origin and evolution of land plants; and angiosperm origins.

W. Lynn Watney (Courtesy Prof.; Kansas Geological Survey). Ph.D., Kansas, 1985. Petroleum geology, characterization and modeling of Paleozoic cratonic stratigraphy and sedimentation, petrophysical and seismic characterization of petroleum reservoirs and related strata.

Donald O. Whittemore (Courtesy Prof.; Geology; Kansas Geological Survey) Ph.D., Penn State, 1973. Environmental geochemistry with emphasis on ground-water chemistry. Research: geochemical characterization, identification, and tracing of salinity sources in aquifer systems and polluted waters; variations in ground-water quality with recharge; factors controlling water-quality variations in stream-aquifer systems.

Research Faculty

Gisela A. M. Dreschhoff (Adjunct Asst. Prof.) Ph.D., Braunschweig, 1972. Physics and geophysics. Research: solar-flare signals in polar ice sheets, proton-beam production of conductive regions in diamond films, and remote sensing by gamma-ray spectrometry.

The University

The University of Kansas is a major educational and research institution with 29,000 students and 2,100 faculty members. The university includes the main campus in Lawrence; the Medical Center in Kansas City, Kansas; the KU Edwards Campus in Overland Park; a clinical campus of the School of Medicine in Wichita; and educational and research facilities throughout the state.

The University of Kansas prohibits discrimination on the basis of race, color, religion, sex, national origin, age, ancestry, disability, veteran status, sexual orientation, marital status, and parental status.

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