

# DEPARTMENT OF GEOLOGY AND GEOPHYSICS

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**Head:** J. Newman

**Graduate Advisor:** M. Everett

## Geology

Graduate work in geology is offered at both the master's and doctoral levels. Programs are designed to provide the student with an understanding of the fundamentals of geology and of related disciplines. Research investigations comprise a significant part of each program. The Department of Geology and Geophysics can also serve as the "home" department for the Master of Geoscience degree. The MGSc is a non-thesis degree that provides a multidisciplinary background in the geosciences, appropriate for science teachers in public schools, or for individuals interested in environmental issues, for example.

Opportunities for research at both the MS and PhD levels are available in ground-water investigations, sedimentation, mineralogy, paleontology and paleoecology, stratigraphy, structural geology, tectonophysics, petrology, field geology, engineering and environmental geology and geochemistry.

Current research areas of members of the department include studies in the origin and spatial distribution of reservoir porosity in depositional, diagenetic and fracture systems; field, theoretical and experimental study of the formation of faults and fault networks; fluid flow and deformation within thrust sheets; the hydrostatic and hydrodynamic trapping of oil and gas; carbonate platform-to-basin transitions; sandstone provenance and diagenesis; integrated quantitative basin analysis; archaeological palynology; isotope stratigraphy and global change; paleobiogeography of plants; how fossil assemblages form from and reflect living communities; water/rock interactions in flow-through experimental systems; fate and transport of organic pollutants in the unsaturated and saturated zones; composition of movement of crustal fluids; crystal chemistry, phase relations and thermodynamics of mantle-derived amphiboles and micas; diagenesis of clastic sediments in relation to reservoir rock potential and quality; metal contaminants in alpine systems; groundwater impacts of surface mining; groundwater interference in civil construction and mining; landslide mechanics; fluid-flow properties of faults and dynamics of faulted reservoirs; and groundwater flow in strongly heterogeneous media.

The department has state-of-the-art laboratory facilities for radiogenic and stable isotope geochemistry, environmental geochemistry, evolutionary biology, paleobiology, rock mechanics, sedimentary geology, petrology and electron microprobe analysis. In addition, sample preparation labs, petrographic microscopes and an extensive network of computers and peripherals are available for student research. More detail can be found at <http://geoweb.tamu.edu/> under Research Facilities.

The Texas A&M Microscopy and Imaging Center houses additional transmission and scanning electron microscopes. An inductively coupled Ar-plasma emission spectrometer (ICP) and other analytical equipment are available in the Department of Chemistry and the Center for Trace Characterization.

The department benefits from the close association with the Integrated Ocean Drilling Program (IODP). Located in the Texas A&M Research Park

adjacent to campus, this \$42 million-per-year basic research program is operated by the College of Geosciences, Texas A&M. The IODP facilities include a large core-storage station and physical-properties, petrography and sedimentary laboratories. Many scientific staff members of the IODP hold adjunct faculty positions in the Department of Geology and Geophysics. The facilities both in the department and elsewhere in the University provide students with an excellent opportunity to use state-of-the-art equipment in their research.

Although degree level is not a requirement for professional practice in geology, the BS should usually be considered as preparatory, the MS should be considered the professional degree and the PhD should be considered the teaching and research degree. The MS degree is granted thesis option only.

In addition to graduate studies requirements for the PhD, the student's committee chair, with advice from the other committee members, will determine, on an individual basis, the student's needs in either foreign language or other broadening areas of study.

## Geophysics

The degrees of Master of Science and Doctor of Philosophy are offered in geophysics. Geophysics includes all areas of scientific inquiry that deal with the physical state of the planets and with the dynamic physical processes that act on and within the planets. The deep interior, crust, atmosphere, oceans and space all lie within the province of the geophysicist. To work effectively in so broad an area requires considerable depth and breadth of understanding of physical principles and considerable proficiency in mathematics. Thorough undergraduate training in an earth or physical science is ordinarily regarded as a necessary prerequisite for advanced study.

An intensive two-year program of study at the master's level is available for students who wish to enter the petroleum industry. This MS curriculum pools the resources of the Departments of Geology and Geophysics and Petroleum Engineering in a manner designed to better prepare students for the petroleum industry than conventional offerings in the separate disciplines. The curriculum is intended for students with an undergraduate degree in geology or extensive exposure to geologic concepts through academic training and/or experience. The course sequencing and the subject sequence in each course is carefully designed to use previously acquired knowledge optimally, and to provide experience in applying fundamental concepts in different contexts and in integrating geological, physical, mathematical, computer and statistical skills in the solution of practical problems.

Current research areas of members of the department include studies in theoretical and model seismology focusing on the internal structure of the earth, earthquake mechanisms and seismic exploration; studies of the anisotropy and anelastic properties of sedimentary rocks and application to exploration; regional and global seismology; studies in experimental rock deformation focusing on the failure strength of rocks, friction in rocks; mechanics of fault development; fluid-flow properties of faults and dynamics of faulted reservoirs; marine studies of the structure of the oceanic crust and continental margins in the Gulf of Mexico, the Caribbean Sea and the Western Pacific; studies of the magnetic anomalies near mid-ocean-ridge systems and the magnetization of oceanic crust; the analysis of magnetic and gravity anomalies and application to exploration and global geophysics; gravity anomalies near trenches, convection in the mantle and global tectonics; vertical seismic profiling; and attenuation of seismic waves.

Members of the department also are involved in geophysical investigations of the sea floor through the Integrated Ocean Drilling Program, which Texas A&M University manages on behalf of JOI, Inc. These investigations include rock magnetism, heat flow, borehole logging and other aspects of marine geophysics.

The department has an extensive computer network of workstations, computer servers and storage for data processing, imaging and modeling. The Immersive Visualization Center provides state-of-the-art 3D visualization of large data sets and models. The Texas A&M Supercomputing Facility is available to students and faculty for computer-intensive applications. The department has field exploration equipment for gravity, ground-penetrating radar, seismic reflection/refraction and electromagnetic surveys. More detail can be found <http://geoweb.tamu.edu/> under Research Facilities.

## Faculty

Bapst, David W, Instructional Assistant Professor  
Geology & Geophysics  
PHD, University of Chicago, 2013

Becker, Mauro R, Research Professor  
Geology & Geophysics  
PHD, University of Texas - Austin, 1996

Belanger, Christina L, Assistant Professor  
Geology & Geophysics  
PHD, University of Chicago, IL, 2011

Benavides Iglesias, Alfonso, Lecturer  
Geology & Geophysics  
PHD, Texas A&M University, 2007

Bhatia, Mukul R, Executive Professor  
Geology & Geophysics  
PHD, The Australian National University, 1982

Chester, Frederick M, Professor  
Geology & Geophysics  
PHD, Texas A&M University, 1988

Chester, Judith S, Professor  
Geology & Geophysics  
PHD, Texas A&M University, 1992

Clement, Brad M, Professor  
Geology & Geophysics  
PHD, Columbia University, 1985

Donovan, Arthur D, Professor of the Practice  
Geology & Geophysics  
PHD, Colorado School of Mines, 1985

Duan, Benchun, Professor  
Geology & Geophysics  
PHD, University of California, Riverside, 2006

Everett, Mark E, Professor  
Geology & Geophysics  
PHD, University of Toronto, 1991

Ewing, Ryan C, Professor  
Geology & Geophysics  
PHD, The University of Texas - Austin, 2009

Giardino, John R, Professor  
Geology & Geophysics  
PHD, University of Nebraska, Lincoln, 1979

Grossman, Ethan L, Professor  
Geology & Geophysics  
PHD, University of Southern California, 1982

Hu, Lin Ying, Professor of the Practice  
Geology & Geophysics  
PHD, Mines Paris Tech, 1988

Kenderes, Elizabeth, Instructional Assistant Professor  
Geology & Geophysics  
PHD, University of Missouri, 2018

Kitajima, Hiroko, Associate Professor  
Geology & Geophysics  
PHD, Texas A&M University, 2010

Knappett, Peter S, Assistant Professor  
Geology & Geophysics  
PHD, University of Tennessee at Knoxville, 2010

Kronenberg, Andreas K, Professor  
Geology & Geophysics  
PHD, Brown University, 1983

Lamb, William M, Professor  
Geology & Geophysics  
PHD, University of Wisconsin - Madison, 1987

Laya Pereira, Juan Carlos, Assistant Professor  
Geology & Geophysics  
PHD, Durham University, United Kingdom, 2012

Marcantonio, Franco, Professor  
Geology & Geophysics  
PHD, Columbia University, 1994

Miller, Brent V, Professor  
Geology & Geophysics  
PHD, Dalhousie University, Canada, 1997

Newman, Julie, Professor  
Geology & Geophysics  
PHD, University of Rochester, 1993

Perez, Nicholas D, Assistant Professor  
Geology & Geophysics  
PHD, University of Texas at Austin, 2015

Pope, Michael, Professor  
Geology & Geophysics  
PHD, Virginia Tech, 1995

Raymond, Anne L, Professor  
Geology & Geophysics  
PHD, University of Chicago, 1983

Reece, Julia S, Assistant Professor  
Geology & Geophysics  
PHD, University of Texas, 2011

Reece, Robert S, Associate Professor  
 Geology & Geophysics  
 PHD, The University of Texas - Austin, 2012

Riggs, Eric A, Professor  
 Geology & Geophysics  
 PHD, University of California-Riverside, 2000

Sparks, David W, Professor  
 Geology & Geophysics  
 PHD, Brown University, 1992

Sun, Yuefeng, Professor  
 Geology & Geophysics  
 PHD, Columbia University, 1994

Yancey, Thomas E, Professor  
 Geology & Geophysics  
 PHD, University of California, Berkeley, 1971

Yu, Alan Zhihuai, Professor of the Practice  
 Geology & Geophysics  
 PHD, University of South Carolina, 1992

Zhan, Hongbin, Professor  
 Geology & Geophysics  
 PHD, University of Nevada, Reno, 1996

## Masters

- Master of Science in Geology (<http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geology-ms/>)
- Master of Science in Geophysics (<http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geophysics-ms/>)

## Doctoral

- Doctor of Philosophy in Geology (<http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geology-phd/>)
- Doctor of Philosophy in Geophysics (<http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geophysics-phd/>)

## Certificates

- Petroleum Geoscience Certificate (<http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/petroleum-geoscience-certificate/>)