The Program

We offer a two-year M.S. degree program for about 10-15 students at a time, in an active, research-oriented environment. We stress personalized, individual attention to student research. Our program provides a combination of classical geological training, involving a significant field component, together with applications of modern technology, such as remote sensing and GIS, to solve geological and environmental problems. Graduate students become proficient in a variety of computer techniques. We are closely linked with the Institute for Environmental Studies at TCU, and many students carry out research in environmental geology, earth surface processes, drainage basin hydrology and related topics. Faculty and students also are engaged in structural, tectonic, sedimentological, paleontological, paleovolcanological and petrological studies in Oklahoma and Texas, Scotland, southern Africa, Peru, the Baja Peninsula and the Sierra Nevada in California. Petroleum geology is a particular strength of the department, with many of our students working as interns for local oil and gas companies.

Fort Worth is centrally located relative to a wealth of diverse geological settings, in addition to the classic Paleozoic and Mesozoic successions of the southern midcontinent. Departmental field trips visit the complex Paleozoic structures of southern Oklahoma and Arkansas (Wichita, Arbuckle, and Ouachita Mountains), Cambrian and Precambrian igneous rocks in the Wichita and Arbuckle Mountains, Precambrian crystalline rocks in central and west Texas, and the spectacularly exposed geology of the Big Bend region.

The **Center for GIS and Remote Sensing** provides a venue for instructing students and area professionals in the use of ESRI's ArcGIS (and its extensions) and other GIS software. We provide GIS training on Windows and Mac platforms. Training and research in remote sensing is performed with a variety of software. The Center is a focus for successful research by students from a variety of backgrounds. The Center houses computer and GPS units and a fiber optic visible-near infrared spectrometer for remote sensing research.

Selected Recent Graduate Theses

Befus, K. (2006) Late Cretaceous and Eocene phreatomagmatic volcanism and magma-sediment interaction in the Big Bend area of West Texas. • **Bellamy, J.** (2001) A test case of the "new stratigraphies" in the subsurface, Wilcox Group (Paleogene), South Texas. • **Berkebile, M.** (2003) Geologic and paleomagnetic studies of a Pliocene volcanic debris-avalanche deposit in the northern Sierra Nevada, California. • **Dakshinamurthy, L.** (2003) Quantifying the impact of impoundment on sediment transport in the lower Trinity River, Texas. • **Dollar, D.** (2004) Land use, slope, and soil type and their control on sediment flux from two lower coastal plain basins, Trinity River, Texas. • **Dennie, D.** (2001) Geology of Cottonwood Wash fan, Rosillos Mountains, Big Bend National Park. • **Horton, R.** (2006) Geology and vertebrate paleontology of Cretaceous and Tertiary strata on the Pitcock Rosillos Mountain Ranch, Brewster County, Texas. • **Johnson, L.** (2003) Spatial and temporal variability in soil moisture content as a control on runoff generation in a hillslope hollow in Parker County, Texas. • **Khanal, S.** (2006) A GIS study of landslides in the lower Los Amigos foreland of Peru. • **Musselman, Z.** (2001) A geomorphic analysis of alluvial fans on the Rosillos laccolith. • **Nader, J.** (2005) Reconnaissance remote sensing and field study of the Dalquest Research Area, Presidio and Brewster Counties, Texas. • **Pancake, J.** (2001) Paleomagnetic and geochronological studies of Mesoproterozoic mafic igneous rocks in Botswana. • **Philips, C.** (2002) Carlton Rhyolite in the Blue Creek Canyon area, southwestern Oklahoma. • **Seidel, E.** (2004) Paleomagnetic and geochronological study of parts of the 1.1 Ga Umkondo igneous province in South Africa. • **Sevier, D**. (2002) High-resolution facies analysis and hydrocarbon production, Pointe ala Hoche field, Louisiana. • **Wellmeyer, J.** (2004) Historic planform change of the Trinity River channel below Livingston Dam, Liberty County, Texas.

TEXAS CHRISTIAN UNIVERSITY - DEPARTMENT OF GEOLOGY
FORT WORTH - TEXAS

TCU

Geology Department

Graduate Studies in Geology

GIS
REMOTE SENSING
TCU

The Faculty

Helge Alsleben Structural geology. *Research interests*: Mesozoic tectonic and structural evolution of the Baja Peninsula and the southwestern Cordillera; accreted terranes; microstructural analysis; evolution of magmatic systems through time.

John A. Breyer Petroleum geology, exploration geophysics, sedimentary geology, sequence stratigraphy. *Research interests*: petroleum geology and petrology of the Barnett Shale in the Fort Worth and Delaware basins; Middle Jurassic deep-water sands, Cotton Valley field, northern Louisiana; subsurface geology of the Wilcox Group, Texas; mining geology and coal geology; Precambrian trace fossils.

Arthur B. Busbey Vertebrate paleontology, stratigraphy, use of microcomputers in geology and remote sensing. *Research interests*: functional morphology and evolution of Crocodilia; Permian fossil vertebrates in Oklahoma; geology and vertebrate paleontology of the Big Bend area; application of statistical and computer modeling techniques to geological problems.

R. Nowell Donovan Provost, TCU. Basin analysis and sedimentary geology, carbonate petrology, structural geology and tectonics. *Research interests*: stratigraphic and structural development of the Southern Oklahoma aulacogen; petrology and sedimentology of Paleozoic carbonate rocks in southern Oklahoma, Texas and Scotland; Devonian basins in Scotland.

Arthur J. Ehlmann Emeritus Professor and Curator of the Monnig Meteorite Collection. *Research interests*: petrology and mineralogy of meteorites.

Richard E. Hanson Igneous and metamorphic geology, volcanology, tectonics, Precambrian geology. *Research interests*: evolution of orogenic belts as approached through tectonostratigraphic, structural, petrological and geochronological studies; island-arc

rocks in the northern Sierra Nevada, California; Proterozoic geology and tectonics of southern Africa; process-oriented studies of ancient volcanic sequences.

Ken M. Morgan, Associate Dean, College of Science and Engineering, TCU; Co-Director, Center for GIS and Remote Sensing. Environmental geology, hydrogeology, urban planning, remote sensing, geographic information systems. *Research interests*: application of remote sensing and GIS techniques to environmental geology, land-use monitoring and geological exploration and mapping; use of satellite data for lithological and structural mapping in Oklahoma and Texas.

Ranjan S. Muttiah Director, Center for GIS and Remote Sensing. *Research interests*: watershed hydrology; environmental contamination; Amazon drainage features; landslides; iron cycle in inundated soils; optical properties of vegetation.

Leo W. Newland Environmental chemistry, environmental mineralogy, soil science. *Research interests*: occurrence and fate of inorganic and organic toxic compounds in the environment; biotechnology of organic wastes; hydrogeochemistry; use of remote sensing techniques in environmental planning.

Michael C. Slattery Director, Institute for Environmental Studies. Fluvial and hillslope geomorphology, soils, drainage basin hydrology. *Research interests*: surface runoff generation and hydrological pathways; soil erosion and sediment delivery; mechanics of sediment transport, rill formation and the physical properties of transported sediments; variability of soil properties.

Financial Aid

Support is given in the form of two-year Departmental and Research Assistantships, which include a nine-month stipend ($13,000 per year in 2006-07), free tuition (30 credit hours), waiver of most university fees and up to $3,000 to defray costs of thesis research. In 2006-07, the total award for two years (tuition and stipend) was $50,000. Students receive additional support during the academic year and/or summer from other departmental funds, faculty research grants, internships with local firms or consulting projects.

Research Facilities

Extensive networked computing facilities, including scanners, digitizers and plotters; complete remote sensing facilities with computer workstations and image processing/GIS software; scanning electron microscope; environmental chemistry lab with absorption spectrophotometer and mercury analysis system; lab and field equipment for surface and groundwater hydrologic modeling and simulation; research microscopes with cathodoluminescence and fluid-inclusion stages; GPR for shallow subsurface research; wet and dry sediment lab; rock preparation lab. We also have extensive mineralogical, paleontological and oil-field core collections, and as well as the Oscar Monnig meteorite collection, one of the finest meteorite collections in the world.

FOR MORE INFORMATION CONTACT:

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Department of Geology
Texas Christian University, Fort Worth, TX 76129

OR CONSULT OUR WEB SITE:
http://www.geo.tcu.edu