

# SUBSURFACE GEOSCIENCE

## THE WIESS SCHOOL OF NATURAL SCIENCES

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### **LECTURER**

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### **DEGREES OFFERED: MS**

Rice University introduced the professional master's degree in subsurface geoscience in fall 2003. This degree is designed for students who wish to become proficient in applying geological knowledge and geophysical methods to finding and developing reserves of oil and natural gas. Students can specialize in two focus areas: geology and geophysics. The geology focus area prepares students to be explorationists, with strong skills in using seismic and other geophysical methods along with geological principles to find oil and natural gas. The geophysics focus area prepares students to become technical experts in aspects of exploration seismology.

The subsurface geoscience degree is one of three tracks in the Professional Master's Program at Rice housed in the Wiess School of Natural Sciences. These master's degrees are designed for students seeking to gain further scientific core expertise coupled with enhanced management and communication skills. These degrees instill a level of scholastic proficiency that exceeds that of the bachelor's level, and they create the cross-functional aptitudes needed in modern industry. This program will allow students to move more easily into management careers in consulting or research and development, design, and/or marketing within oil-and gas-related industries.

### **DEGREE REQUIREMENTS FOR MS IN SUBSURFACE GEOSCIENCE**

In addition to core science courses, students are required to complete a three- to six-month internship and take a set of cohort courses focusing on business and communication. Students select a group of elective courses from their area of interest. Students must present their internship project in both oral and written form in the Professional Master's Seminar.

Part-time students who already work in their area of study may fulfill the internship requirement by working on an approved project with their current employer. For general university requirements for graduate study, see Graduate Students section, page 2–3, and see also Professional Degrees, pages 4–5.

### **ADMISSION**

Admission to graduate study in subsurface geoscience is open to qualified students holding a bachelor's degree in science that includes course work

## 2 DEPARTMENTS/ Subsurface Geoscience

in geology, general chemistry, physics, calculus, differential equations, and linear algebra. Department faculty evaluate the previous academic record and credentials of each applicant individually.

### **Science core courses:**

- ESCI 415 *Petroleum Geology* (S)
- ESCI 417 *Petroleum Industry Economics and Management* (S)
- ESCI 420 *Modern Industrial Exploration Techniques* (S)
- ESCI 440 *Geophysical Data Analysis: Digital Signal Processing* or
- ESCI 441 *Geophysical Data Analysis: Inverse Theory* (S)

- ESCI 442 *Exploration Geophysics I* (F)
- ESCI 444 *Exploration Geophysics II* (S)

### **Cohort courses:**

- NSCI 501 *Professional Master's Seminar* (F, S)  
[required for 2 semesters]
- NSCI 511 *Science Policy and Ethics* (S)
- NSCI 512 *Professional Master's Project* (F,S)
- NSCI 610 *Management in Science and Engineering* (F)

## INTERNSHIP

An internship may be conducted under the guidance of a host company, government agency, or national laboratory. A summary of the internship project is required in both oral and written form as part of the Professional Master's Project.

## ELECTIVE COURSES

NOTE: Each of these electives is not offered every year, and some courses may have prerequisites or require instructor permission.

Students will choose four electives. Recommended courses include, but are not limited to, the following:

### **Geology Focus Area**

- ESCI 427 *Seismic Sequence Stratigraphy* (S)
- ESCI 428 *Interpretation of Reflection Seismograms* (F)
- ESCI 450 *Remote Sensing* (S)
- ESCI 463 *Advanced Structural Geology* (F)
- ESCI 467 *Geomechanics* (F)
- ESCI 470 *Quantitative Hydrogeology* (S)
- ESCI 504 *Siliciclastic Depositional Systems* (F)
- ESCI 505 *Applied Sedimentology* (F)
- ESCI 506 *Carbonate Depositional Systems* (S)

### **Geophysics Focus Area**

- CENG 571 *Flow and Transport through Porous Media I* (S)
- ESCI 427 *Seismic Sequence Stratigraphy* (S)
- ESCI 428 *Interpretation of Reflection Seismograms* (F)
- ESCI 454 *Geographic Information Science* (F)
- ESCI 461 *Seismology I* (F)
- ESCI 467 *Geomechanics* (F)
- ESCI 542 *Seismology II* (F)

### **Additional Electives**

- CAAM 378 *Introduction to Operations Research* (F)
- CEVE 322 *Engineering Economics for Engineers* (F)
- CEVE 505 *Project Management*
- COMP 429 *Introduction to Computer Networks* (S)
- ESCI 454 *Geographic Information Science* (F)
- MGMT 661 *International Business Law* (S)
- MGMT 674 *Production and Operations Management* (F)
- NSCI 625 *New Venture Creation for Science and Engineering* (S)
- STAT 310 *Probability and Statistics* (F, S)
- STAT 410 *Introduction to Statistical Computing and Computer Models* (F, S)

**PROFESSIONAL SCIENCE MASTER'S FIFTH YEAR DEGREE  
OPTION FOR RICE UNDERGRADUATES**

Rice students have an option to achieve the MS in subsurface geoscience by adding an additional fifth year to the four undergraduate years of science studies. Advanced Rice students in good standing apply during their junior year, then start taking required core courses of the subsurface geoscience program during their senior year. A plan of study based on their particular focus area will need to be approved by the track director and the PSM coordinator.