

Department of Physics and Geosciences

Contact Information

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The Department of Physics and Geosciences offers an M.S. degree in Petrophysics, as well as graduate courses in Geology and in Physics. Graduate courses in Geology and Physics provide a strong supporting field for a major in another science, mathematics or engineering.

Master of Science in Petrophysics

Petrophysics is the study of physical and chemical properties of reservoirs (rocks and fluids). It is the first such program in North America, and addresses properties of subsurface rock formations and the fluid within those strata with particular application to the petroleum exploration and production industry. The course work including graduate research project is a multidisciplinary program with Geology, Physics, and Natural Gas Engineering courses.

Admissions Requirements

For the M.S. degree in Petrophysics, a bachelor's degree in Geoscience, Mathematics, Physics, or Chemistry (or related areas) is required. Students not having enough background may need to take additional undergraduate courses.

Graduate Faculty

Al-Bataineh, Hisham Associate Professor, Department of Physics and Geosciences; B.S., Yarmouk University (Jordan); M.S., Aligrah Muslim University (India); M.S., New Mexico State University; Ph.D., New Mexico State University.

Su, Haibin Associate Professor, Department of Physics and Geosciences; B.S., Beijing University (China); M.S., Chinese Academy of Sciences (China); Ph.D., University of Cincinnati.

Associate Member

Sanchez Ramos, Veronica Assistant Professor, Department of Physics and Geosciences; B.S., University of Houston; M.S., University of Houston; Ph.D., University of Houston.

Yelisetti, Subbarao Associate Professor, Department of Physics and Geosciences; B.S., Acharya Nagarjuna University (India); M.S., University of Hyderabad (India); Ph.D., University of Victoria (Canada).

Emeritus

Norwine, James Professor Physics and Geosciences, Department of Physics and Geosciences; Regents Professor; B.S., Southeast Missouri State College; M.S., Southeast Missouri State College; Ph.D., Indiana State University.

Geology (GEOL)

GEOL 5305 Graduate Research Project 3 SCH (0-0-3)

Designed for project option students and requires completion of a research project. Prerequisite: departmental approval. May be repeated for a maximum of 6 semesters hours.

GEOL 5306 Thesis 3 SCH (3)

Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 6 semester hours.

GEOL 5310 Advanced Topics in Geology 1-3 SCH (1-3)

Intensive study at a graduate level of selected advanced topics. May be repeated for credit under different topics.

GEOL 5311 Geochemistry 3 SCH (2-3)

Study of the occurrence, distribution and behavior of major and minor elements in the earth's atmosphere, hydrosphere and lithosphere. Prerequisites: GEOL 3409, GEOL 3411, CHEM 1312 and CHEM 1112

Fee: \$30.00

GEOL 5312 Geographic Info Systems **3 SCH (3-0)**

Principles and practice of geographic information systems (GIS) using vector-based GIS as the primary software package. Students will demonstrate the use of GIS through individual class projects oriented toward their area of interest.

GEOL 5313 Advanced GIS **3 SCH (2-3)**

Research applications of advanced techniques of Geographic Information Systems. Vector-and raster-based GIS modeling: terrain modeling, hydrological modeling, 3-D modeling: hands-on research topics. GIS programming for problem solving in students research applications. Prerequisite: GEOL 5312 or permission of instructor.

GEOL 5352 Remote Sensing **3 SCH (3-0)**

Principles and practice of remote sensing involving analysis and interpretation of aerial photos and digital images. Students will demonstrate the use of remote-sensed through individual class projects oriented toward their area of interest.

Physics (PHYS)

PHYS 5382 Exploration Geophysics **3 SCH (3)**

Application of classical physics to the study of the Earth and the solution of problems in Earth sciences, including gravity, magnetic, seismic, heatflow, electrical, electromagnetic, and well log methods, instruments, data acquisition, processing and interpretation. Applications to petroleum exploration. Prerequisites: GEOL 3370 or permission of the instructor.

PHYS 5385 Seismology **3 SCH (3-0)**

Basics of seismology: wave propagation, seismic reflection and refraction. Application of physics in the seismic velocity and anisotropy structure of the Earth. Earthquake generation, post-seismic deformation and creep events, relation to faulting and plate tectonics. Prerequisites: GEOL 3370 or permission of the instructor.

PHYS 5388 Borehole Geophysics **3 SCH (3-0)**

Basic rock properties concepts; evaluating formations from geophysical well logging. Instrumentation, the physics of logging, and well log interpretation. Rock physics tools and well logs for petroleum and geothermal exploration, as well as water prospecting. Prerequisites: GEOL 1303/ GEOL 1103 and PHYS 2325/ PHYS 2125, PHYS 2326/ PHYS 2126.

Petrophysics, M.S.

The coursework for this multidisciplinary program involves courses in Physics (PHYS), Geology (GEOL), and Natural Gas Engineering (NGEN). The coursework for this program is as follows:

Required Coursework

Code	Title	Semester Credit Hours
PHYS 5382	Exploration Geophysics	3
PHYS 5385	Seismology	3
PHYS 5388	Borehole Geophysics	3
GEOL 5305	Graduate Research Project	3
GEOL 5310	Advanced Topics in Geology	1-3
GEOL 5311	Geochemistry	3
GEOL 5319		3
NGEN 5303	Advncd Topics in Nat Gas Engin	1,3
NGEN 5310		3
NGEN 5312	Pressure Transient Analysis	3
NGEN 5363	Advanced Reservoir Engineering	3
NGEN 5387	Quantitative Well Log Analysis	3

Total Semester Credit Hours

32-36

Degree Plans

For the M.S. in Petrophysics, both Plan I (thesis) and Plan II (non-thesis) are available.

- **Plan I** requires 24 credits of coursework plus completion of a research thesis (6 hours for research proposal and thesis).
- **Plan II** requires 36 hours of course work including completion of a short research project.