GEOPHYSICS (GEOPHYS)

GEOPHYS 5000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

GEOPHYS 5001 Special Topics (LAB 0.0 and LEC 0.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

GEOPHYS 5010 Seminar (LEC 0.50)
Discussion of current topics.

GEOPHYS 5040 Oral Examination (IND 0.0)
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/ comprehensive examination (oral/ written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

GEOPHYS 5096 Global Tectonics (LEC 3.0)
An integrated view of the Earth's structure and dynamics with an emphasis on information gained through geophysical methods. Topics include seismology, heat flow, gravity, rheological and compositional structure, plate motions and intermotions, and mantle driving mechanisms for plate tectonics. Prerequisite: Geology 3310.

GEOPHYS 5099 Research (IND 0.0-15)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

GEOPHYS 5202 Exploration and Development Seismology (LAB 1.0 and LEC 2.0)
Principles of reflection seismology as applied to the delineation of geologic structures and the determination of stratigraphy and lithology. Emphasis on both the capabilities and limitations of the seismic method. The laboratory utilizes both modeled and actual seismic data. Prerequisites: Math 1211 or Math 1214; Geology 1110 or Geo Eng 1150.

GEOPHYS 5211 Seismic Stratigraphy (LAB 1.0 and LEC 2.0)
A study of the seismic expression of depositional models. Reflection patterns and reflection amplitudes are interpreted to determine bed thicknesses, fluid content, depositional environment, and lithology. Special data acquisition and processing techniques are examined. Prerequisites: Geophys 4521, Geology 3310, 3620.

GEOPHYS 5221 Wave Propagation (LEC 3.0)
A study of Hamilton's principle and energy theorems, fundamentals of plane wave theory, waves in stratified fluids, elastic waves in solids, electromagnetic and hydromagnetic radiation, and Allen's functions and point sources. Prerequisites: Geophys 281, 3221.

GEOPHYS 5231 Seismic Data Processing (LAB 1.0 and LEC 2.0)
Introduction to seismic data processing. Topics to be covered include statics corrections, filtering, velocity analysis, deconvolution, stacking and migration. The course has a field component to record seismic data. If this is offered in the summer, an off-campus trip may be needed. Extra fee may be charged to cover the field expenses. Prerequisites: Geophys 3210 or Geophys 5202.

GEOPHYS 5241 Advanced Electrical And Electromagnetic Methds In Geophysical Exp (LAB 1.0 and LEC 2.0)
Theory of the electrical geophysical methods as applied to subsurface investigations addressing geologic, engineering, groundwater and contaminant transport problems. Course content includes both passive and active methods and recent advances in the application of these methods. Course will include a field component illustrating application of techniques to local problems. Prerequisites: Geophys 3251, Math 2222.

GEOPHYS 5261 Computational Geophysics (LAB 2.0 and LEC 1.0)
Scientific programming in a UNIX/Linux environment, with emphasis on solving geophysical problems such as linear and nonlinear inversion, spectral analysis, seismicity, seismic wave attenuation, shear-wave splitting, and seismic tomography. Prerequisite: Geophys 3210.

GEOPHYS 5432 Potential Field Theory (LEC 3.0)
The mathematics and physics of gravitational, magnetic, and electrical fields of the earth as derived from potential functions, with applications to practical problems. The theorems of Laplace, Poisson, Gauss, and Green and their applications to geophysics are presented. Prerequisites: Math 5325 (also may be taken as a co-requisite). (Co-listed with Geo Eng 5432 and Geology 5432).

GEOPHYS 5736 Geophysical Field Methods (LAB 1.0 and LEC 2.0)
Imaging of selected subsurface features and engineering structures using various geophysical tools. Special emphasis is placed on ground penetrating radar and surface wave techniques. One field trip at student expense required. Prerequisite: Junior level standing or higher. (Co-listed with Geo Eng 5736).

GEOPHYS 5761 Transportation Applications of Geophysics (LAB 1.0 and LEC 2.0)
Overview of geophysical and non-destructive test methods that are commonly used to investigate transportation structures and their foundations. Emphasis is placed on bridge system substructure, bridge system superstructure, pavement, roadway subsidence, subsurface characterization and vibration measurements. Prerequisite: Junior level standing or higher. (Co-listed with Geo Eng 5761 and Civ Eng 5750).

GEOPHYS 5782 Environmental and Engineering Geophysics (LAB 1.0 and LEC 2.0)
An introduction to the theory and application of the gravity, magnetic, resistivity, self-potential, induced polarization and electromagnetic methods as applied to the solution of engineering and environmental problems. Prerequisite: Math 2222. (Co-listed with Geo Eng 5782).

GEOPHYS 6000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

GEOPHYS 6001 Special Topics (LAB 0.0 and LEC 0.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

GEOPHYS 6010 Seminar (RSD 0.0-6.0)
Discussion of current topics.

GEOPHYS 6040 Oral Examination (IND 0.0)
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/ comprehensive examination (oral/ written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

GEOPHYS 6050 Continuous Registration (IND 1.0)
Doctoral candidates who have completed all requirements for the degree except the dissertation and are away from the campus must continue to enroll for at least one hour of credit each registration period until the degree is completed. Failure to do so may invalidate the candidacy. Billing will be automatic as will registration upon payment.

GEOPHYS 6099 Research (IND 0.0-15)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

GEOPHYS 6211 Advanced Seismic Interpretation (LAB 1.0 and LEC 2.0)
The integration of geologic information, well log data and seismic information for interpreting the earth's subsurface using advanced 3-D seismic interpretation software packages. Reservoir identification and evaluation as well as horizon and formation attributes are included. Prerequisites: Geophys 3210 or Geophys 5202.

GEOPHYS 6221 Advanced Geophysical Data Analysis (LEC 3.0)
Applications of advanced time series and spatial series analysis techniques to geophysical data. Topics covered include digitization and aliasing of geophysical signals, frequency and wavenumber spectra, digital filtering and linear systems theory. Hands-on data processing exercises will provide theoretical knowledge as applied to geophysical investigations. Prerequisites: Comp Sci 1970 and Comp Sci 1980 or equivalents.

GEOPHYS 6231 Advanced Seismic Data Processing (LAB 1.0 and LEC 2.0)
Theory and application of seismic data processing. Topics to be covered include convolution, correlation, deconvolution, 2-D filtering, migration and inversion. Prerequisites: Geophys 3210 or Geophys 4231.

GEOPHYS 6232 Introduction to Satellite Geodesy (LEC 3.0)
An introduction to satellite geodetic methods, including Global Navigational Satellite Systems (GNSS), satellite gravity, Synthetic Aperture RADAR (SAR) and Interferometric SAR (InSAR), and LiDAR. Geodetic reference frames and various datasets are introduced. Data processing and analysis methods are covered. Students are required to complete a project that utilizes one or more methods covered in the course. Prerequisites: Geo Eng 3148 or graduate standing. (Co-listed with Geo Eng 6232).

GEOPHYS 6241 The Theory of Elastic Waves (LAB 1.0 and LEC 2.0)
A mathematical study of elastic waves in the layered earth. Prerequisites: Geophys 3210.

GEOPHYS 6251 Geophysical Inverse Theory (LAB 1.0 and LEC 2.0)
A study of inverse theory applied to geophysical data, focusing on the relationship between data and model spaces and ways to estimate model parameters via global and local optimization techniques. Prerequisites: Geophys 3210 or Graduate Standing in GGPE.

GEOPHYS 6321 Advanced Mapping with Drones (LAB 1.0 and LEC 2.0)
The course includes an overview of the basic knowledge required for passing the FAA Part 107 Remote Pilots Knowledge Test for small UAS operators, including UAS mapping technology and its rules and regulations, airspace classification, and reading aeronautical charts. More advanced data collection strategies are introduced, as well as the theoretical concepts in mapping, photogrammetry, and surveying. Advanced data processing techniques and the use multiple types of data to achieve survey objectives. Accuracy of the derived products. Credit will not be given for both this course and Geo Eng 4321 Prerequisites: Geo Eng 3148 or Geo Eng 5146 or Instructor approval. (Co-listed with Geo Eng 6321).

GEOPHYS 6401 Introduction to Positioning, Navigation, and Timing (LAB 1.0 and LEC 2.0)
This course provides a technical introduction to Global Navigation Satellite Systems (GNSS), covering theory, procedures, and accuracy issues. Fundamental principles of GNSS measurements are covered, including the various sources of error that can affect their accuracy. Practical skills will be emphasized, including the ability to compute positions using both code and phase techniques, and utilize GNSS post-processing software. Quality control and assurance. Surveying techniques. Prerequisites: Geo Eng 3148 or graduate standing. (Co-listed with Elec Eng 6401).

GEOPHYS 6403 Advanced Positioning, Navigation, and Timing (LAB 1.0 and LEC 2.0)
Advanced topics in Global Navigation Satellite Systems (GNSS). Processing phase and code observations. Data Q/C, accuracy and precision estimates. Kalman filtering and other non-GNSS PNT systems will be explored. Practical applications and technology advancements will be emphasized. Prerequisites: Geophys 6401. (Co-listed with Elec Eng 6403).