

GEOPHYSICS (GPH)

GPH 501. RESEARCH. (1-16 Credits)

Original research work that will not be part of the data used in a thesis. Graded P/N.

This course is repeatable for 24 credits.

GPH 503. THESIS. (1-16 Credits)

Thesis research and writing.

This course is repeatable for 999 credits.

GPH 505. READING AND CONFERENCE. (1-16 Credits)

Independent reading and library research on specialized topics in geophysics, guided by discussions with supervising faculty. A written report may be required.

This course is repeatable for 16 credits.

GPH 507. SEMINAR. (1-16 Credits)

This course is repeatable for 48 credits.

GPH 601. RESEARCH. (1-16 Credits)

Original research work that will not be part of the data used in a thesis. Graded P/N.

This course is repeatable for 36 credits.

GPH 603. THESIS. (1-16 Credits)

Thesis research and writing.

This course is repeatable for 999 credits.

GPH 605. READING AND CONFERENCE. (1-16 Credits)

Independent reading and library research on specialized topics in geophysics guided by discussions with supervising faculty. A written report may be required.

This course is repeatable for 16 credits.

GPH 607. SEMINAR. (1-16 Credits)

This course is repeatable for 48 credits.

GPH 630. ELEMENTS OF SEISMOLOGY. (4 Credits)

Survey of basic concepts in global seismology: world seismicity; elastic structure of the earth; seismic wave paths in the earth; locating earthquakes; earthquake focal mechanisms, magnitudes, stress drop, energy; stress and strain, elasticity, wave equation, plane waves in homogeneous and layered media, surface waves, free oscillations; ray theory; seismometry; earthquake prediction. Laboratory exercises include interpretation and analysis of seismograms from global seismographic networks.

Recommended: Differential equations.

GPH 632. CRUSTAL SEISMOLOGY. (3 Credits)

Structure of the earth's crust and upper mantle from seismic reflection and large offset (refraction, wide-angle reflection) data. Methods of data collection, data processing theory and practice, modeling and interpretation techniques, correlation of seismic results with laboratory measurements of rock properties, and regional case studies.

Prerequisites: GPH 630 with C or better

GPH 640. GEODESY. (4 Credits)

Physical and observational geodesy, including the Earth's gravity field and potential and determination of the Earth's geoid. Interpretation of geoid, geoid anomalies, and isostatic compensation. Gravity, point-position and remote sensing geodetic measurement techniques, including GPS, InSAR, VLBI, leveling, triangulation/trilateration, and low-Earth orbit gravity satellite missions are covered as are geodetic reference frames. Offered alternate years.

GPH 641. ELECTROMAGNETIC METHODS IN GEOPHYSICS. (3 Credits)

Survey of electromagnetic (EM) methods in geophysics. Review of electromagnetic theory, Maxwell's equations in the quasi-static limit, the diffusion of EM fields in a layered conductor, qualitative discussion of EM fields in 2- and 3-D conductors. EM techniques, including DC resistivity, magnetotellurics, controlled source EM, induced polarization, and long-period magnetometer array methods. Applications to exploration, to basic research on crustal structure and to studies of upper-mantle conductivity. **Recommended:** Upper-division EM course.

GPH 642. EARTH MAGNETISM. (3 Credits)

Geomagnetism and magnetic potential: general morphology and secular change; internal and external sources; principles of paleomagnetism, including field and laboratory procedures; origin of remnant magnetism in rocks and the controlling physical and chemical processes; the origin of the Earth's magnetic field.

GPH 650. GEOPHYSICAL INVERSE THEORY. (4 Credits)

Survey of the theory and applications of inverse methods currently used in the geophysical sciences for the interpretation of inaccurate and inadequate data. Backus-Gilbert inverse theory, resolution, regularization methods (such as damped least squares) for linear and non-linear problems, stochastic inversion, and extremal models. Applications to seismic, gravity, magnetic and electromagnetic data.

Recommended: Linear algebra

GPH 651. GEODYNAMICS I. (3 Credits)

Application of the techniques of continuum mechanics to geological problems. Thermal and subsidence history of the lithosphere; stress and strain in the earth; elasticity and flexure of the lithosphere; gravitational compensation. Lec. Offered odd years on Corvallis campus in fall term (subject to change).

GPH 665. GEOPHYSICAL FIELD TECHNIQUES. (3 Credits)

Instrumentation, field methods and interpretation of gravimetric, magnetic, electrical and seismic prospecting techniques. Students will be required to collect, reduce, analyze, and interpret data.

GPH 689. SPECIAL TOPICS IN GEOPHYSICS. (1-4 Credits)

Special topics of current interest in geophysics, not covered in detail in other courses. May be repeated on different topics for credit.

This course is repeatable for 16 credits.