GG450: Geophysical Methods

Combined lecture/lab covering basic geophysical theories, exploration, and interpretation. Seismic reflection and refraction, gravity, and electromagnetics. Constraints on Earth’s internal structure and composition.


Instructor: Dr. Robert Dunn (dunnr@hawaii.edu, POST 808)

Lecture: day/time/place: Tues, Thu/09:00-10:15 am/POST 708
Lab: day/time/place: Tues/1:30-3:30 pm/POST 703
Office Hours: Tues/ 10:30-11:20am/POST 808

Prerequisites
GG302 (Igneous and Metamorphic Petrology), GG250 (Scientific Programming), MATH241-242 (Calculus I & II), PHYS 170 & 272 (Calculus based introductory physics I & II)

Course Objectives
Provide experience in geophysical data acquisition, analysis, and interpretation used in geoscience-related careers in research, industry, and consulting. Improve abilities in independent reasoning and problem solving applied to geophysics. Improve skills in mathematics, physics, and computer programming. Enhance skills in writing, oral communication, and teamwork.

SHORT SYLLABUS

Week 01 Introduction + Material Properties
Week 02 Introduction to Seismology
Week 03 Seismic Refraction Theory and Methods
Week 04 Seismic Refraction Data and Earth’s Structure
Week 05 Seismic Reflection Theory and Methods
Week 06 Seismic Reflection Data and Earth’s Structure
Week 07 Ground Penetrating RADAR
Week 08 Mid-Term Week
Week 09 Gravity Fields and Earth’s Gravity and Geoid
Week 10 Gravity Field Data Processing and Interpretation
Week 11 Spring Break 03/21 - 03/25
Week 12 Magnetic Fields and Geomagnetic Surveying
Week 13 Magnetic Field Data Processing and Interpretation
Week 14 Electric Fields and Geoelectrical Surveys
Week 15 Geoelectrical Data Processing and Interpretation
Week 16 Geodetic Techniques
Week 17 Term Review
Week 18 FINAL EXAM
In general, each course topic covers Basic Theory, Surveying Methods, Data Processing, and Interpretation. Each week there is a reading assignment that is to be completed in advance of the lectures. Lab content covers material from lectures in the previous week.

**Homework:** Assigned on Tuesdays and due the following Tuesday.

**Labs:** Labs may involve field experiments as well as computer programming and analysis. Lab assignments are due the following Tuesday at the beginning of the next lab.

**Grading Policy:** Homework: 30%; Labs: 30%; Midterm: 20%; Final: 20%.

**Laulima:** Course resources (power point images from lecture and handouts) are posted on Laulima under the “resources” link on the course site. https://laulima.hawaii.edu/portal.

**Attendance:** Although attendance is not formally scored, regular attendance is expected. Students should attend lecture because not all material included in exams is contained in the text and the exams and homework tend to follow the lectures more so than the text. In addition, there may be in-class exercises. Attendance at lab is mandatory.

**Late homework/lab policy:** You have 3 “grace days” for late Homework and Labs. That is, you can turn in a total of three assignments a day late, or one assignment three days late. Assignments turned in late (after class on the day due) without “grace credit” will be penalized by 10% per day. Weekends count as 2 days.

**Missed Lab policy:** Missed a lab? No credit. In the event of verifiable extenuating circumstances, there will be a makeup lab period in the final week of class. The makeup lab will be different from the original.