The Earth’s shape, orbit, interior structure, and geological evolution are the result of the interactions between Earth’s materials and physical laws, such as those of conservation of mass, energy, and momentum. In this class, we examine the physical properties and interactions of the Earth as it continues to evolve through time, and explore these interactions using observations of gravity, electromagnetism, heat flow, and seismic wave propagation.
Preliminary Schedule:

Week 01  Introduction to Geophysics/Planets & Orbits
Week 02  Material Properties/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  Magnetic Fields and Geomagnetic Surveying
Week 12  Spring Break 03/26 - 03/30
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/ Acoustic Mapping Techniques
Week 17  Term Review
Week 18  Final Exam

Course Structure: Two lectures, one studio, and one lab per week. Lecture: includes class participation; Studio: small group activities – mostly problem solving; Lab: Lab and outdoor activities with required lab report.

Grading: We will have homework, lab assignments, one in-class midterm, and one final exam. The relative weightings of homework, lab assignments, exams, and class participation are: Midterm and Final 25%, Homework Assignments 25%, Laboratory Assignments 25%, Class Participation 25%. Total 100%

Assignments: Homework and Lab assignments will be assigned approximately weekly, and are due at the beginning of class exactly 1 week after they are assigned (unless otherwise stated). Late assignments not accepted.

Format: Neatness, clarity of expression, and completeness are essential to obtain full credit on exams, labs, and homework. Please make sure to:

1. Write out the equations, or derive new ones, that you will use to solve the problem, and explain (in words) your reasoning. Specify known and unknown information.
2. Draw illustrative figures that describe the problem.
3. Show clearly how you solved the problem.
4. Check your answer – does your solution make physical sense? Check units. Explain why you think your answer is correct.

Lab Write-ups: Follow the instructions on the lab, and make sure that your lab is clear. Also:

1. Matlab Codes. Include a copy of your code at the end of your lab write-up, but don’t bury the
answers to the questions within the code. What you did should be clear from your lab write-up – don’t except a reader to pick through your code.  

(2) Completeness. How much detail to include? A good rule of thumb is to include just enough information so that a reader could take your data and reproduce what you did using the information that you provide. Be concise and complete. (This is a good rule of thumb for scientific writing in general.)  

(3) Format. Your lab write-up should consist of neatly written answers to the questions, in the order in which they are asked. Please do not skip sections or intersperse your answers to questions with code. Present your results with in the proper format for scientific writing – with labeled sections “Introduction”, “Methods”, “Results”, and “Discussion and Conclusions” (unless the lab instructions indicate otherwise).  

(4) Figures: All figures that you include should be clearly labeled (Fig. 1., Fig. 2A, Fig. 2B, etc.) and these labels should be used when referring to the figure in the text. Figures should be clearly labeled on their axes, and multiple lines included in the same plot should be clearly distinguished by labels or legends. Please include units in your labels. It is ok to handwrite axes labels and Figure names, but they should be neat and clear.

Cooperation: Collaboration is encouraged in order to discuss approaches to solving problems. However, do not copy answers to problem sets or labs – work out the problems on your own and write out the solutions by yourself.

Late Assignment: 0 credit. Missed a lab? No credit. In the event of verifiable extenuating circumstances, there will be a makeup lab/exercise period in the final week of class.

Questions: Questions are welcome and help learning. Please ask questions freely!

Learning Objectives: The Department of Geology & Geophysics has established the following undergraduate student learning objectives. All of these objectives are relevant targets for the curriculum of GG450.

1. Students can explain the relevance of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
2. Students can apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
3. Students use the scientific method to define, critically analyze, and solve a problem in earth science.
4. Students can reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
5. Students can evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

Disability Access: If you have a disability and related access needs the Department will make every effort to assist and support you. For confidential services students are encouraged to contact the Office for Students with Disabilities (known as “Kokua”) located on the ground floor (Room 013) of the Queen Lili‘uokalani Center for Student Services: KOKUA Program; 2600 Campus Road; Honolulu, Hawaii 96822. Voice: 956-7511; Email: kokua@hawaii.edu; URL: www.hawaii.edu/kokua
The University of Hawai‘i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the confidential resources available here: http://www.manoa.hawaii.edu/titleix/resources.html#confidential

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299 i9uho@hawaii.edu.