GG 460 Geological Remote Sensing (Spring, 2011)
Lectures (TTh 3:00-4:15, POST 708) and Labs (F 1:30-4:20, POST 733)

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**Date** | **Lab or Lecture (SLO*)**
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Jan. 11 | Class Organization, Overview and Examples of Remote Sensing (1; Scott gone)
Jan. 13 | Data Collection I: Satellite Platforms and Orbits (1, 3, 5; Rob gone)
*Jan. 14* | *ENVI familiarization, Contrast Enhancements, Band Combinations, Subsampling (2)*
Jan. 18 | Data Collection II: Signal Collection, Data Depth, Image File Types (1, 3, 5; Rob gone)
Jan. 20 | Image Co-Registration, Resampling, Geo-coding, and UTM (1, 3, 5; Rob gone)
*Jan. 21* | *Digital Image Processing I: Spatial Resolution and Spatial Filters (2)*
Jan. 25 | Intro. to the Electromagnetic Spectrum (1, 3, 5)
Jan. 27 | Reflectance, Emission, and Noise (1, 3, 5)
*Jan. 28* | *Digital Image Processing II: Resampling, Co-Registration, Geo-Registration (2)*
Feb. 1 | Physical Processes of Energy (1, 3, 5)
Feb. 3 | Thermal Infrared I: Planck Curves, Blackbodies, and Temperature (1, 3, 5)
*Feb. 4* | *Digital Image Processing III: Band Ratios, NDVI, Density Slices (2)*
Feb. 8 | Thermal Infrared II: Temperatures, kinetic vs. radiometric, emissivity (1, 3, 5)
Feb. 10 | Thermal Infrared III: Volcano Monitoring Applications, dual band methods (1, 3, 5)
*Feb. 11* | *Digital Image Processing IV: Reflected and Emitted Energy (2)*
Feb. 15 | Intro to GPS (1, 3, 5)
Feb. 17 | Using a hand-held GPS, in-class exercise (2)
*Feb. 18* | *GPS Mapping (2)*
Feb. 22 | Resolution and resolution trade-offs (1, 3, 5)
Feb. 24 | Effects of Atmospheric Constituents (1, 3, 5)
*Feb. 25* | *Digital Image Processing V: Scatter Plots (2)*
Mar. 1 | Image Classification (1, 2, 3, 5)
Mar. 3 | Principal Components (1, 2, 3, 5)
*Mar. 4* | *Digital Image Processing VI: Image Classification (2)*
Mar. 8 | Introduction to Synthetic Aperture Radar (SAR) (1, 3, 5)
Mar. 10 | Geological applications of SAR data (1, 3, 5)
*Mar. 11* | *Digital Image Processing VII: Principal Components, Decorrelation Stretches (2)*
Mar. 15 | Hyperspectral data and images (1, 3, 5)
Mar. 17 | Real-Time Assessment of Volcano and Fire Hazards (1, 2, 3, 5)
*Mar. 18* | *Digital Image Processing VIII: Pan-sharpening, Hyperspectral Data (2; Scott gone)*
*Mar. 21 – 25* | *SPRING BREAK ！！！！！*
Mar. 29  Air Photos, parallax, distortion (1, 3, 5)
Apr. 31  Digital Elevation Models and Interferometric SAR (InSAR) (1, 3, 5)
        *Distribute Data Sets for Big Island project, Intro. to Hawaiian Volcanic Products (1)*
Apr.  5  Large-scale Topographic Change from InSAR (1, 3, 5)
Apr.  7  Small-scale Topographic Change from InSAR (1, 3, 5)
        *Work on Big Island project*
Apr.  8  Review for MID-TERM
Apr. 12  MID-TERM EXAM!!!!
Apr. 14  *Work on Big Island project*
Apr. 19  How and where to obtain Remote Sensing data (1, 2, 5)
Apr. 21  no class, but Preliminary Big Island projects due (start of Big Island field trip) (4)
        *Big Island Field Trip (1, 3, 5)*
Apr. 22  High spatial resolution data, orthorectification (1, 2, 3, 5)
Apr. 28  Computer Graphics Packages, Vector vs. Raster, Image Compression (1, 2, 3, 5)
        *Digital Image Processing IX: DEMs, Cross-Sections, and Perspective Views (2)*
May  3  no class – work on final projects
May  6  **FINAL PROJECT DUE AT 4:00 PM! (4)**
        **NO EXCEPTIONS!!!!**

This course is partially supported by the Hawai‘i Space Grant Consortium and the Dept. of Geology & Geophysics; computer support kindly provided by Pat Townsend, Sharon Stahl, Ross Ishida, John Moroney, and David Morse)

Labs are due at the beginning of the following lab – no late labs will be accepted, sorry. The Big Island project is due twice. The first version, which will require the most work, is due on Thursday Apr. 21 (before we get on the plane). The final version is due on Friday, May 6 at 4:00 pm – no late projects will be accepted, sorry. There will be quizzes at the start of each Tuesday class, on the previous week’s material.

**Grading:**

- quizzes and homework 15%
- 1 midterm 15%
- lab assignments 40%
- Big Island project 30%

**May 6**
There is no reasonably-priced text that we have found. Instead we will provide you with xeroxed chapters from relevant books and journal articles (don’t tell the copyright police).

**Useful Textbooks:**

**Remote Sensing Journals:**
International Journal of Remote Sensing
Remote Sensing of the Environment
IEEE Transactions on Geoscience and Remote Sensing

*SLOs - Student Learning Objectives*
The Geology & Geophysics Dept. has decided that the following Student Learning Objectives are key goals for any G&G student:

1. Students can **explain the relevance** of geology and geophysics to human needs, including those appropriate to Hawai‘i, 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.

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 “Kōkua”) located on the ground floor (Room 013) of the Queen Lili‘uokalani Center for Student Services.