GG671b Remote Sensing – Planets
Gillis-Davis
Wednesday 1:30-4:20
POST 544

Description:
This course will teach end-to-end principles of remote sensing across electromagnetic spectrum with application to the study of planetary bodies. Topics include: a) interaction of electromagnetic radiation with materials, b) instrument design, characterization, and calibration, c) methods of data analysis, d) imaging principles and interpretation, and e) science objectives and instrumentation of several current and planned planetary missions. This course consists of one 3-hour meeting per week that will incorporate lecture, class discussion, and laboratory. Most of the class time will be spent in a hands-on, laboratory based class that will teach methods behind instrument design, data acquisition, image processing.

This course is designed for students interested in learning how CCDs work, to use and interpret satellite data acquired for planetary bodies, with an emphasis on spectroscopy at visible, near-infrared, and thermal wavelengths. Students will learn about state-of-the art remote sensing methods and basic concepts of how to use such data to derive information about the composition of planetary surfaces. The course is taught at an entry graduate/upper undergraduate level. Prerequisites include basic computing skills and geology knowledge, ability to use either Matlab ENVI, or IDL.

Reading/Text:
There is no required textbook to purchase for this course, but there will be various book chapters, handouts, and articles that students are responsible for reading. All required reading materials will be distributed in class or via e-mail and/or posted on the course website.

Grading:
Homework 20%, 2 Papers 25% each, final project 30%.

Homework: Throughout the semester there will be 8 homework assignments related to spectroscopy and analysis of remotely-sensed data. Many of the homework assignments will consist of computer lab exercises that each student must complete on his/her own time.

Paper 1: A description of methods used to calibrate CCD spectrometer. Paper should be written as if it were the methods section of a peer-reviewed publication. 3 pages @ 1.5 line space. Paper 1 will also be presented as a 5-8 min oral presentation.

Paper 2: Provide a critical review of a journal article that focuses on a topic using either VIS-NIR-IR reflectance spectroscopy or TIR/emissivity measurements. 3 pages @ 1.5 line space. Paper 2 will also be presented as an 8-10 min oral presentation.

Final project: Write a 2,000-word paper (e.g., GRL, science, nature length) that reports findings using spectroscopic methods discussed in class. Data from PDS may be used for any
object in the PDS. Students may also use spectrometers constructed in class. 4 pages @ 1.5 line space. Paper 3 will also be presented as a 10-12 min oral presentation.

**Student Learning Objectives (SLO) for MS and PhD degrees in Geology & Geophysics:**
This class will cover content to MS and PhD SLO1 (Technical Knowledge), SLO2/3 (Scientific Method), SLO3/4 (communicate geological knowledge), SLO4/5 (Employability/Contribution Post-Graduation), and PhD SLO2 (Expertise in a sub-discipline).