University of Maryland at College Park
Department of Geographical Sciences
GEOG671 Advanced Remote Sensing:
Remote Sensing Instruments and Observations

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Office hours: Wednesday 9- 11 a.m.
and by appointment

General information about the course

This course is intended to provide an in-depth exploration of existing satellite-borne optical systems, emphasizing the impacts of instrument design and orbital tracks on radiometric properties of satellite observations of land surface across a range of resolution. The course will be presented as an instructor-guided learning environment where the majority of course materials will be analyzed through guided small-group discussions and empirical learning from manipulation of various datasets. Particular attention will be given to quantifying the uncertainties in characterization of land surface properties arising from variation of systems' properties and data collection strategies.

This course is intended either as one of the two capstone courses in Remote Sensing and requires extensive prior knowledge of remote sensing principles and ability to manipulation satellite imagery within image processing software environments. Pre-requisites for this course include GEOG 372 and 306. Practical knowledge of programming environments for image analysis (e.g. IDL or Python) and statistics (e.g. R) are strongly recommended.

Learning outcomes for the course

- The major aim of this course is to develop a deep understanding of sources and extent of variability in spectral signature of land surfaces imposed by differences in instrument design and orbital configuration.
- This course will build competency in multi-sensor data record development and analysis to support students' future research and applications.
- Finally, the course aims to develop analytical skills that would support intercomparison of any suites of optical datasets not covered within the scope of this course.

Required textbook: No textbook is required for this class

Recommended textbooks:

Schott, J.R. (1997) Remote Sensing: The Image Chain Approach, 1st ed. Oxford University Press, New York. (ISBN 0-19-508729-7)

Additional web-based sources:

A series of on-line sources and peer-reviewed articles will be provided to the students as required or supplementary readings.

Course communication

The main course communication will be carried out through the ***Canvas*** within the University of Maryland Enterprise Learning Management System (ELMS;

https://elms.umd.edu). All students enrolled in the course have access to the system. In addition to communications, ***Canvas*** will be used by the instructor to post assignments and grades and by the students to submit their assignments.

Class structure

The class structure includes one 2 hour and 30 min discussion/hands-on data analysis section per week. Students are expected to do a substantial amount of reading and data analysis outside the assigned class time. Students will be expected to present the summary of their reading and research during the class for a total of 10 class reports. They will also contribute to online development of annotated bibliography.

Provisional outline of topics covered in the course and exams

Please, note that modifications may be introduced to the schedule as the semester progresses. Updated schedules will be made available to all students via ***Canvas*** as soon as possible.

Date	Topic
9/2/2015	Class Overview, Goals and Approaches, Introductions
9/9/2015	Basics of instrument design and calibration
9/16/2015	**Coarse resolution systems:** history, orbital parameters, instrument design, data archival and distribution
9/23/2015	Understanding and using MODIS and VIIRS data
9/30/2015	*Independent analysis of coarse resolution datasets*
10/7/2015	**Coarse resolution intercomparison summary**
10/14/2015	**Moderate resolution systems:** history, orbital parameters, instrument design, data archival and distribution
10/21/2015	Comparing MODIS and Landsat 5,7 and 8 observations
10/28/2015	Radiometric impact of varying surfaces on NDVI of mixed coarse resolution pixels
11/4/2015	*Independent analysis of moderate resolution datasets*
11/11/2015	**Coarse/moderate resolution data intercomparison summary**
11/18/2015	**Very High Resolution (VHR) systems:** history, orbital parameters, instrument design, data archival and distribution
11/25/2015	Impact of aggregation on radiometric signature of land surface: VHR 2 mod, mod 2 coarse
12/2/2015	*Final paper development*
12/9/2015	Final paper presentation and coarse summary

Final course paper

The final course paper will represent the major grading assignment of the course and will account for 50% of the final grade. Paper topic will be assigned by the instructor no later than on 11/25/2015. The paper will present a critical analysis of a peer-reviewed publication with an emphasis on inclusion of knowledge of instrument design and data acquisition strategies developed during this course.

Grade determination

The final grade in the class will be composed of 10 class presentations (each worth 5% of the total grade for the 50% total) and the final course paper (50%). The general guidelines for letter grades will be as follows: 97≤"A+" ≤110 , 93≤"A" <97, 90≤"A-" <93, 87≤"B+" <90, 83≤"B" <87, 80≤"B-" <83, 77≤"C+" <80, 73≤"C" <77, 70≤"C-" <73, 67≤"D+" <70, 63≤"D" <67, 60≤"D-" <63, 60 < "F". Minor adjustments may be introduced to the general scheme to allow for students grade distribution.

Expectations of students in the class

Students are expected to treat each other with respect. Disruptive behavior of any kind will not be tolerated. Students who are unable to demonstrate civility with one another, the teaching assistants, or the instructor will be subject to referral to the Office of Student Conduct or to the University Campus Police. You are expected to adhere to the Code of Student Conduct.

In this class, students will be allowed and encouraged to use their personal computers or other means of technology to take class notes and contribute to in-class data anlysis.

Academic integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.

Honor pledge must be included in every assignment and exam submitted by the students:

"*I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/paper/examination.*"

Students with disabilities

Every effort will be made to accommodate students who are registered with the Disability Support Service (DSS) Office and who provide the instructor with a University of Maryland DSS Accommodation form which has been updated for the Fall 2008 semester. This form must be presented to the instructor no later than October 1, 2015. The instructor will not be able to accommodate students who are not registered with DSS or who provide the instructor with documentation which has not been reviewed and approved by UM's DSS Office.

Medical excuses

Campus Senate policy requires students who are absent due to illness/injury to furnish documentary support to the instructor. Students must contact the instructor by email or by phone prior to class time in which the student will indicate he/she has an illness/injury. In accordance with the University of Maryland policy on student medical absences, "the University will accept as an excused absence a self-signed note from a student who has missed a single lecture, recitation, or laboratory, attesting to the date of the illness. The note must also contain an acknowledgement by the student that the information is true and correct and that providing false information is prohibited under Code of Student Conduct. The student is also obligated to make a reasonable attempt to inform the instructor of his/her illness in advance."
(http://www.provost.umd.edu/announcements/StudentMedicalAbsences.cfm). In this course, only one self-signed note will be accepted for a single lab absence. If additional labs or any of the exams and in-class assessments (i.e. Major Grading Events) are missed, a written documentation from a health care provider is required. The student must present written documentation verifying his/her illness/injury on the first day of class that he/she returns to class. The student will not be allowed to turn in missed assignments or make up exams if he/she has not provided this documentation. In addition, if it is found that the student has falsified the documentation provided, he/she will be referred to the University's Student Conduct Office.

Religious observance

By September 14, 2015, students must provide the instructor, in writing, a request for a makeup exam for a specific exam date on this syllabus that students are unable to make due to a specific religious observance (specify) on a specific date. Please refer to the Online Catalog Policy on Religious Observance. Please remember that accommodations are NOT made for travel to and from the religious observance.