Master of Science in Geographic Information Systems
College of Arts and Sciences

UNIVERSITY OF Redlands

GIS 663 – Fundamentals of Remote Sensing

Spring 2018

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Course Description:

This course aims at introducing the fundamentals of remote sensing. It covers the subject of electromagnetic radiation principles, remote sensing sensor characteristics, remote sensing image data classification, and photogrammetry. Students will perform a series remote sensing image analysis by writing their own computer programs using Python or their chosen programming language.

Course Objectives:

The goal of this course is to ensure that students have a solid foundation of basic remote sensing technology and advanced image analysis theory and skills that will be used to the development of their major individual project (MIP). By the conclusion of this course, students are expected to be able to: understand the principle of EMR and spectral signature; know different remote sensing sensor geometry types; understand different sensor/image resolutions; understand the principle of photogrammetry and RADAR imaging; and perform image analysis by developing customized scripts.

Recommended Texts:

- Jensen, John R. (2007). *Remote Sensing of the Environment, An earth Resource Perspective* (2nd edition). Upper Saddle River, NJ: Pearson Prentice-Hall
- Jensen, John R. (2005). *Introductory Digital Image Processing, A Remote Sensing Perspective* (3rd edition). Upper Saddle River, NJ: Pearson Prentice-Hall
- Handouts at ***Learn*** class web site.

Prerequisites:

This course assumes the students have a basic level of image analysis and programming. The students are required to pass courses *GIS625 – Introduction to Image Data* and *GIS 617 – Programming for GIS* before taking this course.

Accommodations:

Should you require academic accommodations, please consult with Amy Wilms, Assistant Dean of Academics and Student Life: http://www.redlands.edu/DisabilityServices.asp

Policy Statements Regarding Discrimination, Harassment, Sexual Misconduct and Retaliation:

These policy statements support the University's commitments to equality of opportunity and maintaining an academic environment and workplace that is free from unlawful discrimination, harassment, sexual misconduct, and retaliation. Each person to whom this policy applies shares a responsibility for upholding and enforcing this policy.

A. No Discrimination. The University prohibits and will not tolerate unlawful discrimination on the basis of age, color, race, ethnicity, national origin, ancestry, sex, marital status, pregnancy, status as a complaining party of domestic violence, sexual orientation, gender, gender identity or expression, physical or mental disability, genetic information, religion/creed, citizenship status (except to comply with legal requirements for employment), military/veteran status, or any other characteristic protected by law.

B. No Harassment. The University prohibits and will not tolerate unlawful harassment on the basis of the characteristics identified above.

C. No Sexual Misconduct. The University prohibits and will not tolerate sexual misconduct. Redlands is committed to fostering a safe, productive learning environment. Title IX and our school policy prohibit discrimination on the basis of sex, which regards sexual misconduct — including harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. Confidential support may be obtained from the Chaplain's Office and Counseling Center. Reporting should be done through the Title IX Office – contact listed below.

D. No Retaliation. The University prohibits and will not tolerate any retaliation against any person who, in good faith, complains about discrimination, harassment, or sexual misconduct. Similarly, the University prohibits and will not tolerate any retaliation against any person who, in good faith, demonstrates opposition to, or participates in an investigation of, alleged discrimination, harassment, or sexual misconduct.

Preferred first contact for Title IX Complaints from College of Arts & Sciences Students:
Amy Wilms, Deputy Title IX Coordinator
Assistant Dean of Academics & Student Life
Academic Success & Disability Services
Phone: (909) 748-8069

Assignments:
Each student will complete a series of assignments that complement the lecture presentations. The focus of the assignments will be to reinforce the theoretical concepts introduced through lectures and discussions. The assignments will include exercises in calculating spectral distance, calculating spectral reflectance and NDVI, orthorectifying aerial photographs, and performing image classification.

Assessment:
In addition to the assignments, there will be a final exam in this course. The exam will be close book and subjects covered in both lectures and labs will be tested on.

Academic Honesty:
The University policy on academic honesty (University of Redlands Catalog, pp. 12-19) will be strictly enforced. You should read this. If you have any questions about what constitutes academic dishonesty on a particular assignment, ask the professor.

Grades:
Course grades will be based upon the following breakdown. Each assignment will be graded twice: at the end of the class meeting (30%[4.0; 3.7; 3.3; 3.0; 0]) and at the beginning of the next class meeting (70%).

Assignments 60%
Final Project 40%

Grading scale

0-60	60-63	63-67	67-70	70-73	73-77	77-80	80-83	83-87	87-90	90-95	95-100
F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A
0	0.7	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0

Class Schedule

Meeting	Dates	Subject	Reading
1	Jan. 16, 2018	Introduction to Remote Sensing and EMR Lab 1: Calculating NDVI	RSE: 1, 2
2	Jan. 18, 2018	RS Data Acquisition Lab 2: Spectral Distance and Directions	RSE: 7, 8 DIP: 2
3	Jan. 23, 2018	Introduction to Photogrammetry Lab 3: Image Orthorectification	RSE: 3, 4, 5, 6
4	Jan. 25, 2018	Image Classification (I) Lab 4: Image Classification using Minimum Distance	DIP: 9
5	Jan. 30, 2018	Image Classification (II) Lab 5: Image region-growing segmentation	DIP: 9
6	Feb. 1, 2018	Active Remote Sensing Technology Lab 6: Shaded relief calculation	Handout
7	Feb. 6, 2018	Final Project (Maximum Likelihood Classification)	