Syllabus: Earth System Remote Sensing (GEOG 185)

Instructor: Jeff Chambers

Semester: Spring 2019

Class hours: Friday 9-noon

Office hours: Thursday 12:30-1:30p, McCone 519

Final Exam: Monday, May 13th, 7-10pm, McCone 575

Welcome to GEOG 185 Earth System Remote Sensing! To remain enrolled you must attend the first class and sign in, and continue to attend class and sign in each week. There are only 30 workstations in the lab, so enrollment is limited to 30 students. There are many students on the waitlist each year. Your seat will be given to a waitlisted student if you don't attend class.

Course format: The course combines lecture and lab, one local field trip, and weekly assignments including mini-projects.

Total hours per week: Two hours of in-class lecture, with four hours of additional readings and problem assignments outside of class. One hour of lab in class, and two additional lab hours outside of class to complete lab work and independent study assignments.

Course description: (3 units; 2 lecture, 1 lab). This lecture-lab course is focused on Earth system remote sensing applications, including a survey of methods and an accompanying lab. This first part of the course will cover general principles, image acquisition and interpretation, and analytical approaches. The second part will cover global change remote sensing applications that will include terrestrial ecosystems, Earth sciences, the hydrosphere, and human land-use.

Goal of the course: The course focuses on developing an understanding of how to use remote sensing approaches to address Earth system questions for both natural and human-impacted environments. The course covers a survey of methods and analysis techniques, and case studies to demonstrate how specific questions have been addressed using a variety of sensors and approaches.   Instruction will emphasize remote sensing applications to address specific global change problems, with less emphasis on developing remote sensing technical skills. The course is structured as a lecture-lab, with material covered in class being more fully developed with readings and assignments conducted outside of class.

Concise outline of topics covered:

Week 1, Jan 25:	Introduction and History
	(textbook Chapter: 1)
	Lab 1: Mastering the basics
Week 2, Feb 1:	Electromagnetic Radiation and Digital Imagery
	(Chs: 2 & 4)
	Lab 1: Data types and display concepts
Week 3, Feb 8:	Survey of Remote Sensing Platforms (Problem Set#1 due)
	(Chs: 3, 6, 7, 8, & 9)
	Lab 2: Burn severity and ecological risk assessment
Week 4, Feb 15:	Image Interpretation and Resolution (PS#2 due)
	(Chs: 5 & 10)

	Lab 3: WorldView-2 and SWIR data
Week 5, Feb 22:	Analysis I (PS#3 due)
	(Chs: 11, 12 & 13)
	Lab 4: Thematic change in agriculture
Week 6, Mar 1:	Analysis II (PS#4 due)
	(Chs: 14, 15 & 16)
	Lab 5: Classification using ROIs
	Applications
Week 7, Mar 8:	Midterm exam
Week 8, Mar 15:	Terrestrial Ecosystems
	(Ch: 17) Hyperspectral data lab
	Lab 6:
Week 9, Mar 22:	Earth Sciences (PS#5 due)
	(Ch: 18)
	Lab 7: Google's Earth Engine Lab-1
Week 10, Mar 29:	Spring Recess
Week 10, Apr 5:	The Hydrosphere (PS#6 due)
	(Ch: 19)
	Lab 8: Earth Engine Lab-2
Week 12, Apr 12:	Land Use and Land Cover Change (PS#7 due)
	(Ch: 20)
	Lab 9: Earth Engine Lab-3
Week 13, Apr 19:	Global Change (PS#8 due)
	(Ch: 21)
	Lab 10: Earth Engine Lab-4
Week 14, Apr 26:	Field Trip (location: Cesar Chavez Park. Meet at 9 am sharp, bring a snack/lunch)
Week 15, May 3:	Next Generation Approaches (PS#9 due)
	Lab 11: Drone mapping Lab

(8) **Course materials**: Textbook: *Introduction to Remote Sensing* (Campbell and Wynne, Fifth Edition, 2011). Additional readings will be assigned to further develop principles and applications from the text, and to support lab assignments.

(9) **Course requirements**: Weekly problem sets accomplished outside of class hours will be given, which include lab activities to further develop skills learned in class (60% of grade). Late problem sets are not accepted. A midterm exam in Week 7 will test material covered during the first 6 weeks (20%). A final exam will cover material from the entire semester (20%).