Course	GISC 6325/GEOS 5325: Remote Sensing Fundamentals
Term	Fall 2016
Meetings	Thursdays 7:00 – 9:45 P.M., GR 3.402 A& B

INSTRUCTIONAL TEAM AND CONTACT INFORMATION

Instructor:	**Dr. Anthony Cummings**
Office:	GR 3.528
Office Hours:	Tuesdays 11:00 A.M. – 1:00 P.M. or by appointment
Telephone:	972-883-4882
Email:	anthony.cummings@utdallas.edu
Teaching Assistant:	**Ms. Yogita Karale**
Office:	GR 3.414
Office hours:	Thursdays 1:00 -3:00 p.m.
Email:	yyk160030@utdallas.edu

GENERAL COURSE INFORMATION

Description and Objectives:

The course introduces students to remote sensing principles, theory, sensor technologies, image processing techniques, and applications. The course will describe basic concepts in remote sensing and discuss how remote sensing tools may be used to study the Earth's environments and solve real world problems. The course will review the history of remote sensing and fundamental concepts, including remote sensing data collection and processing, electromagnetic radiation principles and energy-matter interaction, followed by introductions to various remote sensing systems, such as aerial photography, visible and near infrared (VNIR) and short wave infrared (SWIR), thermal infrared (TIR), radio detection and ranging (RADAR), light detection and ranging (LiDAR) systems, and an exploration of the most appropriate conditions under which these data sources may be used. While the course will focus on the theory of remote sensing, there will be continuous class discussions on how remote sensing technology is used to understand, manage and protect Earth's resources and environments, including water, vegetation, urban landscapes, and geology. The laboratory exercises designed for the course will provide hands-on experience with spectral characteristics of natural materials, and some image processing techniques. At the end of the class students will understand remote sensing technology and products and be able to choose the most appropriate tools to answer real world questions in which they are interested.

Learning Outcomes:

At the end of the class students will be able to:

1. identify and describe the advantages and disadvantages of various sensor technologies, digital techniques, models, and theories used in the field of remote sensing.
2. utilize state-of-the-art software to visualize, measure, interpret, process and present imagery and the digital representation of energy patterns derived from non-contact sensor systems.
3. locate, obtain, and utilize remotely sensed data to independently design and complete projects that address issues of societal importance and enhance their understanding of human-natural environment interactions.
4. work in a professional and collaborative environment and communicate effectively.

Texts and Materials:

The lecture and exercise materials are derived from a number of sources (textbooks). These sources, listed below, are available through the UT Dallas Bookstore (1), online merchants including Amazon.com (1, 2, 3, and 4). The texts are listed as required and recommended below.

Required text:

1. Jensen, J. R. (2007). Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pages. ISBN: 0131889508.

Recommended texts:

2. Jensen, J. R. (2005). Introductory Digital Image Processing, 3rd Ed., Upper Saddle River, NJ: Prentice Hall, 544 pages, ISBN: 0131453610.
3. Lillesand, T.M., Kiefer, R., Chipman, J.W. (2004). Remote Sensing and Image Interpretation, 5th Ed. John Wiley & Sons, Inc., 763 pages, ISBN: 0-471-45153-5.

COURSE POLICIES

Requirements:

This course meets once per week for two hours and forty-five minutes. During this time, there will be quizzes, lectures, discussion and laboratory exercises. You are required to attend lectures and complete labs. Lecture slides will be posted to Blackboard (eLearning) after class (in some instances before class). Quizzes will be administered before each class and will be based on lectures and the required textbook.

Class Schedule:

The class schedule is presented on page 3 and is subject to change. Please review the schedule and the required reading (s) for each week.

Readings:

For the first five weeks of the class one or more peer-reviewed papers relevant to the topic being covered in class will be posted to eLearning. This paper (s) must be read by all students to:

- identify the research question(s)
- explain how effective remote sensing was in addressing the research question (s)
- identify methods and ideas relevant to their own research interests

Grading:

Your final grade for this class will be determined from four main areas: class participation and labs, two exams, quizzes and attendance and a final project. Quizzes and the midterm exam will be administered via eLearning. Labs and the final project will be submitted via eLearning.

Grade breakdown and criteria:

Participation and labs:	25%
Exams:	35%
Final project:	30%
Quizzes and attendance:	10%

Letter grades:

A > 94 A- = 90-93; B+ = 87-89; B = 83-86; B- = 80-82; C+ = 77-79; C = 73-76;
C- = 70-72; D+ = 67-69; D = 63-66; D- = 60-62; F = <59

Make-up Exams and late work: The dates for exams are listed on page 3. Please speak to me in advance if you will miss a class or provide proof of absence (e.g. a doctor's letter) if you were ill. Late submissions will be penalized 10 % per day.

ACADEMIC HONESTY & CONDUCT

Please refer to the Academic Integrity Policy for the University of Texas at Dallas:
http://www.utdallas.edu/deanofstudents/dishonesty/.

Comet Creed: This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "As a Comet, I pledge honesty, integrity, and service in all that I do."

CLASSROOM CITIZENSHIP

Show respect for others by arriving to class on time and staying the full length of the lecture or discussion. Allow others to speak, even when you may disagree with them. Please turn off your cell phones while in class. Food and beverages may be brought into class but you are responsible for cleaning up after you.

DISABILITY
Please contact the Office of Student Affairs (http://www.utdallas.edu/studentaffairs/) to complete the relevant paperwork to share with me.

UT Dallas Syllabus Policies and procedures: The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to http://go.utdallas.edu/syllabus-policies for these policies.

COURSE CALENDAR

Date	Topic (s), Readings	Lab assignments and milestones
1/25 Aug	Introduction to the Course History of Remote Sensing and Aerial Photography (CH3)	Lab0: Introductions and Course Information
2/1 Sept	Remote Sensing of Environment (CH1); Electromagnetic Radiation Principles Overview (CH2)	Lab1: Data acquisition **Discussion of Reading(s)**
3/8 Sept	Aerial Photography – Vantage Point, Cameras, Filters, and Film (CH4);	Lab2: Image display and manipulation in ERDAS **Discussion of Reading(s)**
4/15 Sept	Elements of Visual Image Interpretation (CH5)	Lab3. Visual Image Interpretation using Image Analysis Extension **Discussion of Reading(s)**
5/22 Sept	Photogrammetry (CH6)	Lab 4: Exploring Unmanned Aerial Vehicles **Discussion of Reading(s)** **Project Idea due**
6/29 Sept	Multispectral Remote Sensing Systems (CH7)	Lab5: Photogrammetry and Stereo Analysis **Discussion of Readings**
7/6 Oct	**Exam 1**	
8/13 Oct	NGA Presentation Thermal Infrared Remote Sensing (CH8)	Lab 6: Urban Heat Island Analysis Using Thermal Imagery
9/20 Oct	Active and Passive Microwave Remote Sensing (CH9); LIDAR Remote Sensing (CH10)	Lab 7: Active Remote Sensing: LIDAR Data analysis and SAR Image Processing
10/27 Oct	Remote Sensing of Vegetation (CH11); Remote Sensing of Water (12)	Lab 8: Vegetation exploration
11/3 Nov	Remote Sensing of Urban Landscape (CH13);	Work on Final Project
12/10 Nov	Remote Sensing of Soil, Minerals, and Geomorphology (CH14)	
13/17 Nov	**Final Project presentation**	
14/24 Nov	***No Class – Thanksgiving***	
15/1 Dec	**Exam 2**	
16/7 Dec	**Final Project due**	

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.