Syllabus

Course Title: Introduction to Remote Sensing	**Course Number** (If applicable): GST 105

COURSE DESCRIPTION: This course is an introduction to remote sensing of the Earth. Topics include the physical principles on which remote sensing is based, history and future trends, sensors and their characteristics, image data sources, and image classification, interpretation and analysis techniques. This course is designed to be used as a stand-alone course to complement other disciplines or as an entry level course into a geospatial program. Course content is based upon the United States Department of Labor's Geospatial Technology Competency Model for entry level geospatial occupations including Geospatial or GIS Technicians and Technologists.

PREREQUISITES: Introduction to Geospatial Technology or consent of instructor; college algebra highly recommended.

REQUIRED MATERIALS: ArcGIS Desktop 10.1

ADDITIONAL RESOURCES (if applicable):

Lillesand, Kiefer, and Chipman, 2007. *Remote Sensing and Image Interpretation*, 6th ed., Wiley & Sons, ISBN: 0470052457 and ISBN-13: 978-0470052457

LEARNING OUTCOMES/COMPETENCIES:

1. Describe basic physics concepts on which remote sensing is based (i.e. Electromagnetic Spectrum, etc.).
2. Select appropriate data set for remote sensing application based on spectral, temporal, radiometric and spatial resolution.
3. Describe characteristics of passive and active remote sensing systems (such as multispectral, LiDAR and Radar).
4. Describe the fundamentals of Photogrammetry.
5. Perform basic remote sensing workflows to solve problems (such as acquiring data, feature extraction, change detection, pre- and post-processing, create composite images and image classification).
6. Describe future trends in remote sensing.
7. Apply basic concepts, methods and uses of accuracy assessment and ground truthing to the results of remote sensing workflows.
8. Interpret, analyze and summarize results of a remote sensing workflow.

COURSE ASSESSMENT:

Grading Scale

Category	Weight
Laboratories	40%
Quizzes	10%
Application Papers	5%
Final Project	35%
Examinations	10%
Final Grade	**100%**

Total Points	Percentage	Grade
	90% – 100%	A
	80% - 89%	B
	70% – 79%	C
	65% - 69%	D
	0% - 64%	F

COURSE SCHEDULE:

Note: This partial example shows a course that combines lecture and lab components.

Module/ Lesson	**Module/Lesson Title & description** (if applicable)	**Learning Objectives**	**Assignment (w/category & point value)**
1.	Overview of Remote Sensing	• Define remote sensing. • List different types of remotely sensed data and sensor systems. • Describe different types of remote sensing systems and their applications. • Describe the history and future trend applications of remote sensing. (SLO 1,3,6)	Application Papers – 50 pts. Module 1 Quiz – 20 pts
2.	Physical Foundations	• Describe the basic physical concepts on which remote sensing is based such as the electromagnetic spectrum, reflection and absorption. • Explain the physical differences between active and passive remote sensing systems. (SLO 1, 3)	Module 2 Quiz – 20 pts
3.	Sensor Platforms and Image Processing Basics	• Describe the primary components of a digital image • Describe characteristics of passive and active remote sensing systems. • Explain common processing functions found within geospatial software: image composites, subsets, mosaics, and band ratios including NDVI and Tasseled Cap Transformation. • Create image data sets using ArcGIS or Create an image composite, image mosaic, and image subsets using ArcGIS.	Module 3.1 Lab – 10 pts Module 3.2 Lab – 10 pts. Module 3 Quiz – 20 pts Exam 1 – 100 pts

		• Analyze results of work sensing workflow for image composites. (SLO 3,5,8)	
4.	Photogrammetry	• Define photogrammetry. • Explain fundamental concepts of photogrammetry. • Explain the common photogrammetric process steps. • Perform an image rectification. • Describe the components of an ortho image/photo. (SLO 4)	Module 4 Lab – 10 pts. Module 4 Quiz – 20 pts
5.	Image Classification	• Define image classification. • Explain supervised, object-based image classification techniques. • Perform image classification techniques such as supervised and unsupervised classification on remotely sensed data. (SLO 2, 5, 7, 8)	Module 5.1 Lab – 10 pts. Module 5.2 Lab – 10 pts. Module 5 Quiz – 20 pts
6.	Accuracy Assessment	• Explain the importance of accuracy assessments and why they are used for image classification project(s). • Describe the computed measures of a typical accuracy assessment. • Perform an accuracy assessment on the products of remote sensing workflows. • Incorporate accuracy assessment results into interpretation and analysis of workflow outputs. (SLO 5, 7, 8)	Module 6 Lab – 10 pts. Module 6 Quiz – 20 pts
7.	Final Project	• Create and implement one or more image processing protocols through an independent project. • Explain the results including the discussion of problems and potential resolutions.	Final Project - 375 pts Exam 2 – 100 pts

		Create presentation to discuss completed image processing project. (SLO 2, 5, 7, 8)	