Remote Sensing and Image Analysis (PSMA 6525)

DEPARTMENT OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES
TENNESSEE STATE UNIVERSITY

Course Syllabus

Course Number: PSMA 6525

Course Name: Remote Sensing and Image Analysis (3cr hrs.)

Office Number: 204c Farell-Westbrook Complex, Tennessee State University

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Course Description:

Theory and practice of remote sensing is a rapidly evolving field of science with great opportunities of contribution to studies of inventory, and monitoring agricultural, forest and rangeland resources, land use land cover mapping, water resources, geology, wetlands and coastal areas and son on. The main focus of this course is enhancing the understanding of remote sensing data acquisition, analysis, interpretation and bio-physical modeling thereby produce scaled maps that are ready for applications within a geospatial information system (GIS). Accordingly, this course introduces students to the principles and practices of remote sensing and applications in the agricultural and environmental sciences including photogrammetry, multispectral, hyperspectral and thermal imaging, and RADAR and LiDAR image analysis in lecture series. In the lab sessions, the students will be introduced to practices of visual image interpretation, radiometric and geometric corrections, spectral image enhancement, classification and accuracy assessment, and analysis of temporal change detection. 3 credit hours.

Prerequisites and Co-requisites:

Prerequisites: None.
Co-requisites: None.

Required Textbook(s), including ISBN:

Mather, P. M., and Koch, M. (2011). Computer Processing of Remotely-Sensed Images, Wiley Blackwell. ISBN: 9780470742389.

Course Outline by Week:

Topic(s)	Date	Theory Readings (Mather and Koch, 2011) (Read material during assigned before beginning of next week's class.)	Lab Assignments (Mather and Koch., 2011) (Please complete before beginning of next week's class and hand in assignments (each map, such as Exercise 1… etc.) as emailed PDFs.
Introduction, Remote sensing image acquisition and handling	Week 1	Introduction, course requirements	Buy the book (if you have not already done so)
	Week 2	Ch. 1. Remote Sensing: Basic Principles	Lab 1: Introducing the software and displaying RS data
	Week 3	Ch. 2. Remote Sensing Platforms and Sensors	Lab 2: Creating composite image, band combination and image statistics
	Week 4	Ch. 3. Hardware and Software Aspects of Digital Image Processing	Lab 3: Sub-setting and visual interpretation
	Week 5	Ch. 4. Preprocessing Remotely Sensed data	**Midterm Exam Preparation (Ch. 1-4 from Mather and Clark, 2011)**
	Week 6	**Midterm Examination**	
Image Enhancement Techniques	Week 7	Ch. 5. Image Enhancement techniques	Lab 4: Radiometric Image enhancement
	Week 8	Ch. 7. Filtering techniques	Lab 5: Spatial Image Enhancement
	Week 9	Ch. 6.1, 6.3, 6. 4 Image Transformation	Lab 6: Spectral Image Enhancement
Information Extraction	Week 9	Ch. 8.1, 8.3. Image Classification	Lab 7: Unsupervised Image Classification
	Week 10	Ch. 8.4. Image Classification	Lab 8: Supervised Image Classification
	Week 11	Ch. 8.6 - 8.10. Advanced image classification techniques and Accuracy Assessment	Lab 9: Accuracy Assessment
	Week 12	Ch. 6.2 – 6.8. Change Detection	Lab 10: Environmental Change Detection
Synthesis	Week 13	Submittal of Final Project Proposal (2 – 3 pages single space) for graduate students	None
	Week 14	Continue working on Final Project	None
	Week 15	Continue working on Final Project	None
	Week 16	Submittal of Final Project Proposal (2 – 3 pages single space) for graduate students	None
		Midterm Examination	

Syllabus Changes:

The instructor reserves the right to make changes, as necessary, to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes by an announcement on the course homepage.

Assessment and Grading

Testing:

There will be Midterm or Final exams administered within this course.

Grading Procedure:

Students will study image analysis and remote sensing through online readings and exercise activities. Exams will contribute 50% to the final course grade, while discussion and tutorial exercise activities will contribute 50% to the final course grade. Students will have opportunities for discussion of content with faculty and other students via email and discussion forums.

Assigned chapter discussions and exercises- 50% of final grade (420 points)
Midterm exam – 25% of final grade (220 points)
Final exam project - 25% of final grade (220 points)

Grading Scale:

A =100 - 90
B = 89 - 80
C = 79 - 70
D = 69 - 60
F = 59 and below