SYLLABUS

For

SPECIAL TOPICS IN REMOTE SENSING (RS) (CEGR 741.185)

(A graduate level course)

by

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COURSE No. CEGR 741.185

TITLE Special Topics in Remote Sensing (RS)

CREDIT HOURS 3

PRERECQUISITS Introduction to remote sensing (RS), or Consent of Instructor

PLACE/TIME Eng. Bldg. RM S348/Tuesdays, 5:00-7:30 p.m.

COURSE
Comprehensive review of the history, concepts, principles, analysis, and applications of remote sensing (RS) are presented and illustrated. Applications of RS in real world problems are presented. Lectures are supplemented by laboratory assignments, and individual project assignment (based on student's discipline/interest). RS data from a suite of sensors/platforms, including, Advanced Very High Resolution Radiometer (AVHRR), Landsat Multispectral Scanner (MSS)/Thematic Mapper (T M), System Probatoire d'Observation de la Terre (SPOT), IKONOS, and Moderate Resolution Imaging Spectroradiometer (MODIS) will be used. Image processing software will include ENVI and ERDAS. Students will be required to complete a RS project, do oral presentation, and submit a written report as part of the final grade for this course.

INTRODUCTION
Remote sensing (RS), as defined by T.J.M. Kennie (1985), is a science of acquiring information about some property of an object through the use of a measuring device which is not in physical contact with the object under investigation. This makes RS one of the most powerful technologies for interdisciplinary scientific applications. Uses include science and engineering, resource management and policy making, climate/weather research, and monitoring/updating spatial databases. As the spatial resolution of RS images improves and their costs decrease, the utility of this technology will undoubtedly escalate. Science, technology, engineering, and mathematics (STEM) disciplines are prime areas that should take advantage of this opportunity if the Nation is to maintain its leadership role in geo-spatial technological paradigm.

This course will introduce students, especially minority and underrepresented students to remote sensing – a cutting-edge technology and provide them with hands-on experience in ENVI, one of the most advanced image processing software in the market today; students will also be encouraged to utilize this technology in their respective thesis and dissertations. Data will come from a suite of sensors including multispectral scanner (MSS)/ thematic mapper (TM), MODIS, SPOT (French satellite), and IKONOS (a US high resolution satellite). Emphases will be placed on image processing, analysis, and applications in the earth system sciences.

OBJECTIVES

- Provide in-depth knowledge of remote sensing (RS) concepts, principles, methodologies, and applications.
- Examine and demonstrate the utility of RS methodologies in real world problems (land-cover/land-use change (LCLUC), transportation, environmental pollution, resource management, and quality of life studies) at desperate spatial and temporal scales.
- Facilitate the use of RS in earth system sciences (ESS) and related disciplines.
- Increase the number of minorities trained in remote sensing technology, and its applications in ESS.

EVALUATION

The class will adhere to **all** the rules and regulations of the graduate school, especially with regards to discipline, attendance, and performance. **All students** are required to **COMPLY fully with ALL COPYRIGHT LAWS and REGULATIONS**. Neither MSU, nor the Instructor(s) will be held responsible in any way, shape, or form for ANY infringement on the laws governing ALL COPYRIGHTED materials and related materials by any student; students will be fully responsible.

Grades will be computed from **tests, exams, attendance**, **participation in class, lab projects**, **assignments, competence** with the RS software, and **successful completion of selected projects**.

GRADES

(%)	Letter
90 - 100	A
80 - 89	B
70 - 79	C
0 - 69	F

Distribution of grades		(%)
Two exams (Mid-term (15%) and Final (25%)		40
Four tests (@ 5 % each)	20	
Lab reports	10	
Assignments	10	
Project	15	
Attendance and Participation	5	

COURSE OUTLINE

A. Lectures	B. Labs	C. Applications
Concepts and Foundation of RS	Introduction to Software	Planning and Construction
Elements of Photographic Systems	Basic Concepts	Transportation
Basic Principles of Photogrammetry	Functions	Urbanization and Planning
Visual Image Interpretation	Tools	Land-use/land-cover Change
Multi, Thermal, & Hyper Sensing	Images	Resource Management
Earth Resource Satellites	Transforms	Population/Quality of Life Studies
Digital Image Preprocessing	Filtering	Environmental Degradation
Microwave Sensing	Registration/Corrections	Environmental Pollution.
Remote Sensing Applications	Masking	
Future Advances in Remote Sensing	Classification	

PROJECTS

Projects will be allocated based on student major, interest, and availability of resources/data. Whenever possible, students will be allowed to choose their own projects. Project milestones include:

1. Selection & Planning/Design of project,
2. Presentations of project plan,
3. Data acquisition, preprocessing, and analysis,
4. Submission of preliminary report,
5. Oral presentations of project, and
6. Submission of final written report.

TEXT BOOK

Remote Sensing & Image Interpretation, by Lillesand, Thomas M. / Kiefer, Ral; John Wiley & Sons, Inc., New York, 2000; ISBN: 0-471-25515-7. (5^{th} Edition)

SUPPLEMENTARY TEXTS

1. Remote Sensing: Models & Methods for Image; Processing; Acad Pr, 1997; Author: Schowengerdt, Robert.
2. Classification of Remotely Sensed Images, Ian L. Thomas, et al; 1987.
3. Applied Remote Sensing; P.C. Lo; Longman, January 1996.
4. Remote Sensing for Landscape Ecology: New Metric Indicators for Monitoring, Modeling, & Assessment of Ecosystems; Library Binding, Lewis Pubs, 1997; ISBN: 1566702755; Author: Frohn, Robert C.
5. Urban Applications of Satellite Remote Sensing & GIS Analysis; World Bank; Author: Paulsson, Bengt.

NB: Please note that students are required to attend all classes, and be punctual. Failure to attend all classes might result in not getting a passing grade. When absence is unavoidable, please inform the instructor ahead; you will be required to determine from the instructor the materials missed and responsible for covering them. Do not hesitate to ask questions when you do not understand anything. The instructor will also be available for further assistance during office hours, by phone, and by Email.