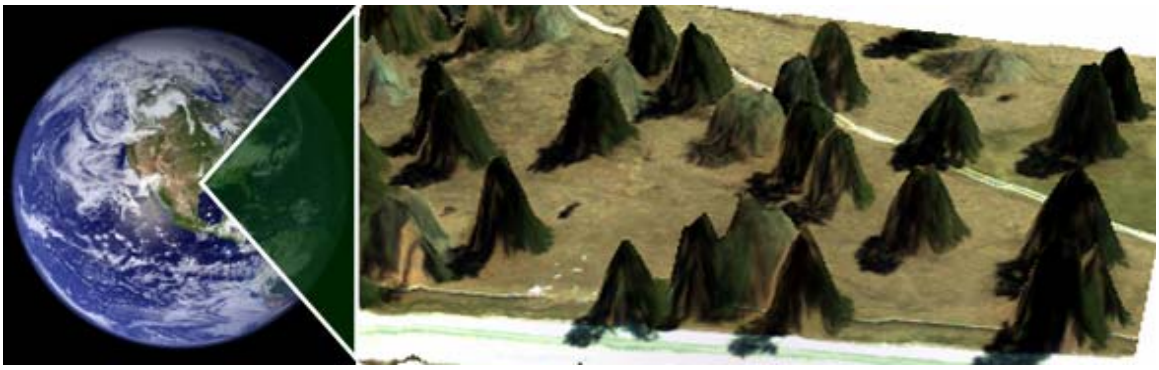

Texas A&M University **Dept. of Forest Science**

Course title	**RENR 444: Remote Sensing in Renewable Natural Resources** **FRSC 608: Remote Sensing for Natural Resources Management**
Course number	**RENR 444/FRSC 608**
Course date	**Spring Semester 2006**
Location	Lecture: **HFSB 105**; Lab: **Centeq B 214**
Meeting day(s)	**RENR 444** (500) Monday, Wednesday, and Thursday **FRSC 608** (600) Monday, Tuesday, and Wednesday
Meeting time(s)	Lectures: MW: **12:40 - 1:30pm** Labs: **RENR 444**: Thursday, 1:00pm to 3:50pm **FRSC 608**: Tuesday, 10:00am to 11:50am

Instructor Information

Name	Dr. Sorin C. Popescu
Email	s-popescu@tamu.edu
Office location	Centeq B 221D
Phone	862-2614
WebCT page	https://elearning.tamu.edu/ (follow link to WebCT LOGINS - TAMU)
Office hours	Open door policy, *when* the door is open, though I recommend emailing or calling for appointments. Please put "**444"** or **"608**" in the subject of email messages regarding this class to receive prompt attention. Please avoid "drop-ins" just before class on Monday and Wednesday.
Teaching Assist	Muge Mutlu mugemutlu@tamu.edu Centeq 215 (across from the lab)

Course description

Objectives	The main objective of this course is to introduce students to the principles and techniques necessary for applying remote sensing to diverse issues in natural resources. The course emphasizes a **hands-on learning environment with theoretical and conceptual underpinnings in both aerial and satellite remote sensing.** Primary focus will be placed on digital image interpretation, analysis, and processing for a broad range of applications.

Textbooks

Required	*Introductory Digital Image Processing, A remote Sensing Perspective*, John R. Jensen, Prentice Hall, 3rd ed., 2005, ISBN 0132058405
Recommended supplemental texts	*Remote Sensing of the Environment, An Earth Resource Perspective*, John R. Jensen, Prentice Hall, 2000, ISBN 0134897331 *Remote Sensing Digital Image Processing: An Introduction,* Richards, J.A., and Xiuping J., Springer, 3rd edtition, 1999, ISBN 3540648607

Grading

10 point brake-out system

90.0 – 100 = A Excellent
80.0 - 89.9 = B Good
70.0 – 79.9 = C Satisfactory
60.0 – 69.9 = D Passing
00.0 – 59.9 = F Fail

Lab assignments	25 %	All lab work is due at the **beginning** of the following lab period
Project	20 %	
IAEGS course	15 %	(Institute for Advanced Education in Geospatial Sciences)
Midterm exam	15 %	Wednesday, March 1st
Final exam	25 %	Monday, May 8th, 10:30am – 12:30pm, in lecture room

Important dates

Midterm exam: March 1st, Wednesday, during lecture time

		% of project grade
Project proposal and presentations (week 9):	March 21 (section 600) March 23 (section 500)	5%
Project progress report (week 11):	April 4 (section 600) April 6 (section 500)	5%
Project paper due (week 14):	April 25 (section 600) April 27 (section 500)	80%
Project presentations (week 14):	April 25 (section 600) April 27 (section 500)	10%

Final exam: May 8th, Monday, 10:30am – 12:30pm, in lecture room

Prerequisites: good academic standing

Tentative course outline

Week	Topic	Reading
1	Syllabus; Definition of terms; History and future of remote sensing; electromagnetic spectrum	Chapter 1
2	The remote sensing process; RS sensors and data acquisition	Chapter 1 and 2
3	Image statistics, image resolution, data visualization	Chapter 4 and 5
4	Image preprocessing; Geometric and radiometric correction	Chapter 6 and 7
5	Image enhancement	Chapter 8
6	Image classification	Chapter 9 and 10

7	Accuracy assessment, Midterm exam	Chapter 13
8	Digital change detection	Chapter 12
9	RS applications: vegetation, water, soils, urban	Handouts
10	Advanced image processing; GIS	Chapters 10
11	Hyperspectral remote sensing	Chapter 11
12	Active sensors: RADAR	Handouts
13	Active sensors: LIDAR	Handouts
14	Final exam review	

Tentative laboratory schedule

Week	Topic
1	Introduction to ENVI and multispectral remote sensing imagery. Web sources of remote sensing data. Image display; subsetting.
2	Image preprocessing: Initial statistics extraction; geometric correction
3	Radiometric correction
4	Band rationing, image filtering
5	Principal component analysis
6	Unsupervised classification
7	Supervised classification
8	Accuracy assessment; Project proposals and presentations
9	Spectral change detection
10	Project work
11	Intro to programming in IDL; Project progress reports due
12	Introduction to hyperspectral data analysis
13	Introduction to LIDAR
14	Student project presentations; final project papers due.

Laboratory, Homework, and Exam policy

The University policy on Scholastic Dishonesty will be enforced in this course. While you are encouraged to help each other understand concepts and techniques, **all work submitted should be your own.** Exceptions to this policy will be explicitly noted by the instructor and should not be assumed by students. Make-up exams will not be offered. If you are going to miss an exam for a valid reason (per University rules), **contact the instructor** well in advance.

Late assignments: All laboratory and homework assignments are to be completed in a neat, logical, and clear fashion. A 10% reduction in grade, up to a maximum of 50%, will be assessed for each weekday an assignment is handed in late. Assignments will not be accepted if more than 5 weekdays late, unless documented excuse is presented (family or medical emergencies).

Save every lab session's work on your home drive (U:) in the class folder. Organize the space on your home drive in a neatly manner, such that TAs can easily find your lab work for grading purposes.

Laboratory reports - Format Guidelines

When specifically indicated, laboratory exercises must contain a **brief** report following the format guidelines given below (1-2 pages for section 500 and 3-4 pages for section 600; double-spaced using a 12-point proportionally-spaced font, with 1 inch margins all

around.) Captions, references, footnotes, appendices, tables, etc. may be single-spaced. The report should be divided into **Introduction (with background and objectives), Methods, Results, and Discussion/Conclusions** sections, and should tie together and synthesize the lecture, readings, and practical exercises. A bullet-type format is accepted for students in section 500, but all the report sections mentioned above must be included. In the Methods section do not include a list of ENVI commands that you have used. Instead, give the big picture of your approach and the remote sensing/image processing methods that you have used. You may include an appendix of ENVI commands used, for future references. Figures and tables inserted in the text are encouraged. When appropriate, include snapshots of your imagery in the report, mainly in the Results section, but no larger than half a page. Each laboratory exercise will be due the following laboratory period, at the beginning of class, unless otherwise indicated. Instructor may give extra credit to students who further develop the lab exercise and use a solid list of references.

Each page following the first full page of text should have a page number. A title page may be supplied; however, reports in special binders are discouraged. In text citations and references should follow the guidelines for manuscripts submitted for publication to the *American Society of Photogrammetry and Remote Sensing* (http://www.asprs.org/publications.html), for *Photogrammetric Engineering and Remote Sensing (PE&RS).* Final projects must be printed using the same criteria. Students are required to keep **electronic** copies of all work submitted.

Projects

Each student is required to design and implement a class project. The project must use digital image source data and the student must develop a specific output product useful to natural resource managers or researchers. When the instructor gives out project data, the data should not be used for any other purpose without instructor's permission. The project is designed to (1) build upon and synthesize techniques or concepts demonstrated in class, and (2) let you explore your own data sets and research objectives using your developing remote sensing "toolkit." Work that contributes to your thesis research or current employment is encouraged (section 600 mainly). Group projects tackling larger research or management issues are encouraged. All projects require instructor approval given on the project proposals.

A proposal (approximately 150 words) and outline describing the project and **proposed methods** must be turned in by the date indicate in the *Important dates* section. However, students are encouraged to turn in proposals as soon as is feasible. The proposal/outline should contain at least **five** preliminary references (section 600) or **three** preliminary references (section 500). The final report must be no more than twenty pages in length including figures and references, and the final report and summary/outline must follow the format guidelines for papers and laboratory reports. Failure to follow these guidelines will result in the paper not being accepted. The final report must include an **abstract** of no more than **150 words** that is succinct and informative without reference to the text. This should be followed by the **Introduction (with a background** subsection containing the literature review **and objectives**), **Methods, Results, and Discussion/Conclusions**.

Keep in mind that these are semester projects. Laboratory time may be provided for work on your project during the semester, but will be insufficient by itself. A 2-5 page project progress report is required at the start of class as indicated in the *Important dates* section. Well-chosen student projects may be suitable for **subsequent publication** in either conference proceedings or the peer-reviewed literature. Please keep this goal in mind as

you develop and carry out your projects, and particularly as you prepare your final reports.

Aggie Code of Honor

Aggies do not lie, cheat, or steal,
nor do they tolerate those who do.

The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other.

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Support Services for Students with Disabilities in Room 126 of the Student Services Building. The phone number is 845-1637.