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Office Hours: M & W 3:00 to 4:15 or by appointment, email or call

Lecture: M-W, 1:00 to 2:15 pm, EN-101
Lab: F, 9 to 11:50 am, CI 229
Prerequisite: GISC 3300 or equivalent

I. COURSE DESCRIPTION
This course will provide an introduction to the theory and practice of remote sensing. Focus will be on the underlying principles of earth observation from spaceborne and airborne platforms and on the processing and integration of such data for mapping and analysis applications. Included is treatment of: aerial photogrammetry; multispectral, thermal, and hyperspectral sensing; earth observation satellites; lidar and radar; and emergent topics.

II. LEARNING OBJECTIVES
Remote sensing (RS) is a powerful tool with application to a diverse range of problem domains. This course is designed to help you become an adept RS analyst who can:
1. Determine the appropriate types of RS data for a particular problem and acquire it
2. Apply techniques to manipulate and enhance imagery for analysis
3. Derive information products from remotely sensed data for end-user applications

In order to achieve these goals we need to acquire the following requisite knowledge:
A. Types of RS platforms and data characteristics
B. Physics of electromagnetic (EM) energy interaction with the earth’s surface
C. Effects of the atmosphere on EM propagation and resultant sensor measurements
D. How RS platforms record reflected and emitted EM energy
E. Response of surface materials (e.g. water) at different wavelengths
F. Exploitation of these spectral signatures for object detection and parameter estimation
G. Spectral, temporal, and spatial resolution considerations for selecting an RS platform
H. State and federal web resources for obtaining regional and global scale RS data
I. Basic digital image processing techniques for image correction and enhancement
J. Pattern classification methods for deriving new maps and information products
H. How to assess the accuracy of the resulting maps
III. TEXT

Additional reading material will be provided.

IV. SOFTWARE
Remote sensing requires image processing and spatial analysis capabilities. This course will use ArcGIS in combination with other software tools for processing remotely sensed data. Students will have the ability to obtain a licensed, student version of ArcGIS for use on their personal machine for free.

Certain labs may utilize Matlab. A student version of Matlab is available for purchase at a low-cost. DO NOT purchase Matlab for the course unless notified; instructions on how to acquire and use Matlab for the lab will be provided to the student.

ArcGIS and Matlab are installed in CI 229.

V. INSTRUCTIONAL METHODS AND ACTIVITIES
Approach: lecture, discussion, and practice exercises. Weekly readings will be assigned. There will be up to ten lab assignments requiring the use of relevant software or problem solving.

In class quizzes will occasionally be given to gauge student progress and spur discussion. These may be unannounced, and the student is allowed one missed quiz. Online students will be given a timed quiz through Blackboard and a deadline for completion.

VI. COURSE GRADING
The final grade will be based on the following weighted average point distribution:

Labs and HW assignments = 38 %
Midterm exam = 27 %
Final exam (or project) = 25 %
Quiz scores = 5 %
Participation* = 5 %

= 100 %

*Max of 5 points is given for participation. Every student starts with a class participation score of C (= 3 points). A student who attends class on time and regularly but does no more will maintain a C. In order to earn a participation grade higher than a C, you must actively participate. Listed below are examples of things you can do that will raise your class participation grade.
• Attempt to answer questions asked of the class (answers need not be correct but should be a constructive effort)
• Asks questions about the material being discussed
• Share ideas and contribute positively to the class discussion such as asking questions about the material or sharing material from outside the class.
• Completes HW on time and pays attention

Students who do not attend regularly, disrupt class, don’t pay attention (e.g. sleep or surf the web on their iPhone) will receive a reduction in class participation with a minimum of 0 points.

This list is illustrative, not exhaustive. The goal is to make this a fun and engaging course and that requires your help! Remote sensing is a lot of fun!

Note: Online student attendance will be gauged based on regular Blackboard access; online student participation can come in the form of postings to the course blog, interaction with me via email and the course discussion form, etc.

Class Specific Policy on Exams and Assignments:
Students are expected to take exams and submit assignments as scheduled. Assignment due dates will be specified for each assignment. Make-up exams and submission of late assignments will only be permitted under approved circumstances. Students are expected to notify the instructor well in advance of a potential conflict. A minimum 10% grade reduction can be applied to late work dependent on the number of days late. Online students must take the exam on a specified date and will be given sufficient notice.

*Online students will be required to take their examinations in a controlled testing environment. To take the exams at the controlled testing environment, the student will be required to cover any and all costs, and will be required to travel to the controlled testing environment on the scheduled day of the examination. Alternative option is to sit for the exam in class. For questions, please ask the instructor.

My Decree
If you are having a problem finishing an assignment or other concerns, please talk to me. My goal is to help you succeed in the course and if you put in the effort, you will.

TENTATIVE COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings</th>
<th>Labs</th>
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<tbody>
<tr>
<td>1</td>
<td>Course outline, Intro to RS (August 27, first class)</td>
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<td>2</td>
<td>RS history and fundamentals</td>
<td>Ch.1</td>
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<td>3</td>
<td>How sensors record data EM radiation principles</td>
<td>Ch.1</td>
<td>Lab 1 Due</td>
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<td>4</td>
<td>EM surface interaction and spectral response patterns</td>
<td>Ch. 1, Appendix A, additional readings</td>
<td>Lab 2 Due</td>
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<td>5</td>
<td>Elements of photogrammetry</td>
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<td>Lab 3 Due</td>
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<tr>
<td>6</td>
<td>Elements of photogrammetry</td>
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<td>Lab 4 Due</td>
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<td>7</td>
<td>Multispectral remote sensing systems (MSS)/hyperspectral</td>
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<td>Lab 5 Due</td>
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<td>8</td>
<td>Mid-Term Review</td>
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<td>9</td>
<td>Thermal IR Intro to Digital Image Processing (DIP)</td>
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<td>10</td>
<td>DIP</td>
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<td>Lab 6 Due</td>
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<tr>
<td>11</td>
<td>DIP</td>
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<td>Lab 7 Due</td>
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<td>12</td>
<td>Data accuracy</td>
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<td>Lab 8 Due</td>
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<td>13</td>
<td>Lidar</td>
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<td>Lab 9 Due</td>
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<td>14</td>
<td>UAS applications</td>
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<td>Lab 10 Due</td>
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<td>15</td>
<td>Emerging topics</td>
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<td>16</td>
<td>Final exam or project presentation (week of Dec. 8)</td>
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**Academic Integrity/Plagiarism**

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will include, but not be limited to a grade of zero for the assignment, and referral to the office of academic affairs.

**Dropping a Class**

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Refer to the University’s
official academic calendar (http://www.tamucc.edu/academics/calendar/) to
determine the last day to drop a class with an automatic grade of “W” this term.
November 7 is the last day to drop a class for this term.

Classroom/professional behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each
individual respect the needs of others to study and learn in a peaceful atmosphere. Under
Article III of the Student Code of Conduct, classroom behavior that interferes with either
(a) the instructor’s ability to conduct the class or (b) the ability of other students to profit
from the instructional program may be considered a breach of the peace and is subject to
disciplinary sanction outlined in article VII of the Student Code of Conduct. Students
engaging in unacceptable behavior may be instructed to leave the classroom. This
prohibition applies to all instructional forums, including classrooms, electronic
classrooms, labs, discussion groups, field trips, etc.

Grade Appeals (College of Science and Engineering Version)
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a
student who believes that he or she has not been held to appropriate academic standards
as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading,
may appeal the final grade given in the course. The burden of proof is upon the student to
demonstrate the appropriateness of the appeal. A student with a complaint about a grade
is encouraged to first discuss the matter with the instructor. For complete details,
including the responsibilities of the parties involved in the process and the number of
days allowed for completing the steps in the process, see University Procedure
13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible
through the University Rules website at
http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science
and Engineering Grade Appeals webpage
(http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the
grade appeal process, students may contact the chair or director of the appropriate
department or school, the Office of the College of Science and Engineering Dean, or the
Office of the Provost.

Disabilities Accommodations
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 call or visit Disability
Services at (361) 825-5816 in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access
issues in the classroom or on campus, please contact the Disability Services office for
assistance at (361) 825-5816.

Statement of Academic Continuity
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

GENERAL GUIDELINES FOR COURSES AND LABS IN THE GISC PROGRAM
CULTURE, REGULATIONS, MODES OF OPERATION AND PROCEDURES

These guidelines are designed to inform scholars of their responsibilities and of the course requirements in order to make this course a positive experience. The instructor is always available for consultation and discussion with students on any aspect of a course and of these general guidelines.

CLASS CULTURE
1. Consider yourself as a scholar rather than a student. The term “student” may imply some passivity, whereas the term “scholar” implies active participation, understanding and searching. We will use these terms interchangeably with the meaning of “scholar” implied. Osmosis does not work in a learning environment!
A good scholar takes NOTES at every class meeting.
2. Further, define yourself as a “thinking explorer”. You are responsible for your education; an instructor can only be a guide and a facilitator. An instructor cannot learn for you. If you come across something that really interests you, explore it further.
3. Your experience at this University should not consist of passing a series of courses to earn a degree. Your experience should rather be a series of activities that will give you an education.
4. Concentrate on “learning to learn”. You will have to be a life-long learner to survive in your chosen career.
5. There is no such thing as a stupid question; there is such a thing as a stupid answer. So ask questions, the instructor is taking all the risks! Ask questions of your instructor and of your fellow scholars. Many times questions are more important than answers.
6. Keep copious notes of all that is going on in all the meetings related to your course. Make a note of what the instructor is stressing. At the end of each lecture you should be able to answer two questions: What did I learn from this lecture? and What was not clear to me? At the beginning of each lecture, if the instructor does not ask for questions, you need to ask if there is something you did not understand from the last lecture. Review, consolidate, annotate and organize your lecture/lab notes on a regular basis, at least once a week. The Internet is a tremendous resource and also a great danger. When you find information on the Internet, you have no idea if it is correct. View such information with caution. But, use the Internet to explore topics that interest you. Do not only prepare for the exam in a course – learn as much as you can on the topics introduced.
to you by the course material. You are responsible for the extent of your education!

**READ MINDFULLY !!!!!**

7. In addition to details of the syllabus given in class, the syllabus for the course includes all the chapters of the required textbook/s unless indicated otherwise by the instructor. The student is responsible for all materials/topics covered in class, in handouts, in assignments, in labs, and in outings or field trips. The instructor is NOT responsible for informing absent students exactly what was covered in previous classes, meetings, etc.

**PROCEDURES & REGULATIONS**

8. The final letter grade for the class will be based on the raw composite numerical score obtained from the weighted average of the tests, quizzes, exams, labs, etc. as indicated by the instructor. The raw composite numerical score may be adjusted (curved) based on the highest score, the statistical profile of the scores and other academic standards or other considerations. Generally the letter grade of A is 90% and over of the adjusted score, a B is between 80% and 89% (inclusive) of the adjusted score, a C is between 70% and 79% (inclusive) of the adjusted score, a D is below 70% of the adjusted score and an F is below 60% of the adjusted score. An incomplete (I) will only be given in very unusual circumstances. The University regulations on incomplete grades state: “An incomplete notation may be given to a student who is passing but has not completed a term paper, examination, or other required work for reasons beyond the student’s control other than the lack of time”. Students are expected to take ALL tests, quizzes, exams, etc., and to complete and hand in all labs and other assignments. There is no provision for “extra credit”. No final grades will be given via the telephone, e-mail, etc.

9. All University rules, regulations and expected student conduct apply to this course. Students are held responsible for the information given in the current Catalog and Student Handbook. Make yourself aware of the University security regulations.

10. All labs, assignments, etc. must be handed in on the assigned due date. Scholars having problems must notify the instructor well before the due date. Marks will be deducted for poor and sloppily presented work.

11. Labs, etc. handed in after the due date may be subject to a penalty of loss of marks. Labs, etc. handed in after the graded labs, etc. have been returned to students will get zero marks but must be handed in to the instructor. Labs will be returned to students, after they have been graded, at a class meeting. Students who miss this meeting will be able to collect graded work in the marked box outside the instructor’s office.

12. Scholars are asked to take special note of the penalties, which the University attaches to Academic Dishonesty. Consult the Student Handbook.

13. All work handed in to the instructor must be the student's own work. Excerpts, extracts, etc. from the work of others must be suitably noted, acknowledged and properly referenced. Any Group Work will be judged in the same way. That is, it is the work of the group and the extracts, excerpts, etc. of others must be acknowledged.

14. All written and graphical work handed in must be presented neatly printed and bound (staples are adequate). Students’ written work will be judged on written communication skills, critical thinking and problem solving ability.

15. Students are expected to be present at all meetings (lectures, labs, etc.) of the class. Students are expected to be present at the date and time assigned for all tests, exams, quizzes, etc. There are NO provisions for making up missed exams except in cases where
prior arrangements have been made and agreed to by the instructor. During the assigned lab session, ONLY assigned labs are to be done. All other work must be done in other rooms.

16. All cellular phones and other similar devices MUST BE TURNED OFF during lectures, labs and other class meetings.

17. All students must keep their university e-mail addresses (firstname.lastname@islander.tamucc.edu). This will be the means of communication between the instructor and the class.

18. The instructor reserves the right to make changes to the above with due notice to the students. These changes will be announced in class and each student is responsible for keeping herself/himself informed of such changes.