Remote Sensing – ATSC 4305.001
Department of Physical and Environmental Sciences
Fall 2018

A. COURSE INFORMATION
Course number/section: ATSC 4305.001
Class meeting time: TR 2:00 pm-3:15 pm
Class location: IH-163
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
Instructor: Dr. Feiqin Xie
Office location: NRC 3507
Office hours: TR 9:30AM-12:00PM or by appointment
Telephone: 825-3229
e-mail: feiqin.xie@tamucc.edu
Appointments: Email or call for appointment

C. COURSE DESCRIPTION
Catalog Course Description
This course aims to introduce the fundamentals of satellite/airborne remote sensing techniques and demonstrates its application to various aspects of Earth Sciences. Topics include physical principles of remote sensing, radiometry, sensors and sensor technology, and calibration. Various environmental applications for land, ocean and atmosphere research will be also discussed. Students should gain an understanding of the basic principles of the remote sensing and be able to extend its application to areas not yet fully explored.

Extended Course Description
None

D. PREREQUISITES AND COREQUISITES
Prerequisites
Permission from instructor. Basic skills in trigonometry and algebra as well as basic understanding of physics are required.

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
Required Textbook(s)
None
Optional Textbook(s) or Other References


Supplies
None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
By the end of this course, students should be able to:
1. Understand the basics of how electromagnetic energy enables remote sensing and describe why different wavelength in the electromagnetic spectrum are useful for different types of remote sensing.
2. Explain the concepts of spatial, spectral, radiometric and temporal resolution and how they impact the selection of the most appropriate sensors and data source(s) for a particular analytical task.
3. Assess the synergies and limitations of various state-of-the-art sensors and explain if a sensor is useful for particular tasks.
4. Gain hand-on experience in remote sensing data collection, analysis, and interpretation.
5. Design and perform a research project based on one set of satellite remote sensing data and communicate the research activities in a professional and effective manner.

G. INSTRUCTIONAL METHODS AND ACTIVITIES
In class presentation and discussion.

H. MAJOR COURSE REQUIREMENTS AND GRADING
The final grade consists of: homework (45%), midterm (25%), final (25%), and attendance (5%). Letter grades will be assigned as follows: A = 90-100%, B = 80-89.99%, C = 70-79.99%, D = 60-69.99% F = 0-59.99%.
I. COURSE CONTENT/SCHEDULE

The outline of lecture topics and major due dates are listed below.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>TOPIC</th>
<th>CHAPTERS</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>08-28</td>
<td>I. Historical review of remote sensing</td>
<td>Chap. 1-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>08-30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>09-04</td>
<td>II. Basic physical principles of remote sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>09-06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>09-11</td>
<td>E&amp;M spectrum &amp; resolution</td>
<td></td>
<td>HW-01</td>
</tr>
<tr>
<td></td>
<td>09-13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>09-18</td>
<td>Radiometry background</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>09-20</td>
<td></td>
<td>Chap. 3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>09-25</td>
<td>Solar &amp; terrestrial radiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>09-27</td>
<td></td>
<td>Chap. 4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>10-02</td>
<td>Irradiance &amp; reflection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-04</td>
<td></td>
<td></td>
<td>HW-02</td>
</tr>
<tr>
<td>7</td>
<td>10-09</td>
<td>III. Spectral Analysis</td>
<td>Chap. 8-10</td>
<td>EXAM-I</td>
</tr>
<tr>
<td></td>
<td>10-11</td>
<td>Mid-term Exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10-16</td>
<td>IV. Sensors technology and platforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-18</td>
<td></td>
<td>Chap. 5-7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10-23</td>
<td>Multispectral imaging systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10-25</td>
<td>Mechanical scanning systems</td>
<td></td>
<td>HW-03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imaging spectrometers &amp; Calibration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10-30</td>
<td>V. Application (geosphere, hydrosphere and atmosphere)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-01</td>
<td></td>
<td>Chap. 9-11</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11-06</td>
<td>Retrieval of surface property</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-08</td>
<td>(temperature, emissivity, reflectance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>11-13</td>
<td>Aquatic remote sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-15</td>
<td></td>
<td></td>
<td>HW-04</td>
</tr>
<tr>
<td>13</td>
<td>11-20</td>
<td>Acoustic remote sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-22</td>
<td>Thanksgiving Holiday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>11-27</td>
<td>Guest Lectures (TBD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11-29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>12-04</td>
<td>Final Exam</td>
<td></td>
<td>EXAM-II</td>
</tr>
</tbody>
</table>

Note: Changes in this course schedule may be necessary and will be announced to the class by
the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F. Chapters are referred to Schott J.R. (2007)

J. COURSE POLICIES

Students are expected to attend all scheduled classes and to participate in class activities. Group discussions are encouraged. However, you are supposed to work out any assignments individually. Work handed in is assumed to be yours, unless specified to be a group project. Please note that university alcohol and drug policies are strictly enforced.

Attendance/Tardiness
Random attendance sheet will be handed out during the semester. The full attendance will earn up to 5% credit to the final grade.

Late Work and Make-up Exams
You may always turn in assignments early. Except for excused absences, late assignments will result in penalty with reduced grade. If you know in advance that you will have an excused absence when an assignment is due, you must turn in that assignment before its due date. You should turn in assignments that were missed because of an unexpected, excused absence as soon as possible.

There will be NO make-up exams except in extremely rare cases in which some verifiable unforeseen crisis/emergency arises. If you know ahead of time that you have a conflict with the exam schedule, discuss this with the instructor as soon as possible to make arrangements for the exam. Do not expect to arrange different exam schedules simply because it is more convenient.

Extra Credit
Individual extra credit is not possible, but extra points can be earned through extra assignments, which will be announced upon specific notice during the semester. A maximum of 5 bonus points (5% of final grade) are available. Note that Extra Credit cannot be made up.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  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 result in a failing grade.
• **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.

• **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
  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 your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. 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. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
  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 at 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.

- **Disability Services**
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 (361) 825-5816 or
visit Disability Services 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.

[http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **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.

L. **OTHER INFORMATION**

- **Academic Advising**
The College of Science & Engineering requires that students meet with an Academic
Advisor as soon as they are ready to declare a major. The Academic Advisor will set
up a degree plan, which must be signed by the student, a faculty mentor, and the
department chair. Meetings are by appointment only; advisors do not take walk-ins.
Please call or stop by the Advising Center to check availability and schedule an
appointment. The College’s Academic Advising Center is located in Center for
Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**
I reserve the right to modify the information, schedule, assignments, deadlines, and course
policies in this syllabus if and when necessary. I will announce such changes in a timely
manner during regularly scheduled lecture periods.