Syllabus for
GSS355 Remote Sensing GIS Data
Online Course

Instructor: TBD
Prerequisites: GSS105, MAR104, GEO102 or equivalent
3 lecture hours

Course Description: This course provides a basic overview of the technology by which aircraft and satellite images of the Earth are produced as well as hands on experience manipulating and interpreting. Participants gain practical experience in environmental analysis using satellite imagery and commonly used sensors and analytical methods for the Earth sciences.

Course Objectives: This course will enable students to: (1) identify sources of remotely sensed imagery appropriate for common applications; (2) acquire, manipulate, and interpret aerial photographs and satellite imagery; and (3) incorporate remote sensing data into Geographic Information Systems.

Topics to be covered:
- What is remote sensing?
- Platforms (vehicles, aircraft, and satellites)
- Light and the electromagnetic spectrum
- Cameras and aerial photography
- Visible/Infrared digital sensors (Quickbird, IKONOS, and Landsat)
- Radar and other microwave sensors
- Interpreting aerial photography
- Interpreting multispectral satellite images
- Algorithms and data processing
- Remote sensing and GIS

Expected Outcomes which serve as the base for the course learning units:
- Review the properties of electromagnetic radiation as they relate to remote sensing.
- Understand basic principles of aerial photography including: camera systems, films, photography acquisition, simple image interpretation, photogrammetry.
- Understand the theory, methods and techniques of spatial analysis using remotely sensed and GIS data.
- Exhibit the ability to describe the characteristics and appropriate applications of different passive and active sensors used for image data collection.
- Understand basic techniques of satellite image processing and how the data are interpreted and integrated into spatial analysis landscape terrains.
• Learn methods of visual interpretation of imagery from digital sensors.
• Understand the principles of basic digital image processing for information extraction.
• Learn relationships between remote sensing and GIS in context of resource assessments.
• Translate research questions in natural resource fields into RS and GIS analysis techniques.
• Become proficient in using ERDAS IMAGINE raster and ArcGIS vector modeling as they apply to addressing natural resource data analysis problems.
• Understand the advantages and limitations of RS/GIS based analysis approaches.
• Plan and conduct spatially explicit research or applications using RS and GIS techniques.
• Be able to write brief but concise laboratory reports in appropriate technical style demonstrating the student’s understanding and interpretation of results.

**Required Text:**

**Optional Texts:**

**Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>1</td>
<td>Remote sensing as a technology and history of remote sensing</td>
<td>Chapter 1</td>
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<tr>
<td>2</td>
<td>EMR: Physical properties and interaction with matters</td>
<td>Chapter 2</td>
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<td></td>
<td><em>HW #1 - Measurement and Analysis of Target Reflectance</em></td>
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<td>3</td>
<td>Aerial photography / aerial cameras / photographic process</td>
<td>Chapter 3, 4</td>
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<td><em>HW #2 - Tools for doing remote sensing</em></td>
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<td>4</td>
<td>Elements of visual interpretation</td>
<td>Chapter 5</td>
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<td><em>HW #3 - Image data interpretation and Analysis</em></td>
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<td>5</td>
<td>Photogrammetric process / softcopy photogrammetry</td>
<td>Chapter 6</td>
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<td><em>HW #4 - Photogrammetric measurements from aerial photos</em></td>
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<td>6</td>
<td>Multispectral and hyperspectral remote sensing systems</td>
<td>Chapter 7</td>
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<td><em>HW #5 - Imagery on the Internet (Guide to Map Composer)</em></td>
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<td>7</td>
<td>Multispectral and hyperspectral remote sensing systems</td>
<td>Chapter 7</td>
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<td><em>HW #5 – Finish HW#5</em></td>
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<td>8</td>
<td>Thermal radiation principles and thermal imaging</td>
<td>Chapter 8</td>
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<td><em>HW #6 - Thermal Infrared Image Interpretation</em></td>
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<td>9</td>
<td>Radar transmission characteristics / Image interpretation</td>
<td>Chapter 9</td>
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<td><em>HW #7 - Radar equations and Radar imagery interpretation</em></td>
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<td>10</td>
<td>Passive microwave sensing / LIDAR</td>
<td>Chapter 9</td>
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<td><em>(Finishing HW#7)</em></td>
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<td>11</td>
<td>Remote sensing of vegetation</td>
<td>Chapter 10</td>
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<td><em>HW #8 - Remote sensing of vegetation</em></td>
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<td>12</td>
<td>Remote sensing of Water resources</td>
<td>Chapter 11</td>
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<td><em>HW #9 - Remote sensing of water resources</em></td>
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Homework Exercises: Homework exercises with remote sensing data will be a major portion of your learning in this course. Learning GIS and remote sensing takes place through doing and practice. There will be ten homework exercises required for the course, and each is preceded by a practice exercise with step-by-step instructions. The homework exercises can be done at your own pace, but all exercises must be completed by one week before the end of the semester. Many of the exercises will use a free public domain image processing software package called MultiSpec, available on the Internet at http://www.ece.purdue.edu/~biehl/MultiSpec/. Details of downloading and installing MultiSpec are available on the course Blackboard site.

Grading:
Discussion board postings 10%
Practice exercises 20%
Homework assignments 40%
Midterm exam 15%
Final exam 15%

Basis for grading: 100-95 (A); 94-91 (A-); 90 – 88 (B+); 87 – 84 (B); 83-81 (B-); 80-78 (C+); 77-74 (C); 73-71(C-); 70-68 (D+); 67-60 (D).

Cell Phone and Electronic Devices: Use of cell phones, blackberries, laptop computers, iPods, MP3 players, and other audio and telecommunications devices is strictly prohibited during class. The only exceptions are through permission granted by the instructor for special purposes. Clickers are excluded from this prohibition, if required for the class. During regular class sessions, cell phones must be either in ‘vibrate mode’ or turned off. Calls cannot be answered. Text messaging is not allowed during class. Cell phones must be turned off and enclosed in a case, book bag, briefcase, or the like during tests and exams. YOU are responsible for ensuring this policy is followed. Students MAY NOT have cell phones, electronic dictionaries, calculators, pagers or other “information rich” devices (anything that can receive and/or store many pages of text) in their possession during tests and exams.

Academic Dishonesty Policy: Academic dishonesty is a serious offense and a breach of academic integrity that may result in failure of the course or failure for the individual paper or assignment. The “Code of Student Conduct” states that all forms of academic dishonesty, including the following are prohibited (see student handbook):
- Plagiarism – the intentional use of ideas or words of another as one’s own paper or other academic assignments. If you are unsure of what constitutes Plagiarism visit this document http://www.wpacouncil.org/positions/WPAplagiarism.pdf or ask the instructor.
- Cheating during examinations, whether by copying from a fellow student or by using information in the form of unauthorized aids brought to the examination.
- The submission of work for any assignment that has been prepared by another student.
**Academic Integrity Statement:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at: [http://naples.cc.sunysb.edu/CAS/ajc.nsf](http://naples.cc.sunysb.edu/CAS/ajc.nsf).

**Classroom Policy:** Students are expected to follow the Stony Brook Code of Conduct while in the classroom. If you are not familiar with the Code you can find it at: [http://studentaffairs.stonybrook.edu/sites/handbook/Code_1-22-03.pdf](http://studentaffairs.stonybrook.edu/sites/handbook/Code_1-22-03.pdf). Behavior that is disruptive to the function of the class, other students, or the instructor will not be tolerated. Poor class behavior or violations to the Code of Conduct will lead to removal from the class, possible withdrawal, or suspension. Food is not permitted in class. Beverages are OK, but please bring a container the can be closed to reduce spills. If a spill occurs please clean it up immediately.

**Instructional Responsibilities:** The University's statement of *Minimal Instructional Responsibilities* and *Minimal Undergraduate Student Responsibilities* are protocols with which you may already be familiar. They were established by the University Senate in 1996. If you have not already done so, please review them carefully. Both statements may be found beginning on page 81 of the *Academic Policies and Regulations* section of the on-line *Undergraduate Bulletin*: [http://www.stonybrook.edu/ugrdbulletin/current/index.shtml](http://www.stonybrook.edu/ugrdbulletin/current/index.shtml).

**ADA Statement:** If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or [http://studentaffairs.stonybrook.edu/dss/](http://studentaffairs.stonybrook.edu/dss/). They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: [http://www.sunysb.edu/ehs/fire/disabilities.shtml](http://www.sunysb.edu/ehs/fire/disabilities.shtml).

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