**SYLLABUS**

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<th>GEOG 5820 – Remote Sensing of the Environment</th>
<th>Fall 2015</th>
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<tbody>
<tr>
<td>Lecture: 40771-- TR 4:00 – 5:40 PM, Wood 2129</td>
<td>4 Hours Cr.</td>
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<tr>
<td>Lab: 42426 -- R 2:00 – 3:50 PM, Wood 2109</td>
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</table>

Instructor Office Hours:
- Office: Wood 3527, Phone: 387-3484
- M 2:00 – 5:00 PM, Email: laiyin.zhu@wmich.edu
- W 3:30 – 5:00 PM, or by appt.

**CATALOG DESCRIPTION:**

**GEOG 5820 Remote Sensing of the Environment.** An introduction to the concepts and foundations of air photo and satellite image interpretation, photogrammetry, and digital image processing. Students are also exposed to the physical principles that underlie electromagnetic radiation and its interactions with the earth-atmosphere system. Students who successfully complete this course should be able to understand the capabilities and limitations of photographic and digital imagery obtained from aircraft and space-borne platforms.

**COURSE OBJECTIVES:**

Statement of Purpose: This course introduces concepts and foundations of image interpretation, photogrammetry, and digital image processing. Students are exposed to the physical concepts that underlie electromagnetic radiation and its interactions with the earth-atmosphere system through a series of discussions, required readings and lab exercises. The ENVI software package will be introduced as an image processing and analysis tool.

GEOG 5820 focuses on deriving knowledge and understanding from remotely sensed imagery. Students who successfully complete this course should be able to understand the capabilities and limitations of photographic and digital imagery obtained from aircraft and space-borne platforms.

**REQUIRED TEXTBOOK:**


**COURSE REQUIREMENTS AND EVALUATION:**

It should be noted that in all elements of this class, "A" level work represents "outstanding, exceptional, extraordinary" effort and ability. This means that in order to get an "A," a student must go well beyond the basic requirements of the course to actively explore the wide ranging capability of current geospatial technology. Copies of the text, Remote Sensing and Image Interpretation, are available in the campus bookstore. You should plan on incorporating ideas expressed in this and other supplemental sources such as the International
Journal of Remote Sensing, Remote Sensing of Environment, the IEEE Transactions on Geoscience and Remote Sensing, and other relevant sources that are available online or in the Waldo Library.

The class has two regularly scheduled lecture sessions and one lab period per week. The lab is devoted to practical demonstrations of the theoretical concepts explored in the readings and in lecture. Note that the time requirements of the lab assignments will inevitably extend beyond the scheduled lab time—the lab periods are primarily intended as problem solving sessions where the TA or instructor will be available to assist the student in overcoming roadblocks. As with any Information Technology-related class, GEOG 5820 requires a significant investment of time outside of class. Labs count for a total of 20% of the course grade.

Exams: The exams will consist of short answer and essay questions. Material from the assigned readings, classroom discussion, and the laboratory assignments is testable. The final exam will be a comprehensive survey of the entire semester with greater emphasis on the latter part of the course. The midterms and final are each worth 20% of the overall course grade. Make up exams will not be given without prior approval.

Project: Each student will also demonstrate competence in digital image processing by completing an individual project using digital images (imagery for Michigan and selected other locations is available in the Geography Department). This will involve: outlining an analytical methodology and work flow, obtaining the necessary data, converting the Landsat or other imagery to an appropriate file format, performing atmospheric, sun angle, and other corrections, georeferencing the imagery to a State Plane or UTM coordinate system, performing the analysis, and presenting the results in the form of a short report, including graphical and tabular output as appropriate. The last week of classes is devoted to short (10 minute) presentations of each student's work.

**Grades** are based upon six factors:

- Labs: 20%
- Homework: 10%
- Individual: 10%
- Midterm #1: 20%
- Midterm #2: 20%
- Final Exam: 20%

**Points to Grade Conversion:**

- 95 - 100 % A
- 88 – 94 % BA
- 82 – 87 % B
- 77 - 81 % CB
- 72 - 76 % C
- 67 – 71 % DC
- 64 – 66 % D
- < 64 % E

**POLICIES**

- All course materials, including the syllabus, lecture notes, homework assignments and data are posted in the WMU elearning system ([http://www.wmich.edu/elearning](http://www.wmich.edu/elearning)).
- The labs in 2107 and 2109 Wood Hall will be available for your use via BroncoCard access. Both labs are equipped with the ENVI image analysis software package, and both have been recently updated. It is therefore highly likely that problems will crop up, so please be patient and do not wait until the last minute to complete lab assignments and projects. Alert the TA or instructor via email if you are experiencing a hardware or software problem. You can use
either lab, but, scheduled lab sections take priority, so if a class is starting, please move to another lab.

- You should obtain an alternate source of data storage such as a flash drive (2 GB or more recommended) and store all of your files on this disk, as the LAN server is not secure and students have lost data and projects from this server in the past. You should also obtain a few DVD-R or RW diskettes for holding the Landsat scenes you will be using to build your projects. The computers in the GIS labs have DVD writers, and assistance will be provided as necessary to help you back up your data.

- The computers are protected by a login screen—you should use your BroncoNet user ID and password to log in. Please be sure to log out before you leave. If you sit at a computer that is still logged in, or if you find a disk or drive left in a machine in one of the labs, please do your fellow student a favor and log them out or place the drive in the chalk tray at the front of the room (hopefully someone else will do you the same favor).

- The building requires a card for access late at night and on weekends (except for an open period from 8:00 to 12:00 on Saturdays). GEOG 5820 students are automatically put on the building (though not the Geography Office) access list, so you should be able to get in after hours after the first week of class.

- The course fee assessed to all students taking this course partially offsets the cost of the software, pays for the paper, inkjet and toner cartridges, and helps maintain the lab equipment. Please be vigilant and protect your lab by limiting access to only those students registered for geography classes that use the lab.

- The only email address that should be used for communication between WMU students and WMU faculty and staff is the email address associated with a BroncoNet ID. This email address typically takes the form “firstname.middleinitial.lastname@wmich.edu.” An example is buster.h.bronco@wmich.edu. Students cannot automatically forward email from this address to other addresses. Students can access this email account or get instructions for obtaining a BroncoNet ID at GoWMU.wmich.edu.

- The nature of the material for this class requires frequent use of scientific calculators (those that can easily calculate roots and trig functions). It is your responsibility to get a simple scientific calculator and become familiar with its basic functions for use on exams and assignments. Complex programmable calculators are not necessary, and in the instructor’s experience, they are more of an impediment than an aid. Cell phone calculators, PDA’s, or any other type of networked device are strictly prohibited for use on exams or lab assignments. Cellular phones must be turned off for lectures, labs, and any other meeting of the class, since incoming calls or text messages are a distraction for everyone in the room.

**POLICY ON CHEATING AND PLAGIARISM:**

You are responsible for making yourself aware of and understanding the University policies and procedures that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. (The academic policies addressing Student Rights and Responsibilities can be found in the Undergraduate Catalog at [http://catalog.wmich.edu/content.php?catoid=22&navoid=882](http://catalog.wmich.edu/content.php?catoid=22&navoid=882) and the Graduate Catalog at [http://catalog.wmich.edu/content.php?catoid=23&navoid=938](http://catalog.wmich.edu/content.php?catoid=23&navoid=938).) If there
is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s) and if you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test. If you have any questions, please consult the websites: http://osc.wmich.edu and www.wmich.edu/registrar to access the Code of Honor and general academic policies on such issues as diversity, religious observance, student disabilities, etc.

POLICY ON STUDENTS WITH PHYSICAL AND LEARNING DISABILITIES:
Please get in touch with the instructor to discuss any problems you foresee in taking this course. I am very flexible and willing to reasonable accommodations and referrals if necessary to counter challenges such as athletics, work schedules, children, transportation problems, as well as any mental or physical condition that might impair your ability to complete the course. However, this requires prior notification, preferably at the beginning of the semester.

POLICY ON RELIGIOUS TOLERANCE:
Students may be excused from class for the purpose of observing major religious holidays without penalty. Missed class time because of major religious observances does not excuse the student from class work or examinations. You are also welcomed to consult with the instructor for solutions.

IMPORTANT DATES:
Tuesday, September 8—Fall classes begin
Monday, September 14—Last day to drop/add
Tuesday, September 15—Census
Wednesday, September 16—$100 late fee begins
Thursday, September 17—Last day to receive a 90% refund for complete withdraw
Monday, September 21—Last day to receive a 50% refund for a partial withdraw
Friday, October 2—Last day to receive a 50% refund for a complete withdraw
Wednesday, October 28—Last day to receive a 25% refund for a complete withdraw
Monday, November 9—Last day to withdraw
Wednesday, November 25—Thanksgiving recess starts at noon
Monday, November 30—Classes resume
Final Exam -- Tuesday, December 15  5:00 –7:00 PM
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<td>Electromagnetic</td>
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<td>Image Interpretation</td>
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<td>Satellites</td>
<td>5. Satellites - Due Oct 9</td>
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<td>Field Techniques</td>
<td>Lab 6. ENVI Intro/Importing Images</td>
<td>Image Manipulation</td>
<td>7. Image Enhancement - Due Oct 23</td>
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<td>Ch 7 p 499-544</td>
<td>Unsupervised Classification</td>
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<td>8. Image Classification - Due Oct 30</td>
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<td>Ch 7 p 545-578</td>
<td>Accuracy Assessment</td>
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<td>10</td>
<td>11/10, 11/12</td>
<td>Ch 7 p 578-592</td>
<td>No class, Instructor at conference</td>
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<td>Final Exam: Tuesday December 15</td>
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5:00 - 7:00 PM