**Physical Science/Biological Sciences 410/510 Remote Sensing Fall 2015**

**Class hours: TR 5:00 – 7:15 Science 259**

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Office hours: Axel M 12-1, T 2-3:30, W 2-3 (or by appointment)

Oberly MWF 9:00-11:00, M 2:00-3:00, Th 1:00-2:00 (or by appointment)

**University Policies:** By enrolling in this course, you agree to the University Policies listed in the reference below. Please read the full text of each policy by going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802> Academic Dishonesty/Excused Absence Policy for Undergraduates/Computing Services Acceptable Use/Inclement Weather/Dead Week/Students with Disabilities/Academic Forgiveness/Academic Probation and Suspension/Academic Rights and Responsibilities of Students/Affirmative Action/Sexual Harassment

**Physical Principles of Remote Sensing with Applications. 4 hours**

A study of the physical systems for collecting remotely sensed data. Statistical/spatial analysis and modeling using image processing/geographic information/spatial analysis computer software systems with earth resource applications. (PR: PHY 203 and 204; MTH 225 or permission.)

**Goals/Outcomes:**

1. Students will demonstrate mastery of basic physical principles for satellite orbits, data collection systems and techniques.

2. Students will be able to describe and explain satellite landscape images, even if unfamiliar with the location.

3. Students will perform remote sensing analysis using an appropriate selection of methods for particular problems.

4. Students will build basic ERDAS Imagine models to support their projects and display skill in using the software help guide to problem solve.

5. Students will manage a semester-long project using statistics to support conclusions resulting in a written report and a class presentation.

**Student Projects:**

Each student will be expected to select a major problem of interest to their study area, e.g., a biologist may want to map habitat areas for a particular plant or animal species. The problem must involve digital data and software processes. They are then to work toward solving the problem using the information gained in the course. In particular, the problem and solution **must** be solvable using the software studied in the course.

**PS/BSC 410/510 Remote Sensing Fall 2015 Page 2**

Software exercises should lead the student through logical paths for analyzing and interpreting images. The primary software package for 410/510 is ERDAS Imagine. Some work with other packages will be required.

Each student will present a written summary of their problem statement, problem solution, and discussion of the results at the end of the semester. (See schedule at end of syllabus.) In addition, each student must present a Power Point presentation of their project to the class and the faculty. Evaluation of the student work will be based on exam performance and project work.

**Required Textbook**: Sabins, Remote Sensing, Principles and Interpretation, 3rd Edition, Freeman, 2007. Bound notebook.

**Course Requirements:**

 Reading assignments from the textbook and other materials.

 Work problems associated with satellite orbits, and spatial and spectral data.

 Use relevant software to manipulate and analyze images.

 Complete relevant physical experiments.

 Take two semester exams – see schedule of assignments.

**Class Schedule:**

**Date Textbook**

August 25, 27 Chapter 1

September 1, 3 Chapters 1 and 12 **Project Description (3rd)**

September 9, 10 Chapter 2

September 15, 17 Chapter 2

September 22, 24 Chapter 3 -4 **Project Title and Scope – due Fri. 25th**

September 29, October 1 Statistics!

October 6 **Lecture** **Exam on Chapters 1 -4 and Stats**

October 8 **Software practical exam #1, Part A**

October 13 Chapter 5

October 15 **Software practical exam #1, Part B**

October 20, 22 Chapter 8

October 27, 29 Chapter 8

October 31 **Last day to withdraw from a course**

November 3, 5 Chpt. 8, Project work

**Handout Second Semester Exam – Take home – Due Fri. Nov. 13, 5:00 pm**

November 10, 12 Chapter 8

November 17 Project work

November 19 **Software Practical Exam #2**

November 22 through 27 **No classes – Thanksgiving Break**

December 1, 3 Project work

December 10 Power Point presentations are due, starting at 5:00 pm

**PS/BSC 410/510 Remote Sensing Fall 2015 Page 3**

 The schedule above will be followed as closely as possible. You must pace yourself with the software exercises so that you are ready for the practical exams.

 A typical schedule for a week will be to have a lecture class at the Tuesday meeting. This class can consist of slides/power point demonstrating applications, lecture presentations of physical systems, computations, demonstrations, etc. The Thursday class will consist of software exercises demonstrating how to manipulate digital image data. For this semester the ERDAS Imagine software will be the primary package used. The schedule above assumes a Tuesday lecture and a Thursday software/experiment presentation.

**Course Grade:**

 Your course grade will be determined by the following:

 First exam (70 points) and first practical exam (30 points) 100

 Second exam (75 points) and second practical exam (25 points) 100

 Project written report 100

 Project power point presentation 100

 Total points 400

Clearly, your project is a very large part of your course grade. You must start thinking about it early and be thorough about its completion and presentation.

 Logbooks will be collected when the papers are due. While not in the above listing for grade contributions, incomplete logbooks can cost you as much as 50 points on your total. That is easily a letter grade.

**Attendance:** Students are expected to attend all scheduled classes, including the software exercise sessions. Classroom discussion and demonstrations are vital for understanding the material covered in the course. During the software sessions you are encouraged to discuss the problems encountered with your classmates. Constructive discussion is part of the learning process. See University Policies above for the attendance policy.