PLS (NRRM) 433/533 GIS/Remote Sensing in Natural Resources

Spring 2014, 3 Credits, SEC 201 (CRN 4513, 4873)

Wednesday: 4:00 – 6:20 pm

Room: Harris Hall 202

Instructor

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Office Hours: T/R: 10:50 – 12:00 pm, W/F: 9:00 – 10:00am, 11:00 – 12:00 pm

                 Other times by appointment

University Policies

By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to 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

Required Texts, Additional Reading, and Other Materials

1) Course main text: Bolstad, P. (2012). *GIS Fundamentals* (4th Ed.). White Bear Lake, MN: Eider Press (http://www.paulbolstad.net/gisbook.html, TEL: 800-247-6553, ISBN: 978-0-9717647-3-6).

2) If you have no previous experience with ArcGIS, you may purchase "*Getting to Know ArcGIS Desktop*" for your own exercise purpose. Additional reading materials will be assigned by the instructor as needed.

Course Description/Format

The course will explore techniques and procedures required for spatially explicit data analysis in

park and protected area applications. Specifically, for developing problem-solving and analytical skills, Geographic Information Systems (GIS) and Remote Sensing (RS) analysis focusing on natural resources management will be accomplished by each student in a computer laboratory with minimal input from the instructor. Various case studies will be used for analysis purposes in class: trail/site selection, vegetation classification, vegetation change analysis, biodiversity pattern analysis, and mapping/editing via Global Positioning System (GPS).

Pre/co-requisites: Since this course introduces and employs various applied/advanced GIS/RS analysis techniques, previous experience in GIS/RS is recommended (recommended courses: IST 423, GEO 426, or equivalent). However, depending on individual circumstances such as levels of analytical, mathematical and programming skills/abilities, the instructor will allow students to take this course. Therefore, students who didn't take the recommended course must see the instructor for registration.

Course Student Learning Outcomes and Assessment Measures
Upon completion of this course, student will be able to

Course Student Learning Outcomes	How students will practice each outcome in the course	How student achievement of each outcome will be accessed in the course
Students will understand the theory, methods and techniques of spatial analysis using remotely sensed and GIS data	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper/presentation
Students will understand basic techniques of aerial/satellite image processing and how the data is interpreted and integrated into spatial analysis for parks and protected areas	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper/presentation
Students will understand the advantages and limitations of using RS/GIS based analysis approaches for managing parks and protected areas	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper/presentation

Students will plan and conduct spatially explicit research or application using RS and GIS techniques for parks and protected areas	In-class examples/materials, discussions, lab exercises	Student final project paper/presentation
Students will write brief but concise laboratory report in appropriate technical style demonstrating the students' understanding and interpretation of results	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper
Students will collect geospatial information using a hand-held GPS unit and edit the collected data using an appropriate protocol	In-class examples/materials, discussions, lab exercises, field work/investigation	Lab 10 - 13, Service learning project with the City of Huntington

Course Requirements

1) **Lab Exercise**: There will be **two lab reports** and **five lab summary assignments** during the semester. The completion of these assignments will require students to work independently in the computer lab on their own time. Generally, students will be given a week to work on the lab summary and two weeks on the lab report. The instructor will provide instructions for the expected content of assignment.

2) **Final Project Paper/Presentation:** The final project serves as the opportunity for students to demonstrate their fulfillment of the course objectives. Students are required to complete an applied GIS/RS analysis project by applying the techniques covered in class. A project may involve posting and testing a research hypothesis related to park and protected area management. The final project topics will require approval by the instructor, and more details schedule will be provided (approximately 3 pages not including tables, figures, or references, *due: April 30*).

3) **Article Review (Graduate Only)**: Students will be required to review a research paper assigned by the instructor. The instructor will provide instructions for the expected content of assignment (approximately 2 pages, *due: March 12*)

4) **Attendance & Participation:** Attendance will be part of your grade as noted below. If student misses more than 30 percent of the lectures, the instructor reserves the right to summarily assign a failing grade for the course. In addition, **55 percent** of the grade for

this course is comprised of lab exercises, most of which will be completed in class. Student will not be allowed to make-up in class lab exercise missed due to unexcused absences. Absences will only be excused if they have been pre-approved by the instructor or if the student is able to document a valid reason for their absence (i.e. illness, death in family, automobile accident, the Dean of Students, etc.).

5) **Extra Point Chance (I)**: To celebrate Earth Day this year, the NRRM program will be hosting a series of events on April 22 (Tuesday, on-campus). All interested faculty, students and staff are invited to participate in the events. If you attend the events, you will receive one extra point (a sign-up sheet will be provided later).

6) **Extra Point Chance (II) - MU PROS Participation**: The Marshall University Park and Recreation Organization for Students (MU PROS) was created to promote active involvement in park and recreation related events on campus and in the community.   Students in this course may earn up to three percentage points of extra credit by participating in MUPROS meetings and events (0.5 points per meeting and 1.0 points per event).

Grade (undergraduate)
Lab Report (15 pts. × 2 = 30 pts.)
Lab Summary (8 pts. × 5 = 40 pts.)
Final Project Paper (10 pts.)
Final Project Presentation (10 pts.)
Attendance & Participation (10 pts.)
Total: 100 pts.

Grade (graduate)
Lab Report (15 pts. each × 2 = 30 pts.)
Lab Summary (8 pts. each × 5 = 40 pts.)
Final Project Paper (10 pts.)
Final Project Presentation (10 pts.)
Article Review Paper (10 pts.)
Total: 100 pts.

Grading Scale
100 – 93	A
92.9 – 85	B
84.9 – 77	C

| 76.9 – 70 | D |
| 69.9 – 0 | F |

Additional Policies and Expectations

1) *Class Materials* can be found at MU-online (http://www.marshall.edu/muonline). The instructor will upload all lecture and class discussion files (pdf format) at MU-online in a timely manner. It is mandatory that students monitor the MU-online for updated class materials at least once a week.

2) *Assignments* (lab report/summary and final project paper) are expected to be professionally presented. The instructor will provide instructions for the expected style of assignment as well as the sample of the assignment.

3) *Late Submissions* are strongly discouraged. Assignments not submitted to the instructor on the specified due date will be considered late. Late assignment will be accepted with a penalty of 25 percent for each day that the assignment is late. Exceptions to this policy will be made only for extraordinary circumstances that are cleared with the instructor ahead of time or with documentation when advance notice is not possible (Assignment placed in my campus mailbox or slid under my office door will not be accepted after the deadlines).

4) *Classroom Etiquette*: Students are expected to exhibit proper classroom etiquette. This means, among other things, that classroom discussions should be appropriate and respectful, cell phones should be turned off and put away at all times, newspapers and other non-class related reading materials should not be on desks, and students should not pack-up to leave until class has been dismissed. Failure to exhibit proper classroom behavior will affect your participation grade.

5) *Resources*: Students who find themselves in need of additional assistance are reminded that the instructor is available during office hours. Again, the instructor's office hours during the spring 2014 semester are as follows: T/R: 10:50 – 12:00 pm, W/F: 9:00 – 10:00am, 11:00 – 12:00 pm.

6) *Course Evaluation*: Mid-semester evaluation will be done by the instructor to identify students' suggestions on the course (i.e. pace and topic/subject of the course). Final student course evaluation will be conducted during the last two weeks of the semester in a manner that maintains the integrity of the process and the anonymity of evaluators (via online).

Course Outline (Please note this is a tentative schedule and it may change upon class progress)

Date	Topic	Readings/ *Assignment*
PLS 433/533 GIS/Remote Sensing in Natural Resources Management		
Jan. 15	Introduction: GIS/RS for Parks/Protected Areas/Natural Resource Management *Lab #1: Map layout & Making trail map*	Bolstad Ch. 1.
Jan. 22	Pre-classification Change Detection Analysis *Lab #2: Working with satellite dataset & NDVI change detection analysis 1*	Bolstad Ch. 6. Kim et al. (2014) Sader et al. (2003)
Jan. 29	Pre-classification Change Detection Analysis *Lab #3: NDVI change detection analysis 2 (continued)*	Bolstad Ch. 6. Kim et al. (2014) Sader et al. (2003)
Feb. 05	Trail/Site Impact Analysis in National Park 1 *Lab #4: Node and linkage effect of vegetation change*	Bolstad Ch. 9. Kim et al. (unpublished) ***Lab 3 Report Due***
Feb. 12	Trail/Site Impact Analysis in National Park 2 *Lab #5: Vegetation impact comparison mechanism*	Bolstad Ch. 9. Kim et al. (2012) ***Lab 4 Summary Due***
Feb. 19	Trail/Site Impact Analysis in National Park 3 *Lab #6: Multi-temporal change detection analysis*	Bolstad Ch. 9. Kim et al. (2011) ***Lab 5 Summary Due***
Feb. 26	Post-classification Change Detection Analysis *Lab #7: Vegetation diversity change detection analysis using supervised classification*	Bolstad Ch. 6. Kim et al. (unpublished) ***Lab 6 Summary Due***
Mar. 05	Post-classification Change Detection Analysis *Lab #8: Vegetation diversity change detection analysis using supervised classification II (continued)*	Bolstad Ch. 6. Kim et al. (unpublished) ***Article Review Paper Due*** *(Graduate Only)*
Mar. 12	Classification Accuracy Assessment *Lab #9: Accuracy assessment*	Bolstad Ch. 14. ***Lab 8 Report Due***
Mar. 19	***No Class** (Spring Break!)*	
Mar. 26	Working With GPS *Lab #10: Trail mapping & editing (on campus)*	Bolstad Ch. 5. ***Lab 9 Summary Due***

April 02	Presentation Preparation / Scheduling / Q & A	*Lab 10 Summary Due*
April 09	**Guest Lecture I** & Presentation Preparation	
April 16	**Guest Lecture II** & Presentation Preparation	
April 23	Student Presentation I (5 students)	
April 30	Student Presentation II (5 students)	*Final Project Paper Due*