PLS (NRRM) 433 / 533 GIS/RS in Natural Resources

Spring 2016, 3 Credits, SEC 201 (CRN 4657, 4667)

Wednesday: 4:00 – 6:20 pm

Room: WAEC 1104

Instructor

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Office Hours: M/W: 09:50 – 11:50 am, T/R: 10:50 – 11:50 am
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 by going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to www.marshall.edu/academic-affairs/policies/. 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

(From Catalog: Focusing on natural resource management, the course will explore techniques and procedures required for spatially explicit data analysis in park and protected area applications.) The course will deal with the technical aspect of geospatial analysis for managing

recreation resources in parks and protected areas. Specifically, Geographic Information Systems (GIS) and Remote Sensing (RS) analysis will be accomplished by each student in a computer laboratory with minimal input from the instructor. In order to emphasize the development of problem-solving and analytical skills, students will have a hypothesized problem set and will determine management alternatives using the outcome of geospatial analysis. 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 highly recommended (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.

Natural Resources/Recreation Management Discipline-Specific Learning Outcomes
Students will ***demonstrate*** the ability to ***identify*** natural resource and or/recreation management problems, ***propose*** appropriate management actions to address those problems, and ***evaluate*** the potential implications of their proposed management actions.

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 methods and techniques of geoprocessing and spatial analysis (under ArcGIS).	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper/presentation
Students will ***understand*** the structure of RS data and basic techniques for RS data analysis (under ERDAS IMAZINE).	In-class examples/materials, discussions, lab exercises	Two lab reports and five lab summaries, Student final project paper/presentation

Students will ***collect*** geospatial information using a hand-held GPS unit and ***classify & edit*** the collected data using an appropriate protocol.	In-class examples/materials, discussions, lab exercises, field work/investigation	Lab 10, Student final project paper/presentation
Students will ***prepare & conduct*** GIS/RS analysis research for managing parks and protected areas.	In-class examples/materials, discussions, lab exercises	Student final project paper/presentation
Students will ***discuss*** the advantages and limitations of using GIS/RS 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

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) **Group Project Presentation:** 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 instructor will provide instructions and data set required for the final project (final presentation: *April 20 & 27*).
3) **Article Review (Graduate Only)**: Graduate 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 16*)
4) **Attendance:** 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, **54 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.).

Grading Policy (undergraduate)
Lab Report (12 pts. × 2 = 24 pts.)
Lab Summary (6 pts. × 5 = 30 pts.)
Final Exam (21 pts.)
Final Project Presentation (15 pts.)
Attendance (10 pts.)
Total: 100 pts.

Grading Policy (graduate)
Lab Report (12 pts. each × 2 = 24 pts.)
Lab Summary (6 pts. each × 5 = 30 pts.)
Final Exam (21 pts.)
Final Project Presentation (15 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 participation*** is essential for the successful completion of the course. Students are expected to read the assigned papers prior to class and to come to class ready to discuss what they have read. In the absence of meaningful classroom discussions/activity, quizzes may be given to ensure that readings have been done.
2) ***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.
3) ***Assignment*** (lab report/summary) is expected to be professionally presented. The

instructor will provide instructions for the expected style of assignment as well as the sample of the review assignment.

4) ***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 are as follows: **M/W: 09:50 – 11:50 am, T/R: 10:50 – 11:50 am**.
5) ***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 (online format).

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

PLS (NRRM) 433 / 533 GIS/RS in Natural Resources		
Date	**Topic**	**Readings/ *Assignment***
Jan. 13	Introduction: GIS/RS for Parks/Protected Areas/Natural Resource Management *Lab #1: Map layout & Making trail map*	Bolstad Ch. 1.
Jan. 20	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. 27	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. 03	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. 10	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. 17	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. 24	Post-classification Change Detection Analysis *Lab #7: Vegetation diversity change detection analysis using*	Bolstad Ch. 6. Kim et al. (unpublished)

	supervised classification	***Lab 6 Summary Due***
Mar. 02	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. 09	Classification Accuracy Assessment *Lab #9: Accuracy assessment*	Bolstad Ch. 14. ***Lab 8 Report Due***
Mar. 16	Working With GPS *Lab #10: Trail mapping & editing (on campus)*	Bolstad Ch. 5. ***Lab 9 Summary Due***
Mar. 23	***No Class (Spring Break!)***	
Mar. 30	Exam Review / Presentation Scheduling / Q & A	***Lab 10 Summary Due***
Apr. 01	**Final Exam** (Lecture room, 4pm)	
Apr. 08	**Guest Lecture I** & Presentation Preparation	
Apr. 15	**Guest Lecture II** & Presentation Preparation	
Apr. 22	Final Presentation I	
Apr. 29	Final Presentation II	