RNEW 5200: Spatial Analysis of Watersheds and Ecosystems
Syllabus, Spring 2010

Lecture: Monday/Wednesday 10:00 – 10:50, Agriculture Bldg 229
Lab: Tuesday 4:10 – 6:00, AG 328
3 Credits

Instructor: Dr. Scott Miller, Department of Renewable Resources
314 Agriculture Building C
snmiller@uwyo.edu; 766-4274

Office Hours: Tuesday 11-12; Wednesday 11-12; or by appointment

Readings: Textbook: Burrough, P.A. and R.A. McDonnell. 1998. Principles of Geographic Information Systems. Oxford University Press Inc., New York.

Supplemental Reading: Will be available through course web site.

Description: Geographic information systems (GIS) are important tools for hydrologists, ecologists, and environmental managers. This course will cover topics related to the application of GIS in both research and management settings. The focus of the course is on watershed- and ecological applications at a range of scales. Topics include land classification and suitability analysis, interpolation techniques, terrain analysis, habitat modeling, model integration, and visualization. A particular emphasis will be placed on sources of potential error and their ramifications in a research context. The class is taught as a 3 unit course, with 2 hours of lecture and a weekly 2 hour lab.

Objective: The goal of the class is to familiarize students with advanced spatial analysis techniques commonly used in research and applications within the earth sciences with a particular emphasis on watershed and ecological applications.

Grading:

Lab Assignments	160 points
Attendance and participation	50
Midterm exam	50
Final exam	50
Class project	50
Total available points (graduate):	**360**

Grading will be on a straight scale:
A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F = < 60%.

Grading Policy: Late work will be deducted 10% per class period past the due date. Work will not be accepted 2 weeks past due date. In order to finalize grading, work will not be accepted past Friday, Dec. 5 (the week before the final exam is due).

Course Organization and Assignments

The course is divided into units that match lecture and lab assignments very directly. The lectures are designed to tie into lab results, and the labs are intended to build on both your theoretical and applied understanding of spatial analyses. The class is conceptualized as having two sections: ecological systems and hydrology. However, the class doesn't split them explicitly but blends the concepts as necessary to build on a general knowledge base of GIS-based research.

A class project is required of all graduate students. This project is intended to support your ongoing thesis work, if applicable, and in the past has led to several presentations and publications.

Expected Course Schedule

Minimum reading assignments are indicated here. Supplemental readings will be assigned in class and via email. If you miss a class please contact the instructor or a fellow student to see whether additional assignments have been made. Each unit will usually be a week, but if opportunities to expand the course content come up we will strive to be flexible.

Unit 1. Review of GIS principles, Introduction to GIS
- Lab1: Data acquisition & introduction to ESRI ArcGIS
- Read: Chapters 1 & 2

Unit 2. Watershed characterization
- Lab2: Erosion Potential Assessment
- Read: Chapter 8 & on-line assignments

Unit 3. Land classification and capability assessment
- Lab2: Finish erosion potential
- Read: Chapter 7 & on-line assignments
- Due: Lab1

Unit 4. Fuzzy logic for watershed assessment
- Lab3: Fuzzy logic in ranking restoration priorities
- Read: Chapter 11 & on-line assignments

Unit 5. Ecosystem Processes I: Habitat Modeling
- Lab: Demonstration of moose habitat modeling in the Snowy Range
- Reading: On-line assignments
- Due: Lab2

Unit 6. Interpolation techniques: Introduction to methods
- Lab4: Modeling summer and winter rainfall with IDW, Thiessen and spline
- Read: Chapter 5 to page 121; Chapter 6 & on-line assignments
- Due: Lab3

Unit 7. Ecosystem Processes II: Habitat mapping & risk modeling
- Lab5: Risk mapping of West Nile Virus
- Read: On-line assignments

Unit 8. Ecosystem Processes III: Landscape ecology
- Lab6: Patch analysis and change detection using landscape ecology
- Read: On-line assignments
- Due: Lab4

Unit 9. Scale effects in spatial analysis for hydrology and ecology
- Demonstration Lab: impacts of scale and data resolution on modeling
- Read: Chapter 11 & on-line assignments
- Due: Lab5

Unit 10. Watershed modeling 1: Lumped & statistical approaches
- Lab7: Land cover change and hydrologic response (2-week lab)
- Read: On-line assignments
- Due: Lab6

Unit 11. Watershed modeling 2: Distributed approaches
- Lab7: Hydrologic response continued
- Read: On-line assignments

Unit 12: Fluvial geomorphology
- Lab8: Estimating channel scour and deposition using LiDAR
- Read: on-line assignments

Unit 13: Open for class discussion
- Due: Labs 7 & 8

Important Dates * *Please note that this schedule is subject to change*

Monday, January 13: First Day of Class

Wednesday, March 5: Midterm exam due

Wednesday, April 21: Graduate student papers due

April 26 - 28: Student Presentations

Wednesday, May 5: Final exam due

Student Support

If you have a physical, learning, or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and provide documentation of your disability to, University Disability Support Services (UDSS) in SEO, room 330 Knight Hall, 766-6189, TTY: 766-3073

Student Code of Conduct

1. Students should exhibit respectful classroom values and behavior by:
   - engaging in appropriate communication, interaction and preparedness
   - demonstrating trust, respect and civility
   - approaching course content as important and necessary
   - meeting all deadlines for assignments and team member obligations
   - turning off cell phones in class
   - avoiding unnecessary talking
   - not reading outside material or doing other work during class

2. Students should contribute to a positive learning environment by:
   - arriving, attending and departing class in a respectful manner
   - taking responsibility for team and individual assignments
   - developing cooperative relationships with other students and faculty

3. Students should support a professional learning environment by:
   - avoiding inappropriate language
   - refraining from unrealistic expectations in dealing with administration, faculty and staff
   - communicating with the instructor if changes could be made to improve the learning environment

4. Students must uphold the academic integrity standards expected by the University of Wyoming. Academic integrity is conceptualized as doing and taking responsibility for one's own work. This includes individual assignments and the assumption of responsibility for work that is turned in as the "work product" of a team. Each team member is equally responsible for the work presented as the output of that team's effort. Each team member must carefully collaborate and have jointly participated in the final output. The University of Wyoming's definition of Academic Dishonesty referenced in the Student Code of Conduct: "An act attempted or performed which misrepresents one's involvement in an academic task in any way, or permits another student to misrepresent the latter's involvement in an academic task by assisting the misrepresentation." These acts include, but are not limited to: "Representing as one's own work material copied or borrowed from any source, written or otherwise, public or private, without proper citation of the source. *See* University of Wyoming Regulation 802. A good rule of thumb is to never use more than five consecutive words from a source without providing a citation. Student work may be evaluated for plagiarism using anti-plagiarism software if the instructor suspects academic dishonesty.