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GEO 491.01: Special Topics - An Introduction to GIS in Geosciences

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University of Montana
Department of Geosciences

An Introduction to GIS in Earth Sciences

Geos491

Spring 2013

Science Complex/ Clapp 335

TR: 11:10 a.m. – 1:00 p.m.

Instructor:

Alisa Wade

alisa.wade@umontana.edu

Clapp 368

Office Hours: posted on Moodle or by appointment

A. Course Objectives:

This course introduces the basic principles and techniques of Geographic Information Systems (GIS) with applications to Earth Sciences, including geomorphology, geology, hydrology, and biogeography. The course will provide a working knowledge of ESRI ArcGIS (10 Desktop, ArcInfo) via applied exercises using spatial data and tools related to careers in the Earth Sciences. The course predominantly consists of hands-on lab exercises, although lectures will be used to introduce concepts.

Note that science is worthless if not communicated. You will be graded on your ability to communicate your analyses, and a final project will consist of a presentation of a self-created spatial analysis project. If you need help with your communication skills, visit the UM Writing Center (<http://www.umt.edu/writingcenter/>), or check out the many on-line services. Improving and honing your communication skills should be a life-long goal.

B. Learning Objectives:

By the end of the course, students should:

- Understand basic terminology and concepts related to GIS
- Know how to import, display, query, and edit spatial datasets
- Be able to perform simple Earth system spatial analyses in GIS
- Know where to search for additional GIS data
- Be prepared for, and aware of need for, further study in GIS&S (*Systems and Science*)
- Have a strong foundation in completing scientific lab-write ups and oral presentations

C. Course Materials

Required Text: *GIS Concepts and ArcGIS Methods: Basics, 5th Edition*, David Theobald, 2012. The book is an e-book, and costs \$19.99. You will download the book to your computer from <http://www.consplan.com/books.htm>. If you do not own a computer, be sure to save the book to a USB flash drive (required for class). **Be sure to write down the password provided when you order the book;** you will need it each time you open the document. Note, it would not be difficult to share this book between students. I submit that would be uncool to Dr. Theobald who has been generous enough to write the best basics book out there and make it available for only \$20. My second favorite book, should you want something that covers GIS in more detail, is *Geographic Information Systems* by Kang-

tsung Chang. You can get away with an older edition on [Amazon](#) or elsewhere and save money (this book is NOT required).

Required Hardware: Minimum 2 gig USB external drive for data storage, back up, and transferring of files. On-line synching or back up services may not work well given network speeds in the lab. We are working in a new lab this year, and there are not enough computers for all students. I plan to experiment with server-based on-line access to ArcGIS v.10, but I will also have student copies of ArcInfo level licenses of ArcGISv.10 for use by a few students with relatively new, fast laptops in the event that doesn't work out. If you have a pretty good laptop, bring it, and we'll sort out the details in the first weeks of class.

Course Website: This course will use Moodle (<https://umonline.mrooms3.net/>). I will post all course documents and announcements through Moodle, and I encourage you to use the Moodle Forum for getting help from fellow classmates. You should be enrolled in the Moodle course once you enroll for the class. You will need your NetID to log in. For instructions on obtaining your NetID, go to <http://www.umt.edu/it/support/accessres/netid.php>.

D. Course Policies

- Students should come to class having read assigned material prior to class and be prepared to discuss materials or be quizzed on materials. Students are expected to attend both lecture and lab meetings and to participate in any discussions/activities.
- All assignments are due as noted in the schedule by the beginning of class. **Late assignments are not accepted.**
- All work will be emailed to alisa.wade@umontana.edu unless you are otherwise directed. All work must be entitled: GEOS491_your last name _ item.extension. For example, GEOS491_Wade_lab1.docx. This should also be the subject line of the email to which it is attached. **I will respond to each properly named and emailed assignment confirming receipt. You are responsible for ensuring that work is received in a timely manner.** If you want to be sure I received it in time, send it to me 16 hours in advance of the due-time, to allow me time to confirm receipt. If you send it to me at the exact time it is due, and I do not get it, it will be considered late and not be accepted, unless you can show a time-stamped email.
- All students should be familiar with and abide by the Student Conduct Code and its definitions of academic misconduct. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php. Students found to be in violation of academic integrity policies may be given a failing grade. Be very careful about plagiarizing. When in doubt, cite it. Because of past problems, I run assignments through a plagiarism checker,

E. Course Assessment

Course components:

Attendance/participation	5 %
Labs	65 %
Class project proposal draft	5 %
Class project proposal final	5 %
Final presentation	15%
Final presentation peer assessment	5 % (2% for giving, 3% for getting)

Lab Exercises: Labs will be posted on the course website (Moodle). If you like printed versions of labs to work from, you should come prepared to class with your own hardcopy. Labs will attempt to provide both point-and-click GIS guidance *and Geosciences*-based learning. Some lab assignments will require only brief answers, but many will require a formal lab write-up in the format of a journal manuscript ([IMRAD](#)). I *encourage* you to work together on labs – help each other out with the technical stuff. *HOWEVER*, each write up must be completed individually and should reflect your own work. Work together on the GIS, do the analysis and write up alone, unless the lab is specifically a group-lab (many are). I will drop your lowest lab score.

Final Project: The final project will consist of an independent, hypothesis-driven and spatially-based research project on a topic related to Earth Sciences (defined broadly) of the student's choice. The project must require GIS analyses as a primary tool. Students are encouraged to pursue a topic that will contribute to their research and/or interests; otherwise, I will happily assist students in developing a project. The project will culminate in a 15 minute oral presentation. Your peers and other outside judges will participate in grading your presentation. I will provide a separate hand-out on the project.

Attendance/participation: Attendance/participation will be assessed based on...wait for it... attendance and participation. In-class quizzes on the readings are a distinct possibility. Readings listed in the schedule for each week should be read by start of class. There are NO make up quizzes. I will drop your lowest quiz score.

Grades: Grades will be assigned based on the percentages listed below. Recognize that a "C" is for average work. Providing the minimum effort requested is average work. An "A" requires initiative and innovation. I grade to encourage excellence. That said, I generally grade "on a curve". This has no mathematical basis; it means that if at the end of the course I believe I have graded too harshly and that persons that I believe did "excellent" work did not receive an A, I will bump them to that level and give all others the same additional number of points necessary to make it so. I will never subtract points. Remember, I will drop your lowest lab grade.

Letter Grade	Performance	Percentage
A	Stellar	93-100%
A-	Exceptional	90-92%
B+	Excellent	86-89%
B	Well above average	83-85%
B-	Above average	80-82%
C+	Above average	76-79%
C	Average	73-75%
C-	Below average	70-72%
D+	Below average	66-69%
D	Well below average	63-65%
D-	Poor	60-62%
F	Failing	<60%