

Course Number: NR422 – GIS Application in Natural Resource Management

Department of Forest and Rangeland Stewardship
Warner College of Natural Resources

	Instructor	GTA
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Office Hours:	Monday 10:00-11:00am Friday 9:00-10:00am or by appointment	Monday and Wednesday 12:00-1:00pm or by appointment

Term:	Spring 2019
Lectures:	Monday and Wednesday 8:45 to 9:50am; Room NR 243
Computer Lab:	Friday 10:00 to 11:40am; Room NR 243
Course Credits:	Four credits

Course Overview

This class is designed to help students with a minor in Spatial Information Management to use GIS technologies to solve natural resource management problems.

1. Goals: Ability of independent problem solving through basic spatial/aspatial database management, SQL scripting, spatial analyses, and GIS programming in natural resource management.
2. Objectives:
 - a. Student should demonstrate the ability to clearly identify natural resource management problems that can be studied through spatial analyses, design, select and conduct GIS analyses to address those problems, and effectively communicate with potential stakeholders about the spatial analysis results.
 - b. Student should demonstrate good understanding of key GIS concepts, spatial/aspatial database structures, data models, and geospatial analysis.
 - c. Student should demonstrate the ability to automate spatial data analysis using Modelbuilder, SQL and Python.
 - d. Student should be familiar with some basic GIS analysis methods (i.e. classification, hydrology, habitat, interpolation, network analysis) commonly used in natural resource management assessment, planning and management.
3. Software: We will use Microsoft Access, Python, Arcpy, ArcGIS Pro 2.0 and ArcGIS 10.6 through this class.

Course Prerequisites

1. This is not an introduction of GIS class; rather, it is a course focusing on using GIS to solve natural resource management problems; it emphasizes critical thinking in spatial data analysis and processing. Students should have taken either NR322/NR319 or obtained understanding of GIS concepts via other equivalent university/college GIS courses or professional experiences.
2. Fundamental experience of ArcGIS 10 or ArcGIS Pro is expected.

3. Fundamental knowledge of spatial projections, datum, and data models is expected.
4. The review of GIS components and concepts will be brief and non-comprehensive.
5. Lab instructions may be topical instead of having detailed step-by-step instructions.

Lab Assignment Policy:

All lab assignments are due by Friday of the designated week unless otherwise specified. Late assignment is subject to **10% penalty per day including weekends and holidays**. Some lab assignments may have a computer-based section and a non-computer-based section. Grades from both sections will be added together as the final grade of the lab assignment. Each lab will be weighted differently towards the final grade due to different workloads. General requirements for all lab reports are:

1. All maps need to have the following elements as the minimum: data frame, title, legend, north arrow, and scale bar. Basic rules of cartography need to be followed. You will lose points by missing any of those elements.
2. All lab assignments need to be turned in through canvas; multiple files need to be zipped together before uploaded to Canvas.

Grades of "Incomplete":

Per university policy, an instructor may assign temporary grade of Incomplete to a student who demonstrates that he or she could not complete the requirements of the course due to circumstances beyond the student's control and not reasonably foreseeable. A student must be passing a course at the time that an Incomplete is requested unless the instructor determines that there are extenuating circumstances to assign an Incomplete to a student who is not passing the course. When an instructor assigns an Incomplete, he or she shall specify in writing using the Department Incomplete Grade Form the requirements the student shall fulfill to complete the course as well as the reasons for granting an Incomplete when the student is not passing the course. The instructor shall retain a copy of this statement in his or her grade records and provide copies to the student and the department head or his or her designee. (Section I.6 of the *Academic Faculty and Administrative Professional Manual*)

Disability Access:

Colorado State University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations must first contact Resources for Disabled Students before requesting accommodations from the professor. Resources for Disabled Students (RDS; <http://rds.colostate.edu/home>) is located in room 100 of the General Services Building. Their phone is (970) 491-6385 (V/TDD). Students who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations.

Attendance Policy: Participation in official University activities, e.g., an out-of-town athletic event, or special religious observances may provide a legitimate reason for an excused absence. Students are responsible for discussing this with the instructor at the beginning of the semester.

Professionalism Policy:

Per university policy and classroom etiquette; mobile phones, iPods, etc. **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade. When emailing the instructor or TA, please include your full name, CSU ID, and the course number in your email.

Term Project:

One or multiple students (no more than three) should work together to select a term project topic, design a study plan, collect necessary data, conduct spatial analyses, and prepare a professional poster for presentation during the last week of the semester. The term project needs to focus on applying GIS techniques to solve a specific natural resource management problem. This project should demonstrate your ability to identify and design a spatial analysis problem, implement a variety of GIS concepts, theories and tools (i.e. geodatabase, SQL, geoprocessing models, python script, geostatistics etc.), and should lead to interesting and logical conclusion and discoveries. The due day of each intermediate project assignment is the Friday of the due week.

Academic Integrity:

The Department of Forest and Rangeland Stewardship takes academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. The CSU writing center defines plagiarism this way:

Plagiarism is the unauthorized or unacknowledged use of another person's academic or scholarly work. Done on purpose, it is cheating. Done accidentally, it is no less serious. Regardless of how it occurs, plagiarism is a theft of intellectual property and a violation of an ironclad rule demanding "credit be given where credit is due."

Source: (Writing Guides: Understanding Plagiarism.

<http://writing.colostate.edu/guides/researchsources/understandingplagiarism/plagiarismoverview.cfm>.

Accessed, May 25, 2012)

If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the course. Each instance of plagiarism, classroom cheating, and other types of academic dishonesty will be addressed according to the principles published in the CSU General Catalog (see page seven, column two: <http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf>).

Of course, academic integrity means more than just avoiding plagiarism. It also involves doing your own reading and studying. It includes regular class attendance, careful consideration of all class materials, and engagement with the class and your fellow students. Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, we will ask to you sign the CSU Honor Pledge as part of completing all of our major assignments. While you will not be required to sign the honor pledge, we will ask each of you to write and sign the following statement on your papers and exams: **"I have not given, received, or used any unauthorized assistance."**

Final Exam

Final exam is comprehensive and based on materials from class handout, class exercise, lab exercise, assignment, lecture PowerPoint, discussion and review notes.

Final Grade

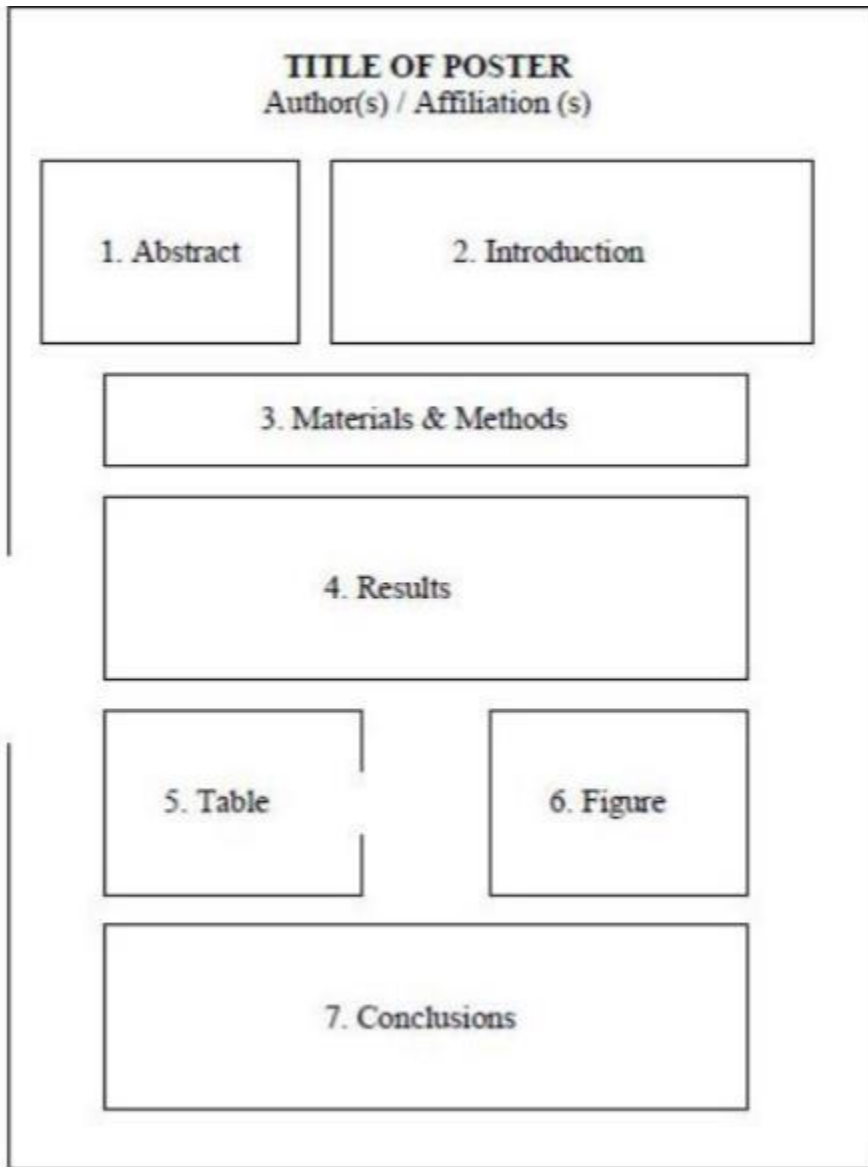
Assessment	Percent of Final Grade
Labs and follow up exercises	50%
Term Project	30% (10% intermediate results; 20% poster)
Final Exam (based on PPTs, handouts, and assignments)	20%

Grading Scale (%)	
[90, 100]	A
[80, 90)	B
[70, 80)	C
[60, 70)	D
[0, 60)	F

Course Schedule

Week Seq.	Technical Emphasis	Labs and follow up exercises	Project assignments
1	Relational database and SQL language	Lab 1 , Relational database (10%)	Form group, submit draft project title, author(s), and 1-page description by the end of the third week. (1%)
2			
3			
4	Geodatabase, ESRI Model Builder, geoprocessing	Lab 2 , Geodatabase in ArcGIS (5%)	Submit the outline of the class project by the end of the 6 th week. (2%)
5		Lab 3 , Vector data model, model builder, and land classification (6%)	
6			
7	Network analysis	Lab 4 , Network analysis (6%)	Draft poster due by the end of the 10 th week (3%).
8	Python programming	Lab 5 , Intro to Python programming and ArcPy (10%)	
9			
10			
11	Watershed delineation; spatial interpolation	Lab 6 , Watershed delineation (8%)	Revised draft poster due by the end of the 14 th week (4%).
12		Lab 7 , Intro to spatial interpretation (5%)	
13			
14	Problem solving case studies, review and synthetization	Finalize the class project, print out the poster	Poster display and presentation session; the last Friday of the 15 th week during the Friday lab session (20%)
15			
16		Final exam (20%); follow the posted CSU final exam schedule	

An example of poster layout:



Guidance for Evaluation of Poster:

Poster Name and Authors:					
Poster Title:					
Domain	1	2	3	4	5
Relevance/importance – problem is relevant, well defined, and have clear objectives.					
Technical quality – soundness of methodology and conceptual framework					
Clarity of presentation – organized, clear conclusions, concise, comprehensive					
Visual impact – How effective is this poster visually? How valuable is each figure and graph in furthering viewers’ understanding of the research subject?					