NR 322 Introduction to Geographic Information Systems Fall 2016

Department of Ecosystem Science and Sustainability
Colorado State University

Instructor: Dr. Randall Boone
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Lecture:	**9:00-9:50 Mondays and Wednesdays, Plant Sciences W009**
Laboratory, Section 1:	**10:00-11:40 Fridays, Natural Resources 232**
Laboratory, Section 2:	**12:00-1:40 Fridays, Natural Resources 232**

Course Website: **Canvas**

Course Objectives: This course is designed to introduce students to geographic information systems (GIS). The purpose of the course is threefold, to:

1) Examine the broad context in which GIS is adopted and used;
2) Understand core concepts of GIS;
3) Gain hands-on experience using ArcGIS software and methods in an integrative fashion with other technologies.

The objective of this course is to allow students a venue in which to apply newly acquired skills in geospatial information technologies. Laboratories will provide students with basic skills and information on GIS software, Internet data sources, and examples of research activities. Lectures are interactive.

Course Materials:

Required text: D. Theobald, "GIS Concepts and ArcGIS Methods," 5th Edition, which is digital only. The *GIS Concepts and ArcGIS Methods: Basics & Advanced (v10)* set is recommended. Source: http://www.consplan.com/books.htm

Selected readings will be assigned, as shown in the Schedule handout. These readings will be available on-line. A volume of Theobald (2009; the 4th edition) is on reserve at Morgan Library as well.

Note: Some materials provided in this course are drawn, with permission, from course materials prepared by Drs. Melinda Laituri, Jim Graham, David Theobald, Jessica Salo, as well as Colin Leslie and others.

Course Structure: The course will consist of lectures and laboratories. Readings are assigned prior to lecture and laboratories. Students should come to class prepared to discuss the materials. Course work consists of laboratory and lecture exercises, a mid-term exam, and a final exam in both lab and lectures. Course work is expected to be completed and handed in when due.

Course Exercises:

> *Laboratory exercises and lecture assignments.* Weekly laboratory meetings are scheduled throughout the semester. Students will be expected to complete weekly laboratory assignments. Laboratory exercises are due **AT THE BEGINNING** of the following week in lab. **NO LATE COURSE EXERCISES WILL BE ACCEPTED** without a documented, valid excuse (e.g., personal illness, family emergency, professional commitment). All final lab exercises should be word-processed or in a map format. A single laboratory exercise (non-exam) with the lowest score will not be considered in grading.

Attendance Policy and Participation: Students are encouraged to attend lectures regularly. If you are forced to miss a lecture, the visuals used will be posted afterward informing you of what you have missed. However, those visuals will not include animations or discussions that were had during lecture. Writing materials should be brought to lecture, as there will be weekly exercises to improve understanding of GIS principles or practice techniques.

Special Needs: Any student who needs special accommodations or has special needs is encouraged to speak with me about those needs within the first two weeks of the semester.

Academic Responsibility: All work in this course must be completed in accordance with the CSU academic honesty policy (http://catalog.colostate.edu/front/policies.aspx). Plagiarism or failing to meet the academic honesty policy in other ways will result in dismissal from class and will be reported. By participating in this course, you agree to abide by the following honor pledge, "I will not give, receive, or use any unauthorized assistance in this course."

Expectations of Me: I will bring my enthusiasm and experience with spatial analyses to our meetings, and strive to create an atmosphere of collaborative learning. I will have up-to-date lecture materials, and will use engaging examples in our class. Students have their own experiences and background. I will build off those, encouraging and appreciating an

interdisciplinary approach to our work. I will strive to keep all students up-to-date on their class standing. I will be readily available to students, with my office door commonly open, and by appointment if helpful.

Expectations from You: In addition to promptness, participation, attention to CSU student expectations, etc., I expect students to embrace the interdisciplinary nature of the course. People of different backgrounds and experience gain from this course; we are colleagues, sharing in a learning experience and learning from each other. If you have any difficulties in the class, *speak with us* or find some other way to let me know, otherwise your difficulties may go unrecognized. Our main advice is to stay up-to-date with course assignments.

Need Other Help?
CSU is a community that cares for you. Counseling Services has trained professionals who can help. Contact 970-491-6053 or go to http://health.colostate.edu. "Tell Someone" by calling 970-491-1350 to discreetly discuss your concerns (http://safety.colostate.edu/tell-someone.aspx).

Methods of evaluation:

Class participation: 10%
Students are expected to raise questions, complete lecture exercises, and join in discussions in class and laboratories. In-lecture hands-on exercises will also count towards your class attendance/participation scores.

Laboratory exercises: 35%
Students will be doing analyses and exercises associated with spatial data. These assignments will be evaluated, and feedback provided.

Class notebook: 5%
Students will be compiling a notebook of GIS assignments and concepts. The completeness and organization of that notebook will be assessed.

Mid-term laboratory exam: 10%
A mid-term exam will assess students' understanding of techniques covered in laboratories.

Mid-term lecture exam: 10%
A mid-term exam will assess students' understanding of core concepts.

Final laboratory exam: 15%
A final exam will assess students' understandings of techniques covered in laboratories.

Final lecture exam: 15%
A final exam will assess students' understandings of core concepts.

Final grades will be assigned using the following CSU grading scheme:

Grade	Score	Course Credit
A	93-100	4.0
A-	90-92	3.7
B+	87-89	3.3
B	83-86	3.0
B-	80-82	2.7
C+	77-79	2.3
C	70-76	2.0
D	60-69	1.0
F	0-59	0

A computer account on the Natural Resources network is required for the course. If you do not have an account, your laboratory instructor will guide you on how to acquire one.

NR 322, Fall 2016: Tentative Course Schedule Dates and topics may be changed and updated.

Week	Date	Lecture	Laboratory	Main readings and due dates
1	Aug 22	Introduction		
	Aug 24	Fundamentals of GIS		Theobald: Chapter 1
	Aug 26		Introduction to ArcGIS	Due Sep 2
2	Aug 29	GIS in Research		
	Sep 31	Communicating with Maps		
	Sep 2		Getting to Know ArcMap	Due Sep 9
3	Sep 5	*Holiday*		
	Sep 7	Scale and Projections		Theobald: Chapter 3
	Sep 9		Projections, Scales, and Datums – Global Perspectives	Due Sep 16
4	Sep 12	Coordinate Reference Systems and Local Projections		
	Sep 14	Spatial Data and Attribute Data		Theobald: Chapter 2
	Sep 16		Projections, Scales, and Datums – Local Perspectives	Due Sep 23
5	Sep 19	Cartography		Theobald: Chapter 4
	Sep 21	Spatial Data and Design Concepts		
	Sep 23		Cartography	Due Sep 30
6	Sep 26	Acquiring Spatial Data		Theobald: Chapter 6
	Sep 28	Editing Data, Topology, and Review		
	Sep 30		Digitizing in ArcMap and Topology	Due Oct 7
7	Oct 3	*Mid-term Exam*		
	Oct 5	Single-layer analysis		
	Oct 7		Single Layer Analysis	Due Oct 14

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Week	Date	Lecture	Laboratory	Readings and Due dates
8	Oct 10	Spatial Analyses in GIS		Theobald: Chapter 4, Advanced
	Oct 12	Measurements and Summaries		
	Oct 14		*Midterm Lab Practical*	Draft lab notebooks due
9	Oct 17	Queries and Reasoning		Theobald: Chapter 5
	Oct 19	Transformations		
	Oct 21		Multiple layer analysis	Due Oct 28
10	Oct 24	Optimization and Hypothesis Testing		Theobald: Chapter 5, Advanced
	Oct 26	Error Propagation and practice		
	Oct 28		Querying Attributes of Vector Data	Due Nov 4
11	Oct 31	In-class Project / Vector Analysis		
	Nov 2	GPS and GIS		
	Nov 4		GPS and GIS	Due Nov 11
12	Nov 7	Model Building		Theobald: Chapters 1, 2, 3, Advanced
	Nov 9	Raster Data		
	Nov 11		Introduction to Model Builder	Due Nov 18
13	Nov 14	Raster Analysis		
	Nov 16	Raster Analysis		
	Nov 18		Raster Analysis and Buffers	Due Dec 2
14	Nov 21	*Fall Recess*		
	Nov 23	*Fall Recess*		
	Nov 25		*Fall Recess*	

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Week	Date	Lecture	Laboratory	Readings and Due dates
15	Nov 28	Raster Calculator and Interpolation		Theobald: Chapter 6, Advanced
	Nov 30	In-class Project / Raster Analysis		
	Dec 2		Raster Calculator and Cost Distance	Due Dec 9
16	Dec 5	GIS in Society and on the Web		
	Dec 7	Review		
	Dec 9		*Final Lab Practical*	Lab notebooks due
17	Dec 15	*Final Exam 4:10 pm – 6:10 pm*		