NR 6910 : GIS for Natural Resource Applications

3 credits, Online Delivery

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Course Description

The course is designed for graduate students who need an introduction to GIS software and applications. No prior GIS experience is needed, but familiarity with natural resources spatial issues is assumed and be proficient in computing and file management. Students will use the ESRI software ArcGIS 10 for all course exercises. Students will learn how to acquire geospatial data from various web sources as well as develop an understanding of how spatial data is created and how to implement field collected data in ArcGIS. Spatial data will be used to develop maps and conduct basic to advanced spatial analyses relevant to natural resource issues.

Course Objectives

> **To gain comfort using basic tools in ArcGIS**
> To create evaluative habits: data, tools functions, results
> To become familiar with web-based GIS resources
> To develop skills in spatial analyses and spatial thinking
> **To gain a fundamental understanding of spatial data models**
> To understand how data accuracy and precision can limit real world applications
> To understand how spatial data is connected to place
> To understand theoretical geospatial principles underlying GIS practices
> **To effectively display spatial data and convey results of GIS analyses**

Course Curriculum

The course covers nine topics during the fifteen week semester

Topic 1	Intro to ArcGIS and basic cartographic principles
Topic 2	Mapping with GIS data: classification and symbolization
Topic 3	Coordinate systems, datums, projections
Topic 4	Understanding spatial data structure, attributes and nuances
Topic 5	Data Creation: Digitizing
Topic 6	Data Quality
Topic 7	Vector analysis/ geoprocessing
Topic 8	Working with DEMs and raster surfaces
Topic 9	Integrated analyses

Course Materials

Canvas: The course will use Canvas (https://online.usu.edu/) for course announcements, assignment delivery and submission, quizzes, discussions, grades, etc. It is the student's responsibility to log in to and utilize the Canvas system. Help using the Canvas system can be obtained by contacting USU Information Technologies at 797-HELP or going to http://it.usu.edu.

Software: The ESRI education edition software package (a one year free trial of the most current version of ArcMap Desktop and ArcGIS Pro) will be made available to all students enrolled in the class.

Hardware: Students will need access to a computer running Windows OS.

> Please see: http://desktop.arcgis.com/en/system-requirements/latest/arcgis-desktop-system-requirements.htm for more information or to test your computer for compatibility with ArcGIS.

> **Note: ArcGIS WILL NOT RUN ON THE APPLE OS.** You will need to run a windows OS or have full access to a windows based computer.

Internet access: *A reliable high-speed internet connection is required for all students enrolled in the course.*

Required Textbook: No required text. Periodic readings from online sources will be assigned.

Supplementary Textbooks (not required):

> Mastering ArcGIS 7th edition, Price. ISBN: 9781259598456, 1259598454
> This book is a thorough 'recipe' style GIS workbook. A great resource. Includes data disk.

> GIS Fundamentals 6th edition, Bolstad. ISBN- ISBN: 978-1-59399-552-2
> This is a very approachable text on the principles underlying GIS. Not ESRI specific. Online version available.

Activities

Each module will be composed of a power point presentation, video tutorials, a set of lab instructions, and intermittent reading assignments. Modules and course materials will be available on Canvas or available on the web.

Lab exercises are designed to provide students the opportunity to learn GIS (systems) and GISc (science) concepts through hands-on experience. Lab exercises make up the bulk of the work in this course and have been written with the intent of exposing students to fundamental tools of ArcGIS, promoting spatial thinking and problem solving, and

introducing a variety of resources to use for troubleshooting and/or designing analysis workflows while introducing students to some of the invaluable theoretical background required to do intelligent GIS work. The pace of the class is such that students must complete one module (or module component) per week of the semester. *This is not a self-paced course.*

Reading assignments from web sources will accompany most modules to help reinforce fundamental theoretical concepts behind geographic information systems and science.

Work load: I'm not going to lie; this course is a *lot* of work. You should expect to spend *at least* 10 hours per week (or maybe substantially more) on the activities for each module. I've tried to make the workload similar each week. There are two assignments that are a bit heavier. I will let you know in the overview for those weeks.

Course assessment: Assessment of the class will occur during the last few weeks of class using the IDEA course assessment tool. Please think about feedback you might offer in this course evaluation as you work through the semester. I take the feedback seriously and amend the course every semester to best suit student needs (and to fix things that are inefficient and do more of what works). The IDEA questionnaire is notably generic, but it is the main mechanism by which I am evaluated as an instructor, and is the only place I get direct input I can use to improve the course. Thanks!

Grading

Grades for the class will be assigned based on the following weighting scale:

Weekly assignments – 100% of total grade

Utah State University Grading Scale:

	Minus							Plus		
A	90	91	92	93	94	95	96	97	98	99+
B	80	81	82	83	84	85	86	87	88	89
C	70	71	72	73	74	75	76	77	78	79
D	60 – 69									
F	< 59									

Communication

Canvas will be utilized for basic communication of announcement. The course has a discussion board (phpBB) that will be used for all discussions, responding to frequently

asked questions (FAQ), and is a forum for students to request help or feedback from each other.

The instructor will be available via email to answer any individual questions or to clarify issues that arise throughout the semester. I make a strong effort to respond to students as quickly as possible. Students are expected to monitor Canvas announcements and their email in order to receive communications about the class in a timely manner.

In addition to Canvas and email, the instructor will provide individual and specific feedback on each assignment in Canvas. If you aren't sure how to retrieve this feedback, ask right away. I will also use screen capture demonstration videos and other technologies when appropriate to ensure that adequate interaction and assistance is available.

Policies

Late work

1. You can't afford to fall behind in this class

2. Late labs take 2-3 times longer to grade which is horribly inefficient.

For those reasons I employ a late work penalty.

Any work submitted past the due date will receive a 10% reduction unless due to a pre-approved excused absence. 20% will be deducted over the next few days based on communication (or lack of) between student and instructor. Partial credit can be received for work turned in late *assuming the student has sought approval from the instructor*. ***No work will be accepted more than two weeks after the original deadline unless a specific arrangement has been made between student and instructor.***

Honor Pledge: Students will be held accountable to the Honor Pledge, which they have agreed to: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity."

Academic Integrity: The instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University's Student Code:

Acts of academic dishonesty include but are not limited to:

1. Cheating: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity, including working in a group when the instructor has designated that the quiz,

test, examination, or any other academic exercise or activity be done "individually… (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; … (6) submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or (7) engaging in any form of research fraud.

2. Falsification: altering or fabricating any information or citation in an academic exercise or activity.

3. *Plagiarism: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.*

> This instructor highly values the University's Academic Code of Conduct and the integrity of this course.
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> Plagiarism will not be tolerated in this course.
>
> Professional and ethical behavior dictates that you clearly cite all sources referenced in any part of the work you submit for this course. *Give full credit to the original source (person or entity) for any ideas, thoughts, phrases (reworded or not), or data that you use, in part or in whole*.

Full text of the Student Code available at available at available at http://www.usu.edu/studentservices/pdf/StudentCode.pdf:

Special needs: Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, (435)797-2444 voice, (435)797-0740 TTY, (435)797-2444 VP, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

Gender-Inclusive language guidelines: Students are welcome to share their preferred pronouns and names, and these gender identities and gender expressions will be honored. Utah State University's Access and Diversity Center provides guidelines and resources regarding gender-inclusive/non-sexist language (https://accesscenter.usu.edu/lgbtqa/allies/index). Following these guidelines fosters an

inclusive and welcoming environment, strengthens academic writing, enriches discussion, and reflects best professional practices.

Non-discrimination policy: Utah State University does not discriminate based on race, color, religion, sex, national origin, age, genetic information, sexual orientation or gender identity/expression, disability, status as a protected veteran, or any other status protected by University policy or local, state, or federal law. For more information, visit https://aaeo.usu.edu/non-discrimination