SWS4720C - GIS IN SOIL & WATER SCIENCE

Spring 2021

Sections 0267, 0268, 2104, 21H5, 21H9 3 credit hours

3086 McCarty B – Tuesday (6-7 or 8-9 periods) or Web based

Instructor
Susan Curry
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2163 McCarty Hall A
Office Hours: M, T, W – 10:45 – 11:45 am or by appointment
352-294-3147

Teaching Assistant
TBD

CANVAS COURSE WEBSITE: http://elearning.ufl.edu

CLASS MEETINGS (on campus sections): Tuesday Period 6-7 (12:50PM - 2:30PM) or 8-9 (3:00PM - 4:40PM)

ONLINE MEETINGS / CHATS (web sections): Monday evening 6:00-7:00 pm EST every week beginning (1/11/21).
The link to the zoom chat session is on the Home page of the canvas site or https://ufl.zoom.us/j/798733554
Chat session attendance is not mandatory but attendance or responses to questions posed in the recorded chat session are part of your participation grade and material covered will be on quizzes and exams. Please have your microphone and camera working and turned on for each session.

COURSE OBJECTIVES:

To provide students with the basic concepts of geographic information systems and applications focused on soil and water resource management. To familiarize the students with the ESRI ArcGIS Pro software and provide guided practice. Students who finish this class should be able to:

- Explain what a GIS is and what it can do
- Work with and create GIS maps in ArcGIS Pro
- Access and query a GIS database
- Describe two common GIS data structures/models
- Explain what geographic data is, how it is made, and where to get it
- Explain what spatial analysis is and solve geographic problems using ArcGIS analysis tools
- List common GIS tasks and identify which ArcGIS Desktop application is used for each task
- Understand what the geodatabase offers for GIS data storage
- Create, edit, and add data to a geodatabase
- Control the appearance and display of data layers in ArcGIS Pro
- Change the coordinate system and map projection used to display a dataset
- Query and analyze GIS data
- Create presentation-quality maps and graphs

COURSE COMMUNICATIONS: Email through the Canvas Course site is used for asynchronous communication. Please allow up to 48 hours if submitting a question on the weekend or holiday. Comments about your assignments are posted on the assignment submission page.

PREREQUISITES:

Basic knowledge in Computer file management, high-speed Internet access (e.g. DSL, cable modem, or satellite modem) and in geography, statistics, and soil science/land resources are expected.

DELIVERY MODE:

Course material is provided via **Canvas**: https://elearning.ufl.edu/
(Including annotated Power Point slides, reading material in pdf format, library of GIS video clips, quizzes, and hyperlinks)

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Virtual computer lab is used for GIS assignments:  https://vdi.ifas.ufl.edu
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The virtual computer lab provides 24/7 access to the ArcGIS Pro software package and spatial datasets that will be used for the assignments. Please logout after use to free that system for another user.
Note: You must logout from the virtual computer (not just close the window) to release your session and make the virtual lab available to other students.

SOFTWARE:

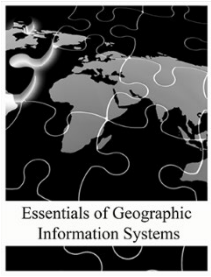
In this course the ArcGIS Pro Version 2.6 (Environmental Systems Research Institute, Redlands, CA) software is used including the components ArcCatalog, GIS Online and ArcEditor.
The following extensions will be used: Spatial Analyst and 3D Analyst.

Other supporting software packages available in the virtual computer lab include: MS Office Suite-MS Word, PowerPoint, Excel and Access.

REQUIRED TEXTBOOK:

Gorr W. and Kristen Kurland. 2021. GIS Tutorial for ArcGIS Pro 2.6. ESRI Press. Redlands, California. ISBN 978-1-58948-589-1
Required textbook comes with software and free trial license: A student may use the software on their own computers instead of the virtual lab. If this is your choice, no technical help for setup/debugging problems will be provided by the instructor.

RECOMMENDED READING:



Essentials of Geographic Information Systems (Open Textbook Library)

Campbell, Jonathan UCLA, MIchael Shin, UCLA. 2011. Saylor Foundation

ISBN 13: 9781453321966

https://saylordotorg.github.io/text_essentials-of-geographic-information-systems/

OTHER RESOURCES:

ESRI online forums and support
YouTube
Gis.stackexchange.com
Google Earth

GRADING

Assignments	**40%**
2 Exams	**20%**
Quizzes	**10%**
Project	**20%**
Course participation - discussions	**10%**
TOTAL	**100%**

Assignments are worth 10 to 50 points depending on difficulty. A grading rubric and additional instructions for submission will be provided with each assignment. Late assignments will be accepted for 3 days after the submission date and will lose 10% of the grade per day that they are late. After 3 days (including Saturdays and Sundays) the assignment will no longer be accepted, and the student will receive a zero for that assignment. Start your assignments early, technical difficulties seem to always occur the night before an assignment is due. Several of these assignments can take over 5 hours to complete. They are not hard, but **they are time consuming**.

Study the learning material provided on the course web site and textbooks. The participation grade is based on active participation in class activities, tutorial screen shot submissions and postings on the discussion board. All hands-on assignments, the exam, and the GIS project must be completed and stored within the virtual computer lab where output files are written to individual private student user folders (identified by their Gatorlink username). These files can be viewed by the instructor and TA and serve as proof that an assignment, exam, or project was conducted by a student enrolled in this course. The instructor and TA are available for questions as they arise.

Students are encouraged to ask questions about the assignments and learning materials in the General Discussion Board (under Discussions tab) to be shared and viewable to everybody in class. The instructor or TA will post answers to questions within 48 hours (another reason to start assignments early). You may contact the instructor through Canvas email, UFL email or by phone (M-F). A response can be expected within 24 hours during the week and 48 hours on the weekends.

GRADING SCALE:

A	90-100	C	70-76.99
B+	87-89.99	D+	67-69.99
B	80-86.99	D	60-64.99
C+	77-79.99	E	<60

COURSE MODULES:

Module 1: Intro to Geographic Information Systems (GIS)
Introduction: Course Mechanics. IFAS Virtual Lab.
Introduction to the basic components and structure of GIS. Geographic concepts, definitions and data formats will be introduced. Introduction to the ArcGIS Pro software. Examples of how a GIS can be used. Introduction to the fundamentals of basic map design (cartography)

Module 2: Data Models
Common spatial data models (vector, raster and TIN) and map basics. We will discuss the differences

between raster and vector formats and the advantages and disadvantages when using these different formats.

Module 3: Geodatabases and Attribute data
In this module you will learn about database management of spatial data, attribute tables and metadata. You will learn what a geodatabase is and the benefits of organizing your data into a geodatabase. Introduction to relational databases, table operations and queries.

Module 4: Map Projections
This module provides an overview of geographic coordinate systems and map projections. You will be introduced to basic geodesy, datums, coordinate systems, and map projections.

Module 5: Data Sources and Entry
Introduce the students to the many type of digital data that are available through government agencies and online. Practice downloading and manipulating digital data for project use. In this module you will be introduced to digitizing data for GIS systems.

Module 6: Basic Spatial Data Analysis
An overview of multiple vector-based and raster-based (local, focal, zonal and global) spatial operations will be provided. You will learn how to create new spatial datasets and how to edit existing spatial datasets. Examine some basic spatial analysis operations such as Clip, Intersect, and Union.

Module 7: Topics in Raster Analysis
This module will introduce map algebra and local functions which can be used in a GIS analysis. Look at some basics for raster data analysis. Understand map algebra, local, neighborhood and zonal functions.

Module 8: Remote Sensing and Digital Data
In this module you will be introduced to the different methods of collecting/digitizing data for GIS systems such as GNSS, GPS, aerial and satellite images. Examine aerial photographs and satellite scans and their uses in GIS. Understand what orthographic images are and how they are developed.

Module 9: Project
In this module you will work to develop a GIS project.

ACADEMIC HONESTY:

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment*."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student- conduct-honor-code.

CAMPUS HELP RESOURCES

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, **www.counseling.ufl.edu/cwc/**
Counseling Services, Groups and Workshops, Outreach and Consultation, Self-Help Library, Wellness Coaching

Career Resource Center, First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

Services for Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, **www.dso.ufl.edu/drc/**

SOFTWARE USE:

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.