GIS IN SOIL & WATER SCIENCE – Fall 2025

SWS 4720C - 3 credit hours

INSTRUCTOR	TEACHING ASSISTANT
Dr. Yang Lin **Asstant Professor** **G6163 McCarty Hall A** **352-294-3125**	**Samuel Aregbesola, graduate student** samuelaregbesola@ufl.edu **Saman Rabiei, graduate student** rabieisaman@ufl.edu
Office Hours: Tuesdays 12:30 to 1:30 pm or by appt.	

COURSE WEBSITE is through E-Learning via **Canvas**: http://elearning.ufl.edu/

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.

CLASS MEETINGS (on campus section): 3086 McCarty B – Tuesdays Periods 7-9 (1:55 pm-4:30 pm)

ONLINE MEETINGS/CHAT (web sections): **Tuesday evening 7:30-8:30 pm EST every week beginning August 25, 2025**. The zoom URL for all chat meetings is posted on the HOME page of the class website. Chat session is designed to serve online education students, while all are welcome to attend. Chat session attendance is strongly recommended because material covered will be on assignments, quizzes, and exams. Please have your microphone and camera working and turned on for each session. The chat will be online using Zoom on unless otherwise indicated on lecture schedule. Our chat sessions are audio visually recorded for students in the class to rewatch and for enrolled students who are unable to attend live.

**Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

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:

- Work in ArcGIS Pro to create presentation-quality GIS maps and graphs
- Access, query and analyze GIS data using a geodatabase
- 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
- Control the appearance and display of data layers in ArcGIS Pro
- Understand coordinate systems and correct map projections used to display a dataset

COURSE COMMUNICATIONS:

Message through the Canvas Course site is preferred for asynchronous communication. The instructor can also be reached via email or phone (M-F). Additionally, students can ask questions about the assignments and learning materials in the General Discussion Board (under the Discussions tab) to be shared and viewable to everybody in class. A response can be expected within 24 hours during the week and 48 hours during the weekends. Comments about your assignments are posted on the assignment submission page.

DELIVERY MODE:

Course material is provided via **Canvas**: https://elearning.ufl.edu/ Lectures of the class (power point presentations and pdf files), assignments, quizzes and handouts are posted on the class website on Canvas. Go to http://elearning.ufl.edu/ log on using your Gatorlink.

UF Apps will be used for ArcGIS Pro assignments: https://info.apps.ufl.edu

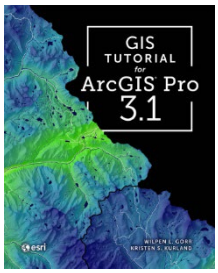
UF Apps provides 24/7 access to the ArcGIS Pro software and spatial datasets that will be used for the assignments and course project.

SOFTWARE:

In this course the ArcGIS Pro Version 3.3 (Environmental Systems Research Institute, Redlands, CA) software is used. The following extensions will be used: Spatial Analyst and 3D Analyst.

Other supporting software packages available in UF Apps include MS Office Suite-MS Word, PowerPoint, Excel and Access. Canvas can be accessed through UF Apps Chrome for easy submission of assignments.

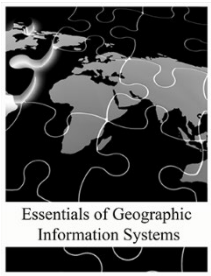
REQUIRED TEXTBOOK:



Wilpen L. Gorr and Kristen Kurland. 2023. GIS Tutorial for ArcGIS Pro 3.1. ESRI Press. Redlands, California. ISBN 9781589487390

The earlier version of the textbook (i.e., GIS Tutorial for ArcGIS Pro 2.8) is acceptable, though some of the textbook tutorials have changed drastically. All students at UF are allowed to install this software on their personal computers. Download link and instructions can be found at: https://www.geoplan.ufl.edu/software/arcgis-pro/. It is a VERY large program. Please contact the instructor for more information. 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	**30%**
2 Exams	**20%**
Quizzes	**10%**
Project	**20%**
Participation – readings and textbook tutorials	**20%**
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. You will have at least 1 week to complete an 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 tutorial screen shot/pdf submissions and assigned reading via Perusall. All hands-on assignments, book tutorials and the GIS project must be completed and stored within the UF Apps where output files are written to individual private student user folders (identified by your Gatorlink or identifiable username). These files can be viewed by the instructors 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.

Deadlines for assignments are carefully structured to support your learning journey by ensuring a consistent and manageable pace throughout the course. Meeting these deadlines allows you to engage with the material in alignment with the class schedule and to benefit fully from subsequent lessons. To provide flexibility, late submissions will be accepted until the final deadline of **December 10th**. Please note that delayed submissions may disrupt the intended learning progression and could negatively impact your ability to keep up with the course. To make the most of this course, **we strongly encourage you to submit your work on time whenever possible.**

Online student meetups with the instructor: To ensure a smooth learning experience, online students are required to schedule and participate in two one-on-one meetings with the instructor during the course: after Module 1 and after Module 4. The purpose of these meetings is to address technical challenges, such as issues with accessing UF Apps, ArcGIS Pro software, or other learning-related concerns. These sessions also provide an opportunity to discuss progress and clarify any questions. The meetups are an integral part of your participation grade. Scheduling details will be shared via Canvas announcements.

GRADING SCALE:

A	90-100	B+	87-89.99	B	80-86.99	C+	77-79.99
C	70-76.99	D+	67-69.99	D	60-66.99	E	<60

COURSE MODULES:

Module 1: Intro to Geographic Information Systems (GIS)
Introduction: Course Mechanics. UF Apps.

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 types 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. Overview of different methods of collecting/digitizing data for GIS systems such as GNSS, GPS, aerial and satellite images.

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. Understand map algebra, local, neighborhood and zonal functions and basic raster data analysis and watershed analysis.

Module 7: Project
In this module you will work to develop a GIS project.

ACADEMIC POLICIES:

- Requirements for class attendance and make-up exams, assignments, and other work in the course are consistent with university policies. See UF Academic Regulations and Policies for more information regarding the University Attendance Policies.
- Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. See the "Get Started With the DRC" webpage on the Disability Resource Center site. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.
- Information on current UF grading policies for assigning grade points. This may be achieved by including a link to the University grades and grading policies.
- Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

1. The email they receive from GatorEvals
2. Their Canvas course menu under GatorEvals
3. The central portal at https://my-ufl.bluera.com

Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

- The University's Honesty Policy regarding cheating, plagiarism, etc.:

  UF students are bound by The Honor Pledge which states "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. See the UF Conduct Code website for more information. If you have any questions or concerns, please consult with the instructor or TAs in this class.

- In-Class Recording: Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal education use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and deliver by an instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course.

  A class lecture does not include lab sessions, student presentations, clinical presentation such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session.

  Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless, of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

ACADEMIC RESOURCES:

- E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. Call 866-281-6309 or email ask@ufl.libanswers.com for more information.
- Academic Resources: 1317 Turlington Hall, Call 352-392-2010, or to make a private appointment: 352- 392-6420. Email contact: teaching-center@ufl.edu. General study skills and tutoring.
- Writing Studio: Daytime (9:30am-3:30pm): 2215 Turlington Hall, 352-846-1138 | Evening (5:00pm-7:00pm): 1545 W University Avenue (Library West, Rm. 339). Help brainstorming, formatting, and writing papers.

- Academic Complaints: Office of the Ombuds; Visit the Complaint Portal webpage for more information.
- Enrollment Management Complaints (Registrar, Financial Aid, Admissions): View the Student Complaint Procedure webpage for more information.
- UF Student Success Initiative: Visit https://studentsuccess.ufl.edu/ for resources that support your success as a UF student.

CAMPUS HEALTH AND WELLNESS RESOURCES:

- UF Whole Gator Resources: Visit https://one.uf.edu/whole-gator/discover for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

Tentative Schedule – Deadlines and Due Dates may be adjusted as the semester progresses. Refer to the Canvas website for final due dates. Readings and tutorial submissions are both parts of participation.

COURSE MATERIAL	Week	DUE DATE
Introduction		August 21-30
Syllabus **Quiz**	*1*	Friday, August 22
Perusall Introductory **Reading**	*1*	Friday, August 22
Setting up ESRI Account	*1*	Tuesday, August 26
Setting up UF Apps Student Folder	*1*	Tuesday, August 26
Module 1 - Principles of Geographic Information Systems	**Week**	August 25-September 6
View Module 1 Lectures	*1-2*	
Module 1 ***Reading***	*1*	Friday, August 29
GIS ***Tutorial*** *Workbook*	*2*	Friday, September 5
Assignment 1: *GIS Basics Completion*	*2*	Friday, September 5
Complete ***Quiz 1***	*2*	Friday, September 5
Module 2 – Data Models	**Week**	September 8-17
View Module 2 Lectures	*3-4*	
Module 2 ***Reading***	*3*	Friday, September 12
GIS ***Tutorial*** *Workbook*	*3*	Friday, September 12
Assignment 2: *Florida Wetlands*	*4*	Wednesday, September 17
Complete ***Quiz 2***	*4*	Wednesday, September 17
Module 3 - Geodatabases and Attribute data	**Week**	September 18-October 1
View Module 3 Lectures	*5-6*	
Module 3 ***Reading***	*5*	Wednesday, September 24
GIS ***Tutorial*** *Workbook*	*5*	Wednesday, September 24
Assignment 3: *Classifying rasters*	*6*	Wednesday, October 1
Complete ***Quiz 3***	*6*	Wednesday, October 1
Module 4 – Map Projections	**Week**	October 2-11
View Module 4 Lectures	*6-7*	
Module 4 ***Reading***	*7*	Friday, October 10
GIS ***Tutorial*** *Workbook*	*7*	Friday, October 10
Assignment 4	*7*	Friday, October 10
Complete ***Quiz 4***	*7*	Friday, October 10

COURSE MATERIAL	WEEK	DUE DATE
Test 1 – Due Saturday, October 18, online	**8**	
Module 5 - Data Sources and Entry	**Week**	October 20-November 1
View Module 5 Lectures	*9-10*	
Module 5 ***Reading***	*9*	Friday, October 24
GIS ***Tutorial*** *Workbook*	*9*	Friday, October 24
Assignment 5: *Digitizing Assignment*	*10*	Friday, October 31
Complete ***Quiz 5***	*10*	Friday, October 31
Module 6 - Basic Spatial Data Analysis	**Week**	November 3-15
View Module 6 Lectures	*11-12*	
Project Proposal Submission	*11*	Friday, November 7
Module 6 ***Reading***	*11*	Friday, November 7
GIS ***Tutorial*** *Workbook*	*11*	Friday, November 7
Assignment 6: *Watershed Analysis*	*12*	Friday, November 14
Complete ***Quiz 6***	*12*	Friday, November 14
Project	**Week**	
Project Proposal	*11*	Friday, November 7
Draft Project Upload for Peer Review	*13*	Friday, November 21
Final Project Report Due	*14*	Wednesday, December 3
Final Project Map Due	*14*	Wednesday, December 3
Test 2 – Due Wednesday December 10, online	**Exam Week**	