GIS IN SOIL & WATER SCIENCE – Fall 2022

SWS 4720C - Sections 8197, 133A, RE4C, 134C, 133F

3 credit hours

INSTRUCTOR	TEACHING ASSISTANT
Dr. Yang Lin **Asst. Professor** **G6163 McCarty Hall A** **352-294-3125**	**Yasmeen Saleem** **Graduate student**
Office Hours: Tuesdays 10 am – 12 pm or by appt.	**TBD**

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 7:00-8:30 pm EST every week beginning (8/30/22). The zoom URL for all chat meetings for Fall 2022 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 not mandatory but material covered will be on 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 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.

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 (apps.ufl.edu) will be used for ARCGIS Pro assignments: https://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 2.7 (Environmental Systems Research Institute, Redlands, CA) software is used. The following extensions will be used: Spatial Analyst and 3D Analyst.

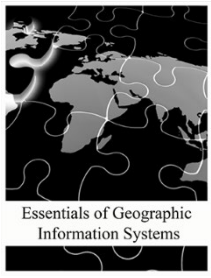
Other supporting software packages available in UF Apps include MS Office Suite-MS Word, PowerPoint, Excel and Access. Canvas can be accessed through UF Apps Chrome for easy submission of assignments.

REQUIRED TEXTBOOK:

Wilpen L. Gorr and Kristen Kurland. 2021. GIS Tutorial for ArcGIS Pro 2.6. ESRI Press. Redlands, California. ISBN 978-1-58948-589-1

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. The required textbook also comes with software and free trial license: https://www.esri.com/en-us/esri-press/browse/gis-tutorial-for-arcgis-pro-2-6. Please contact the instructor for more information. No technical help for setup/debugging problems will be provided by the instructors.

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. 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 active participation in class activities, tutorial screen shot/pdf submissions and postings on the discussion board. 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.

Students are encouraged to 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. 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 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	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.

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, Remote Sensing and Digital Data
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 and basic raster data analysis. Examine aerial photographs and satellite scans and their uses in GIS. Overview of different methods of collecting/digitizing data for GIS systems such as GNSS, GPS, aerial and satellite images.

Module 8: Project
In this module you will work to develop a GIS project.

ACADEMIC HONESTY:

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 several behaviors that are in violation of this code and the possible sanctions. Click here (https://sccr.dso.ufl.edu/process/student-conduct-code/) to read the Conduct Code. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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.

Tentative Schedule – Deadlines and Due Dates may be adjusted as the semester progresses. Refer to the Canvas website for final due dates.

COURSE MATERIAL	Week	DUE DATE
INTRODUCTORY Lecture and Syllabus Quiz		August 24-August 27
Syllabus FAQ Quiz (in Canvas)	*1*	Saturday, August 27
Setting Up ESRI Account	*1*	Saturday, August 27
Setting UF Apps Student Folder	*1*	Saturday, August 27
Module 1 - Principles of Geographic Information Systems	**Week**	August 24-September 3
View Module 1 Lectures	*1-2*	
Discussion *Module #1 – first response*	*2*	Tuesday, August 30
Discussion *Module #1 – 3 responses*	*2*	Wednesday, August 31
M1 - GIS Tutorial Workbook submission	*2*	Thursday, September 1
Assignment 1: *GIS Basics Completion*	*2*	Friday, September 2
Complete ***Quiz 1***	*2*	Friday, September 2
Module 2 – Data Models	**Week**	September 6-17
View Module 2 Lectures	*3-4*	
GIS Tutorial Workbook	*3*	Thursday, September 8
Assignment 2: *Florida Wetlands*	*4*	Thursday, September 15
Complete ***Quiz 2***	*4*	Friday, September 16
Module 3 - Geodatabases and Attribute data	**Week**	September 19-October 1
View Module 3 Lectures	*5-6*	
Discussion *Activity Module #3– first response*	*5*	Tuesday, September 20
Discussion *Activity Module #3– 3 responses*	*5*	Wednesday, September 21
GIS Tutorial Workbook	*5*	Thursday, September 22
Assignment 3: *Classifying rasters*	*6*	Thursday, September 29
Complete ***Quiz 3***	*6*	Friday, September 30
Module 4 – Map Projections	**Week**	October 3-15
View Module 4 Lectures:	*7-8*	
GIS Tutorial Workbook	*7*	Wednesday, October 5
Assignment 4-1	*7*	Thursday, October 6
Assignment 4-2	*8*	Thursday, October 13
Complete ***Quiz 4***	*8*	Friday, October 14

COURSE MATERIAL	WEEK	DUE DATE
Test 1 – Due Saturday, October 15	**8**	
Module 5 - Data Sources and Entry	**Week**	October 17-October 29
View Module 5 Lectures:	*9-10*	
Discussion *Activity Module #5– first response*	*9*	Tuesday, October 18
Discussion *Activity Module #5– 3 responses*	*9*	Wednesday, October 19
GIS Tutorial Workbook	*9*	Thursday, October 20
Assignment 5: *Digitizing Assignment*	*10*	Thursday, October 27
Complete ***Quiz 5***	*10*	Friday, October 28
Module 6 - Basic Spatial Data Analysis	**Week**	October 31-November 12
View Module 6 Lectures:	*11-12*	
GIS Tutorial Workbook	*11*	Thursday, November 3
Project Proposal Submission	*11*	Friday, November 4
Assignment 6: *Spatial Analysis*	*12*	Thursday, November 10
Complete ***Quiz 6***	*12*	Friday, November 11
Module 7 - Raster Analysis, Remote Sensing & Digital Data	**Week**	November 14- November 30
View Module 7 Lectures:	*13-14*	
Discussion *Activity Module #7 – first response*	*13*	Tuesday, November 15
Discussion *Activity Module #7 – 3 responses*	*13*	Wednesday, November 16
Project Progress Assignment	*13*	Wednesday, November 16
GIS Tutorial Workbook	*13*	Thursday, November 17
Assignment 7: *Raster Analysis*	*14*	Tuesday, November 29
Complete ***Quiz 7***	*14*	Wednesday, November 30
Project	**Week**	
Project Proposal	*11*	Friday, November 4
Project Progress Assignment	*13*	Wednesday, November 16
Draft Project Upload for Peer Review	*14*	Wednesday, November 30
Final Project Report Due	*15*	Wednesday, December 7
Final Project Map Due	*15*	Wednesday, December 7
Test 2 – Due Wednesday December 14	**Exam Week**	

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. Students are expected

to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/ . Summaries of course evaluation results are available to students at: https://gatorevals.aa.ufl.edu/public-results/.

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.

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, https://disability.ufl.edu/

Campus Helping Resources: Students experiencing crises or personal problems that interfere with their general wellbeing 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/**
    - Counseling Services
    - Groups and Workshops
    - Outreach and Consultation
    - Self-Help Library
    - Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Connections Center, First Floor JWRU, 392-1601, https://career.ufl.edu/.
- Student Success Initiative, http://studentsuccess.ufl.edu.
- Student Complaints, Residential Course: https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/