

## **GIS IN LAND RESOURCE MANAGEMENT SWS 5721C**

**[GIS: Geographic Information System]**

**INSTRUCTOR:**

Dr. Sabine Grunwald, Professor, Soil, Water and Ecosystem Sciences Department, University of Florida, Rm. 2171 McCarty Hall, PO Box 110290, Gainesville, FL 32611-0290.

**CONTACT:**

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**TIMES:** Fall, even and odd years

**CREDIT HOURS:** 3

**ENROLLMENT CAP:** 20

**FORMAT:** On-campus and online (distance education) sections

**On-campus section:** Classroom discussion Tue 2<sup>nd</sup> period (8:30 to 9:20 am EST)

**Both on-campus and distance education section:** GIS labs Wed 4<sup>th</sup> period (10:40 am to 11:30 am EST) and 5<sup>th</sup> period (11:45 am to 12:35 pm EST)

**Online section:** Zoom chats Tue (6:00 to 7:00 pm EST)

**Virtual Office Hours:** Tue 9:30 to 10:30 am EST or by appointment

**DELIVERY MODE:**

- Course material is provided at UF eLearning: <http://elearning.ufl.edu> (Canvas) (incl. lecture video recordings, reading assignments, GIS online teaching materials, and GIS resources)
- Email and the discussion board are used for asynchronous communication
- Zoom is used for chats (synchronous communication) for students enrolled in the online section
- Packback.AI is used for posts and discussion
- The ArcGIS Pro and ArcGIS Online software will be used which is accessible through the UF GeoPlan Center, UF Apps or the CALS Virtual Computer Lab.

**PREREQUISITES:**

Basic knowledge in Windows operating system, spatial thinking (geography), and soil science or natural resource management, or similar discipline.

**COURSE OBJECTIVES:**

To provide students with the basic concepts of, and experience in using, the ArcGIS geographic information system (GIS) and geospatial methods as applied to land resource management issues.

In this course you will gain ample hands-on experience in using ArcGIS and geospatial analysis using real-world spatial data. Learning about GIS is fun and a creative process. Discovery learning through work

with geospatial data and applications is a focal point in this course. Practical training through GIS practice assignments, a GIS project, and knowledge in GIS science form important learning elements in this course. After course completion, you will be able to independently conduct your own GIS projects and find solutions to basic geospatial problems.

**OTHER INFORMATION:**

The course counts towards the ICGIS certificate (<https://icgis.uflib.ufl.edu/>).

**SOFTWARE:**

In this course the ArcGIS Pro and Online software (Environmental Systems Research Institute, Redlands, CA) are used.

**REQUIRED TEXTBOOK:**

Law M. and Collins A. (2021 edition). Getting to Know ArcGIS Pro. ESRI Press.

Bolstad P. (2019). GIS Fundamentals. Eider Press, White Bear Lake, Minnesota. Also available as ebook: <http://www.paulbolstad.net/gisbook.html>.

**GRADING:**

GIS practice assignment: 25%

GIS test: 15%

GIS project: 30%

Posts (spatial reasoning): 30%

**GRADING SCHEME:**

Passing Letter Grade	Course Points	Grade Points
A	95-100	4.0
A-	90-95	3.67
B+	90-85	3.33
B	85-80	3.0
B-	80-75	2.67
C+	75-70	2.33
C	70-65	2.0
C-	65-60	1.67
D+	60-55	1.33
D	55-50	1.0
D-	50-45	0.67
S	45-below	0

Failing Grades	Course Points	Grade Points
E	0	0
WF	0	0
I	0	0
NG	0	0

### Definitions

**E** = Failure

**H** = Deferred grade assigned only in approved sequential courses or flexible learning

**I\*** / **I** = Incomplete

**N\*** / **NG** = No grade reported

**S** = Satisfactory

**U** = Unsatisfactory

**W** = Withdrew

**WF** = Withdrew failing

The grading policy of UF will be followed in this course as outlined at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx#repeat>

### **EXPECTATIONS AND GRADING POLICY IN THIS COURSE:**

It is highly recommended that on-campus students attend the classroom (face-to-face class sessions) and online students attend the live chats (Zoom). The etiquette in the classroom and in the Zoom meetings involves to switch off digital devices and reduce other noises (TV, music, etc.) that may interrupt class activities. Be mindful to participate in dialogue, Q&A, and focus attention on the course topics during class time.

All students enrolled in this course are expected to study the learning material provided on the course web site, videos, and textbooks. Attendance means to login/come to class punctual when the class starts and stay until the end of the scheduled class time.

The Packback.AI platform will be used for online discussion about class topics. Packback Questions is an online community where you can be fearlessly curious and discuss open-ended questions to build on top of what we are covering in class and relate topics to real-world applications. The Packback Questions will focus on inquiries into geospatial topics that will be critically discussed. The posts focus on demonstrating your spatial reasoning skills.

The discussion board on the course web site will be available for questions that arise during GIS practice on assignments and your GIS project.

The GIS practice assignments and the GIS project shall be conducted using ArcGIS Pro software. Student course folders in UF Apps are private and coupled to Gatorlink accounts. Other access to the ArcGIS Pro software are available.

Students are expected to work independently on their hands-on GIS assignments and GIS project and produce their own reports. Copying of results or text (reports) from other students or the Internet is considered plagiarism and results in zero points. In this course the Turnitin anti-plagiarism software is used.

Use of artificial intelligence (AI) tools, such as ChatGPT or Bard, Large Language Models (LLMs): There is an open policy to make use of AI models for assignments focused on writing. If you make use of them provide a citation and acknowledgement to the AI tool/chat bot you used to write a post or paragraph in a report (i.e., make it transparent that it was not you who produced the text but a machine). Note that the quality of AI-LLM differs widely and issues persist (e.g., hallucinations / false claims made by AI LLMs, mismatched citations and arguments, lack in transparency where the data or information come from (i.e., insufficient or improper sources), missing or incorrect citations, etc.).

In this course, any assignment that involves written text adheres to the ethical and scientific standards of academic writing. Arguments, assertions, facts, interpretations, and data are expected to be properly referenced with citations and references that allows tracking them down to an original source (creator, author, publisher). Reliable sources (e.g., journal articles with DOI numbers, textbooks, and other peer-reviewed scientific publications) are preferred over soft literature (e.g., web sites that can change any moment). Geospatial data also need to be referenced with proper citations and entry into the reference list.

The IT staff of the University of Florida provides services to assist with technical problems (e.g., GIS software and UF apps). The instructor does not have administrative permissions to fix IT problems. Act swiftly to contact UF IT staff (UF Helpdesk: 352-392-HELP or [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu)) if technical problems arise to allow sufficient time for submission of assignment reports and posts.

Late submissions of GIS assignment or project reports will result in 15% reduction of points within 24 hours late submission, and 30% reduction of points between 24-48 hours late submission. After more than 48 hours late submission zero points will be assigned. All reports need to be submitted through the course website (UF eLearning). Submissions via email attachments will not be accepted. In case of a medical emergency or extraordinary circumstances contact the course instructor ASAP to avoid loss of points.

## **COURSE MODULES AND LEARNING OBJECTIVES:**

### Module 1: Principles of Geographic Information Systems

Explore the basic elements of spatial data and how they are implemented in a GIS. Geographic concepts are introduced that provide the framework for GIS analysis.

### Module 2: Geodesy, Datums, Projections and Coordinate Systems

Gain understanding why projections and coordinate systems are important in spatial modeling. Examine various coordinate systems and map projections to display and represent spatial datasets.

### Module 3: Maps, Data Entry, Editing, and Output Building in a GIS Database

Discover how spatial data are created through digitizing and how geospatial data are entered into databases. Examine how spatial data are documented by meta data and output maps are cartographically presented.

### Module 4: Spatial Data

Discover what kind of spatial datasets are available at local, regional, continental, and global scale for use in ArcGIS. Explore soil and land resource specific geospatial datasets.

### Module 5: Attribute Data and Tables

Gain knowledge about relational databases and how to work with spatial data tables. Explore soil databases that use the relational database concept.

### Module 6: Spatial Data Analysis

Explore various vector-based processing functions to conduct GIS analysis.

### Module 7: Raster Analysis

Explore various raster-based processing functions to conduct GIS analysis.

### Module 8: Spatial Estimation

Estimate site-specific measurements across a region through various interpolation methods. Understand the distinctions between global, local and geostatistical methods to interpolate spatially explicit data.

### Module 9: Spatial Models and Modeling

Discover the potential of complex spatial models with ArcGIS that integrate multiple spatial datasets, use sequential geoprocessing functions (e.g., suitability analysis), spatio-temporal models, or couple spatial models to machine learning (AI) approaches.

### Module 10: Geospatial Data Standards and Data Quality

Explore various geospatial data standards, learn how to assess spatial data accuracy, and what kind of errors may occur in spatial modeling.

## **ATTENDANCE AND MAKE-UP WORK**

### **Absences**

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Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first class meeting.

In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved.

You cannot participate in classes unless you are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

If you do not participate in at least one of the first two class meetings of a course or laboratory in which you are registered, and you have not contacted the department to indicate your intent, you can be dropped from the course. You must not assume that you will be dropped, however. The department will notify you if you have been dropped from a course or laboratory. You can request reinstatement on a space-available basis if you present documented evidence.

The university recognizes the right of the individual professor to make attendance mandatory. After due warning, professors can prohibit further attendance and subsequently assign a failing grade for excessive absences.

### **Religious Holidays**

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The Florida Board of Education and state law govern university policy regarding observance of religious holidays. The following guidelines apply:

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.

- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that he or she has been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

### **Illness Policy**

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If you are absent from classes or examinations because of illness you should contact your instructors. You should contact your college by the deadline to drop a course for medical reasons. You can petition the Dean of Students Office to drop a course for medical reasons. The university's policy regarding medical excuse from classes is maintained by the Student Health Care Center.

### **Twelve-Day Rule**

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Students who participate in athletic or extracurricular activities are permitted to be absent 12 scholastic days per semester without penalty. (A scholastic day is any day on which regular class work is scheduled.) Instructors must be flexible when scheduling exams or other class assignments.

The 12-day rule applies to individual students participating on athletic or scholastic teams.

Consequently, a group's schedule that requires absence of more than 12 days should be adjusted so that no student is absent from campus more than 12 scholastic days.

If you previously have been warned about absences or unsatisfactory work you should not incur additional absences, even if you have not been absent 12 scholastic days. It is your responsibility to maintain satisfactory academic performance and attendance.

### **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>.

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/>."

### **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 a number of behaviors that are in violation of this code and the possible sanctions. Use this link

<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. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>. The updated (2018) UF Student Honor and Student Code of Conduct can be found at: <http://gatortimes.ufl.edu/2018/08/20/updated-uf-student-honor-and-student-code-of-conduct/>.

#### **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, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

#### **CAMPUS HELPING 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.

#### **Health and Wellness:**

U Matter, We Care: If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

### **Academic Resources:**

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto: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.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring. Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.

On-Line Students Complaints: View the Distance Learning Student Complaint Process.

### **IN-CLASS RECORDINGS:**

Our class sessions may be audio visually recorded for students in the class to refer back 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. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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 educational 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 delivered by any 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 presentations 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 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.