GRG 460G

Fall 2024

Course Information

Instructional Mode: Face-to-face
Meeting Times: Tue/Thu 02:00 PM - 03:30 PM; Mon 09:00 AM - 11:00 AM
Meeting Location: RLP 0.128; RLP 1.404
Unique Number: 36360

Instructor

Yuhao Kang
Email: yuhao.kang@austin.utexas.edu

Office Hours and Location

Instructor Office Location: RLP 3.422

Instructor Office Hours: T/Th 3:30-4:30 pm or by appt.

Teaching Assistants

Haoyu Wang (Andrew), hywong@utexas.edu

Office Location: RLP 3.420

Office hours: F 9:00-11:00 am or by appt.

Pedro Vasconcelos, pedrovasconcelos@utexas.edu

Office: RLP 3.400A Cubicle #10

Office hours: M/W 3:00-4:00 pm or by appt.

Catalog Description

An introduction to the creation and use of geographic information systems.

Overview of the Class

This course is designed to provide students with a solid foundation in the concepts, technology, and methods of GIS and related technologies, including global positioning systems (GPS), cartography, remote sensing, and spatial analysis. Through a series of lectures, hands-on labs, and project-based assignments, students will learn to collect, manage, analyze, and visualize spatial data effectively. The laboratory component introduces students to commonly used GIS software, equipping them with the skills to address real-world geographical challenges. Students will also explore critical issues related to data integrity, legal, privacy, and ethical aspects of GIS use. Upon completion, students will be well-prepared to apply their knowledge and skills in various fields, understanding not only how to operate GIS software but the scientific principles behind the software.

Pre-Requisites for the Course

Prerequisite: Upper-division standing.

Learning Outcomes

At the conclusion of this course, students will be able to:

- Understand the basic concepts and principles of GIS.
- Collect, map, and analyze geographic data to better understand the dynamics of our physical and social world.
- Think spatially and develop problem-solving skills with a critical understanding of the geographic context for addressing and solving geographical challenges.

- Demonstrate proficiency in using GIS software and basic scientific computing skills to reason and communicate geographic information effectively.
- Understand the scope, significant themes, and current challenges within GIScience.
- Recognize the legal, privacy, and ethical considerations associated with the use and distribution of geospatial data.

Flag Courses

This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

Grading Policy

Grading policy

Labs	40%	10 labs, 4% each
Exams	20%	2 exams, 10% each
Attendance and Participation	10%	11 attendance checks [lowest grade dropped], 1% each, up to 5% extra points
Post-class quizzes	10%	10 quizzes, 1% each
Final Group Project	20%	

Grade Breaks

Grade	Cutoff
A	94%
A-	90%
B+	87%
B	84%
B-	80%
C+	77%
C	74%
C-	70%
D+	67%
D	64%
D-	60%
F	<60%

Overview of all Major Course Requirements and Assignments

Labs There are 10 laboratory assignments in the course. Each laboratory assignment is designed to allow students to apply the geospatial technologies covered in both the lectures and the respective lab sessions. These lab tasks offer an opportunity for students to consolidate their understanding and engage in hands-on practice. The submission deadline for labs is typically one week after the assignment, with a 10% penalty per day for late submissions. While collaborative discussions among students regarding lecture materials and lab tasks are encouraged, copying answers is not permitted and will be reported.

Exams There will be two exams covering the materials in the course. The exams will cover concepts from the lectures, labs, and readings and will include a combination of multiple choice, matching, fill-in-the-blank, short answer, and/or essay questions. The mid-term exam is scheduled for October 10, 2024, and the final exam is scheduled for November 21, 2024. Notes sheets with typed notes or handwritten notes on both sides of the paper are not allowed and may result in a 0 on the exam.

Class attendance and participation Attendance and participation are mandatory and collectively account for 10% of your final grade, with an opportunity to earn up to an additional 5% in extra credit points. There will be 11 in-class quizzes at the end of several lectures throughout the semester which will serve as attendance checks. To accommodate occasional absences, the lowest quiz grade will be dropped. If in an emergency you need to miss a class, please notify Prof. Kang and the TAs via Canvas with a brief explanation before the start of the class period. Attendance is mandatory but we understand that life happens.

During class, the Instructor will occasionally ask questions. Providing a thoughtful and insightful answer that enhances our discussion may earn you an additional 1% extra credit point. Alternatively, the Instructor may call on students at random. If a student is not present when called upon, they will lose 1 point. Throughout the semester, students can accumulate up to 5%

extra participation points. Please note that while efforts are made to be objective, this aspect of grading may involve some subjectivity.

Post-class Quizzes You will have ten take-home quizzes. Each quiz contains 5-10 questions. They will be purely objective (i.e., multiple choice, true/false, or text entry) and will be covering material discussed in the classes.

Final Group Project You will have a final group project that applies the geographic knowledge and GIS skills learned from this class to address a geographic challenge. Each group consists of 2-3 team members. A project proposal (2% of final grade) will be submitted in Week 10. The proposal contains a research question, dataset, and methods you tend to use. The final project is graded based on two components: presentation (5%) and paper (13%). The remaining classes after Thanksgiving will be used to work on your project (see course schedule below). Each group will present present their projects in the last week of class. The final project paper is due **December 8, 2024**. A rubric and more details on the Final Group Project will be posted on Canvas. Only one paper will be submitted per group of students, but all students should contribute to the paper.

Canvas Assignments

Due Date	Assignment Name	Points
10/10	Mid-term Exam	100
11/21	Final Exam	100
11/7	In-class Quiz 9	2
11/24	GIS Day	2
10/31	Final Project Proposal	2
10/27	Quiz 6	13
11/5	In-class Quiz 8	2
10/31	In-class Quiz 7	2
10/6	Quiz 5	5
10/1	In-class Quiz 4	2
9/29	Quiz 4	8

Due Date	Assignment Name	Points
9/24	In-class Quiz 3	2
11/24	Extra Pts - Attendance and Activities	5
9/8	Quiz 1	10
9/15	Quiz 2	10
11/10	Quiz 8	8
9/10	In-class Quiz 2	2
12/8	Final Project	13
10/3	In-class Quiz 5	2
11/3	Quiz 7	8
	Final Project Team	0
	Final Project Presentation	5
11/12	In-class Quiz 10	2
11/22	Ransom Center exhibition report	10
10/24	In-class Quiz 6	2
11/17	Quiz 9	5
9/22	Quiz 3	10
9/5	In-class Quiz 1	2

Required Course Materials

GIS Fundamentals: A First Textbook on Geographic Information Systems, 7th Ed.
Authors: Paul Bolstad, Steven Manson

Recommended Course Materials

Price, M., 2023. *Mastering in ArcGIS Pro*, 2nd Ed.

Final Exam Date and Time

The final exam will be held on Nov. 21, 2024

Notice of Academic Accommodations from Disability and Access (D&A)

The university is committed to creating an accessible learning environment consistent with university policy and federal and state law. Please let your instructors know if you experience any barriers to learning so they can work with you to ensure you have equal opportunity to participate fully in your courses.
If you are a student with a disability, or think you may have a disability, and need accommodations please contact Disability & Access (D&A).
Please refer to the D&A website. for more information. If you are already registered with D&A, please deliver your Accommodation Letter to your instructors as early as possible in the semester so you can discuss together your approved accommodations and needs in your courses.

University Policies and Resources for Students Canvas Page

This Canvas page is a supplement to all UT syllabi and contains University policies and resources that you can refer to as you engage with and navigate your courses and the university.

How Will You Learn?

Teaching Modality Information

This course is primarily conducted in person, requiring attendance at scheduled class times as published in the Course Schedule. All lectures and laboratory sessions will take place in designated classrooms and labs. Students are expected to be present physically for each class to participate in interactive discussions, group learning projects, and hands-on activities. Please

note that this course does not offer remote participation options, and attendance is mandatory for successful completion.

Communication

The course Canvas site can be found at utexas.instructure.com. Please email me through Canvas. You are responsible for ensuring that the primary email address you have recorded with the university is the one you will check for course communications because that is the email address that Canvas uses.

Asking for help

If you have questions or need assistance with course materials, please ensure you direct your inquiries to the appropriate person for timely and effective support. For lecture-related questions, contact the Instructor directly either by email or during office hours. For lab-related inquiries, please reach out to one of the two designated Teaching Assistants (TAs). We strongly encourage you to make use of office hours to discuss course content, seek clarification on assignments, and engage in further discussions about GIS topics.

Artificial Intelligence

The creation of artificial intelligence tools for widespread use is an exciting innovation. These tools have both appropriate and inappropriate uses in classwork. The use of artificial intelligence tools (such as ChatGPT) in this class is permitted for students who wish to use them, **provided the content generated by AI is properly cited and acknowledged.**

Late Work and Making up Missed Work

Students are expected to complete all assignments by the due dates. However, if you anticipate or encounter situations such as serious illness, family emergencies, or other valid reasons that prevent you from submitting on time, please notify Prof. Kang and the TAs via Canvas for extensions. Late work will be accepted with a penalty. Assignments submitted late will incur a grade reduction of 10% per day past the due date.

Sharing of Course Materials is Prohibited

No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class without my explicit, my written permission. Unauthorized sharing of materials may facilitate cheating. The University is aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in initiation of the student conduct process and include charge(s) for academic misconduct, potentially resulting in sanctions, including a grade impact.

Course Outline

This is a tentative schedule and may change based on progress.

Week	Date	Day	Lecture	Lab	Readin
1	27-Aug 29-Aug	T TR	Introduction	No Labs	Chap.
2	3-Sep 5-Sep	T TR	Data Models	Lab 1: Introduction to ArcGIS Pro	Chap.
3	10-Sep 12-Sep	T TR	Geodesy Map Projection	Lab 2: Projecting GIS Data	Chap.
4	17-Sep 19-Sep	T TR	Map Distortions Digitizing	Lab 3: Digitalization	Chap.
5	24-Sep 26-Sep	T TR	Maps Visual Communications	Lab 4: Managing Vector Data	Chap. Chap.
6	1-Oct 3-Oct	T TR	Remote Sensing Remote Sensing II	Lab 5: Managing Raster Data	Chap. Chap.
7	8-Oct 10-Oct	T TR	Digital Data Mid-term Exam	Q&A of the Mid-term Exam	Chap.
8	15-Oct 17-Oct	T TR	Tables Raster Analysis	Lab 6: Tables and Selection	Chap. Chap.
9	22-Oct 24-Oct	T TR	Guest lecture Raster Analysis II	Lab 7: Raster Analysis	Chap.
10	29-Oct 31-Oct	T TR	Spatial Analysis	Exhibition Visit	Chap.
11	5-Nov 7-Nov	T TR	Terrain Analysis Carees in GIS	Lab 8*: Spatial Analysis	Chap.
12	12-Nov 14-Nov	T TR	Spatial Estimation I Exhibition Visit	Lab 9 & 10: Terrain Analysis & Interpolation	Chap. Chap.
13	19-Nov 21-Nov	T TR	Spatial Estimation II Final Exam	Q&A of the Final Exam	
14	26-Nov 28-Nov	T TR		Fall Break	
15	3-Dec	T	Project Presentations		

5-Dec	TR		Project Presentations**

* Final project proposal due: Oct. 31, 2024

** Final project due: Dec. 8, 2024