

## GRG 410C – Spatial Data and Analysis

UNIQUE NUMBER: 36785

Spring 2022

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**Lectures:** Tuesdays and Thursdays 12:30-2pm, SZB 2.418

**Lab:** Thursdays 2-3:30pm, RLP 1.404

**Instructor:** Sara Eshleman

**Pronouns:** she/her

**Email:** eshlemansa@utexas.edu

**Office Hours:** Tuesdays 2-4pm in RLP 3.422  
and on Zoom or by appointment

**Lab Instructor:** Pedro Vasconcelos

**Pronouns:** he/him

**Email:** pedrovasconcelos@utexas.edu

**Office Hours:** Friday 11am-1pm on Zoom  
or by appointment

## Course Description

### University Catalog Course Description

Fundamental concepts in spatial data acquisition, analysis, and presentation, with an emphasis on the needs of professionals in cartography, geographic information systems (GIS), and remote sensing.

### What will I learn?

Through this course, you will gain knowledge and skills in the basic techniques used in geographical/spatial analysis, demonstrated through reading, lectures, and lab activities. These techniques include spatial data formats and handling, sampling methods, and the basic statistical techniques that are used in spatial data analysis. Lectures will cover major topics and introduce techniques and labs will engage you in applying geographic methodologies, hands-on computations, and discussions of results.

### Learning Outcomes

1. Develop quantitative skills required for interpretation and analysis of spatial data.
2. Think critically about issues associated with spatial data and analysis.
3. Understand the basic principles and concepts within quantitative geography fields.

### Pre-requisites for the course

There are no pre-requisites for this course.

## Course Requirements

### Required Materials

- 1) An Introduction to Statistical Problem Solving in Geography  
J.C. McGrew, A.J. Lembo, and C.B. Monroe, ISBN: 9781478611196, 2014, 3rd ed., Waveland Press, USA.
- 2) Workbook for Statistical Problem Solving in Geography  
A.J. Lembo. ISBN 9781502982292, 2014
- 3) Applied Regression: An Introduction  
Colin Lewis-Beck and Michael S. Lewis-Beck, ISBN: 9781483381473, 2016, 2nd Ed., SAGE Publications Inc.

## Required Devices

Hardware: Computer with zoom capabilities  
Software: Microsoft Excel, Zoom

## Assessments

### 1. Exams

Two exams in the middle and end of the semester that will assess your knowledge of concepts from that part of the course. (50% of grade)

### 2. Labs

Weekly labs (12 in total) that will engage you with hands-on activities to further your comprehension of spatial data and the analysis of those data. These will be introduced and started during the Thursday lab time and are due the following Wednesday at midnight unless otherwise noted. (30% of grade)

### 3. Weekly Review Quizzes

Weekly quizzes (14 in total) that function as a review of important topics from the previous week's lectures, as well as the book chapter you read for that week. These are "open book" and "open note." The two lowest quiz grades will be excluded from your final grade. (12% of grade)

### 4. Attendance and Participation

You are expected to attend both weekly lectures and lab. I recognize that unexpected events come up, so to partially account for this, perfect attendance will be counted as 25 of the 28 lectures. Due to the nature of labs, all 12 labs will be counted towards your attendance grade. (8% of grade)

## Grading for this Course

The following table represents how you will demonstrate your learning and how we will assess the degree to which you have done so.

Assignments	Percent of Total Grade
1. Exams (2 exams   25% each)	50%
2. Labs (10 labs   3% each)	30%
3. Review Quizzes (10 of 12 quizzes   1.2% each)	12%
4. Lecture Attendance (22 of 25 lectures)	5%
5. Lab Attendance (11 labs)	3%

Grade	Cutoff
A	>94%
A-	90-93.9%
B+	87-89.9%
B	84-86.9%
B-	80-83.9%
C+	77-79.9%
C	74-76.9%
C-	70-73.9%
D	65-69.9%
F	<65%

## Course Outline

All instructions, assignments, readings, rubrics and essential information will be on the Canvas website at <https://utexas.instructure.com>. Check this site regularly and use it to ask questions about the course schedule.

Unit	Week	Date	Lecture	Class Topic	Due Before Class	
Introduction to Spatial Data	1	18-Jan	1	Introduction	Review Syllabus	
		20-Jan	2	Spatial data I: Remote Sensing Lab 1		
	2	25-Jan	3	Spatial data II: Projections and Coordinates	Ch. 1 McGrew Review Quiz 1	
		27-Jan	4	The Scientific Method Lab 2	Lab 1	
	3	1-Feb	5	Data characteristics	Ch. 2 McGrew Review Quiz 2	
		3-Feb		** Lecture & lab cancelled due to winter weather **	Lab 2	
	Descriptive Statistics	4	8-Feb	6	Cartography	Chs. 3 & 4 McGrew Review Quiz 3
			10-Feb	7	Measures of central tendency and dispersion Lab 3	
	Probability and Sampling	5	15-Feb	8	Measures of shape and relative position; Spatial data considerations	Ch. 5 McGrew Review Quiz 4
17-Feb			9	Probability I Lab 4	Lab 3	
6		22-Feb	10	Probability II	Ch. 6 McGrew Review Quiz 5	
		24-Feb	11	Probability III Lab 5	Lab 4	
7		1-Mar	12	Sampling I	Chs. 7 & 8 McGrew Review Quiz 6	
		3-Mar	13	Sampling II Lab 5 (cont.)	Lab 5	
Exam 1		8	8-Mar	14	Exam Review	
	10-Mar			<b>Exam 1</b>		
Spring Break						

Unit	Week	Date	Lecture	Class Topic	Due Before Class	
Inferential Spatial Statistics	9	22-Mar	15	Non-spatial Inferential Statistics	Chs. 9 & 13 McGrew Review Quiz 7	
		24-Mar	16	Inferential Spatial Statistics Lab 6		
	10	29-Mar	17	Point Pattern Analysis I	Ch. 14 McGrew Review Quiz 8	
		31-Mar	18	Point Pattern Analysis II Lab 7	Lab 6	
	11	5-Apr	19	Join Count Analysis	Ch. 15 McGrew Review Quiz 9	
		7-Apr	20	Spatial Autocorrelation I Lab 8	Lab 7	
	Correlation & Regression	12	12-Apr	21	Spatial Autocorrelation II	Ch. 16 McGrew Review Quiz 10
			14-Apr	22	Correlation I Lab 9	Lab 8
		13	19-Apr	23	Correlation II	Ch. 17 McGrew; Ch. 1 Lewis-Beck Review Quiz 11
			21-Apr	24	Simple Linear Regression I Lab 10	Lab 9
14		26-Apr	25	Simple Linear Regression II	Ch. 2 Lewis-Beck Review Quiz 12	
		28-Apr	26	Applications of spatial statistics	Lab 10	
Exam 2	15	3-May	27	Review		
		5-May		<b>Exam 2</b>		
No Final Exam						

**Changes** to the schedule may be made at my discretion and if circumstances require. It is your responsibility to note these changes when announced (although I will do my best to ensure that you receive the changes with as much advanced notice as possible).

# Policies

## Classroom Statements and Policies

### Land Acknowledgment

I would like to acknowledge that we are meeting on the Indigenous lands of Turtle Island, the ancestral name for what is now called North America. Moreover, I would like to acknowledge the Alabama-Coushatta, Caddo, Carrizo &/Comecrudo, Coahuiltecan, Comanche, Kickapoo, Lipan Apache, Tonkawa and Ysleta Del Sur Pueblo, and all the American Indian and Indigenous Peoples and communities who have been or have become a part of these lands and territories in Texas.

### Statement on Learning Success

Your success in this class is important to me. We will all need to be adaptable because we all learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course. I also encourage you to reach out to the student resources available through UT. Many are listed on this syllabus, but I am happy to connect you with a person or Center if you would like.

### Statement on Flexibility

In acknowledgement of COVID 19 and its impact on the University of Texas at Austin community, this course will reaffirm one of the core values here at UT Austin: responsibility. Our responsibility to ourselves and each other is to put our humanity in the forefront of our academic pursuits. With that being said, this semester I commit to being adaptable in this time of great need, which is reflected in the course policies below around attendance, grading, and assignments/exams.

If you experience any hardships such as illness, accident, family crisis please know that these policies may be amended and therefore you should communicate with me as soon as you feel comfortable doing so. If for any reason you do not feel comfortable discussing with me, please visit [Student Emergency Services](#). For additional campus resources, please visit [protect.utexas.edu](http://protect.utexas.edu).

### Personal Pronouns

Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name, unless they have added a "preferred name" with the Gender and Sexuality Center, which you can do so here: <http://diversity.utexas.edu/genderandsexuality/publications-and-resources/>. I will gladly honor your request to address you by a name that is different from what appears on the official roster, and by the gender pronouns you use (she/he/they/ze, etc). Please advise me of any changes early in the semester so that I may make appropriate updates to my records. For instructions on how to add your pronouns to Canvas, visit <https://utexas.instructure.com/courses/633028/pages/profile-pronouns>.

### Late work

Late lab assignments and review quizzes will lose 10% of their potential points for each day past the due date. After 3 days, the assignment will no longer be accepted and it will receive zero credit unless a valid excuse is provided before the original due date.

### Absences

Being present is critical to achieving our goals for this course. You are expected to attend both weekly lectures and lab. I recognize that unexpected events come up, so to partially account for this, perfect attendance will be counted as 25 of the 28 lectures. Due to the nature of labs, all 12 labs will be counted towards your attendance grade.

*Excused Absence:* Absences will be considered excused if they are for religious holidays or extenuating circumstances due to medical or family emergencies. If you plan to miss class due to observance of a religious holiday, please let us

know at least two weeks in advance. You will not be penalized for this absence, although you will still be responsible for any work you will miss on that day if applicable. Check with us for details or arrangements.

## University Resources and Supports for Students

### Services for Students with Disabilities

The university is committed to creating an accessible and inclusive learning environment consistent with university policy and federal and state law. Please let me know if you experience any barriers to learning so I can work with you to ensure you have equal opportunity to participate fully in this course. If you are a student with a disability, or think you may have a disability, and need accommodations please contact Services for Students with Disabilities (SSD). Please refer to SSD's website for contact and more information: <http://diversity.utexas.edu/disability/>. If you are already registered with SSD, please deliver your Accommodation Letter to me as early as possible in the semester so we can discuss your approved accommodations and needs in this course.

### Counseling and Mental Health Center

The [Counseling and Mental Health Center](#) serves UT's diverse campus community by providing high quality, innovative and culturally informed mental health programs and services that enhance and support students' well-being, academic and life goals. To learn more about your counseling and mental health options, call CMHC at (512) 471-3515.

If you are experiencing a mental health crisis, call the CMHC Crisis Line 24/7 at (512) 471-2255.

### The Sanger Learning Center

Did you know that more than one-third of UT undergraduate students use the Sanger Learning Center each year to improve their academic performance? All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas. For more information, please visit <http://www.utexas.edu/ugs/slc> or call 512-471-3614 (JES A332).

### BeVocal

BeVocal is a university-wide initiative to promote the idea that individual Longhorns have the power to prevent high-risk behavior and harm. At UT Austin all Longhorns have the power to intervene and reduce harm. To learn more about BeVocal and how you can help to build a culture of care on campus, go to: <https://wellnessnetwork.utexas.edu/BeVocal>.

### Wellbeing Resources

[Longhorn Wellness Center](#) resources for self-care  
[Virtual Mindfulness and Stress Reduction Activities](#)

*Undergraduate Writing Center:* <http://uwc.utexas.edu/>

*Libraries:* <http://www.lib.utexas.edu/>

*ITS:* <http://www.utexas.edu/its/>

*Student Emergency Services:* <http://deanofstudents.utexas.edu/emergency/>

*UT University Health Services:* <https://healthyhorns.utexas.edu/>

## Important Safety Information

**COVID-19 Update:** While I will post information related to the contemporary situation on campus, you are encouraged to stay up-to-date on the latest news as related to the student experience.

<https://protect.utexas.edu/>

If you have concerns about the safety or behavior of fellow students, TAs or Professors, call BCCAL (the Behavior Concerns and COVID-19 Advice Line): 512-232-5050. Your call can be anonymous. If something doesn't feel right – it probably isn't. Trust your instincts and share your concerns.

The following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety/>

Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.

- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- Students requiring assistance in evacuation shall inform their instructor in writing during the first week of class.
- In the event of an evacuation, follow the instruction of faculty or class instructors. Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.
- Link to information regarding emergency evacuation routes and emergency procedures can be found at: [www.utexas.edu/emergency](http://www.utexas.edu/emergency)

### ***Title IX Reporting***

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, unprofessional or inappropriate conduct of a sexual nature, dating/domestic violence and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When unprofessional or inappropriate conduct of a sexual nature occurs in our community, the university can:

1. Intervene to prevent harmful behavior from continuing or escalating.
2. Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation.
3. Investigate and discipline violations of the university's [relevant policies](#).

Beginning January 1, 2020, Texas Senate Bill 212 requires all employees of Texas universities, including faculty, report any information to the Title IX Office regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Texas law requires that all employees who witness or receive any information of this type (including, but not limited to, writing assignments, class discussions, or one-on-one conversations) must be reported. **I am a Responsible Employee and must report any Title IX related incidents** that are disclosed in writing, discussion, or one-on-one. Before talking with me, or with any faculty or staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you would like to speak with someone who can provide support or remedies without making an official report to the university, please email [advocate@austin.utexas.edu](mailto:advocate@austin.utexas.edu). For more information about reporting options and resources, visit <http://www.titleix.utexas.edu/>, contact the Title IX Office via email at [titleix@austin.utexas.edu](mailto:titleix@austin.utexas.edu), or call 512-471-0419.

Although graduate teaching and research assistants are not subject to Texas Senate Bill 212, they are still mandatory reporters under Federal Title IX laws and are required to report a wide range of behaviors we refer to as unprofessional or inappropriate conduct of a sexual nature, including the types of conduct covered under Texas Senate Bill 212. The Title IX office has developed supportive ways to respond to a survivor and compiled campus resources to support survivors.

### **Emergency Evacuation Procedures**

The following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety/>

## University Policies

### Academic Integrity

Each student in the course is expected to abide by the University of Texas Honor Code: “As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.” You are responsible for understanding UT’s Academic Honesty and the University Honor Code which can be found at the following web address: <https://deanofstudents.utexas.edu/conduct/standardsconduct.php>

**Plagiarism is taken very seriously at UT** and is subject to academic disciplinary action, including failure of the course. To learn more about what plagiarism is and how to avoid it, see the [Avoiding Plagiarism tutorial](#) developed by the UT Libraries in partnership with the Writing Flag program and Student Judicial Services.

### Q Drop Policy

If you want to drop a class after the 12th class day, you’ll need to execute a Q drop before the Q-drop deadline. Under Texas law, you are only allowed six Q drops while you are in college at any public Texas institution. For more information about Q drops in general, see: <http://www.utexas.edu/ugs/csacc/academic/adddrop/qdrop>.