San José State University
College of Social Sciences, Department of Urban & Regional Planning
Course Number, GEOG171 – Advanced Geographic Information Systems, Sections 1 & 2, Spring 2024

Course and Contact Information

Instructor(s):	Dr. Ahoura Zandiatashbar
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TA Office Hours	With appointment only - Thursdays 3:30PM to 4:30PM
Class Days/Time:	Wednesdays 4:00PM - 6:45PM
Classroom:	Washington Square Hall 113
Prerequisites:	GEOG 170: Introduction to GIS or instructor consent

Course Description

Throughout the course, you will acquire expertise in mapping techniques as essential tools for geographic expression and research. The curriculum encompasses advanced spatial analysis using Geographic Information Systems (GIS), along with comprehensive training in data collection, description, measuring absolute and relative location, patterns, and interaction and association. The primary objective of this course is to equip you with the skills to become a proficient and independent GIS analyst. You will delve into advanced topics such as data management, spatial analysis, and the visualization capabilities of ArcGIS, enabling you to address geospatial questions with precision.

Course Format

This course is taught face-to-face during 3-hours per week of lecture and laboratory experience. This course has two sections of lecture and laboratory in in-person format. Active engagements by all students in both sections is highly encouraged. Materials for both sessions will appear at noon on Wednesday; before class session and will be remain available through Canvas for instructional or educational purposes *only for the students who enrolled in the class*. Course laboratory weekly assignments/quizzes, one final exam, a case study, active participation, and a final project will be used as a basis for grading.

Course Web Page

All course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the [Canvas Learning Management System course login website](http://sjsu.instructure.com) at http://sjsu.instructure.com . You are responsible for regularly checking to learn of any updates. For help with using Canvas see [Canvas Student Resources page](http://www.sjsu.edu/ecampus/teaching-tools/canvas/student_resources) (http://www.sjsu.edu/ecampus/teaching-tools/canvas/student_resources)

Course Learning Outcomes (CLO)

This course is advances Geographic Information Systems knowledge through analysis of geographic relationships. Spatial distributions and phenomena will be examined through spatial anlaytics, and maps will be network and field representations of actual physical and environmental processes. While most techniques have a geographic origin, we will address all geospatially relevant methods, including geophysical, landscape ecological, econometric, epidemiological, and regional science approaches. On the practical side, you will be introduced to five different software and coding packages. Geoprocessing workflows are equally important at this level and is independent information system development.

- *CLO 1. Critically interpret maps and GIS displays.*

- *CLO 2. Measure, model and analyze spatial data.*

- *CLO3. Apply locational insights to solve simulated real-world analytical problems and make choices among alternatives.*

- *CLO4. Integrate theory/science with technology to design, implement and present a GIS project.*

Required Texts/Readings

Textbook

In addition to the readings to be provided via Canvas, there will be three reference guides will be used in this course (available on Canvas as well) with focus on Statistical Analysis, ArcGIS Pro, QGIS and R programing language:

- Law, M. and Collins, A., 2019. *Getting to Know ArcGIS Pro*. Esri press (to be provided via Canvas)

- Ewing, R., & Park, K. (Eds.). (2020). *Basic quantitative research methods for urban planners*. Routledge. (to be provided via Canvas)

- QGIS. 2018. *A Gentle Introduction to GIS.* https://docs.qgis.org/testing/en/docs/gentle_gis_introduction/index.html

- Walker, K. (2023). *Analyzing us census data: Methods, maps, and models in R*. CRC Press. (to be provided via Canvas)

- *Geocomputation with R.(Optional) This book is open source and available on:*

  https://geocompr.robinlovelace.net/

  https://github.com/Robinlovelace/geocompr#geocomputation-with-r

Supplemental readings and tutorial videos will be posted to Canvas modules. It might be helpful at times to refer to the textbook from Geog170:

- de Smith M, Goodchild, M and P Longley. 2018. *Geospatial Analysis.* Leicester: Winchelsea Press. http://www.spatialanalysisonline.com/

- Harder, C., & Brown, C. (2017). *The ArcGIS book: 10 big ideas about applying the science of*

where. Esri Press.

The required textbook is [The ArcGIS Book: 10 Big Ideas About Applying the Science of Where](#) which is available [in an interactive .pdf format](#) and comes with an [Instructional Guide](#) providing the technical knowledge

Other technology requirements / equipment / material

- Arc GIS Pro, QGIS and R will be our primary software platforms used this semester

- QGIS and R are free software packages

- As a SJSU student you have free access to ArcGIS Pro, details here: https://kb.mlml.sjsu.edu/books/software/page/gaining-access-to-arcgis-pro

- Any web-browser and internet access that allow you to connect for class sessions and enter AGOL

- Microsoft Office – Microsoft Excel will be used frequently (student version available on: [SJSU information technology webpage](#))

- Adobe Creative Suite utilizing Acrobat Reader (available as Adobe Creative Cloud for students on [SJSU eCampus webpage](#))

- Knowledge of zipping and unzipping folders
- Online data storage (e.g. Dropbox, OneDrive, or Google Drive)
- Students are required to have a laptop or desktop with a camera and built-in microphone. SJSU offers a [free equipment loan](#) program available for students.
- Students are responsible for ensuring that they have access to reliable Wi-Fi during tests. If students are unable to have reliable Wi-Fi, they must inform the instructor, as soon as possible or at the latest one week before the test date to determine an alternative. See [Learn Anywhere](#) website for current Wi-Fi options on campus.
- Strongly consider an [average Windows based *lap-top or personal computer*](#) that allows using QGIS or Arc GIS Pro and Canvas. Feel free to contact instructor if you have question about the hardware requirements.   Using personal computer creates a work environment that is more portable (in case of a laptop) and also supports frequent practice which is a critical factor in learning GIScience techniques.
- All Weekly Quizzes (WQs) must be submitted and uploaded to Canvas in Adobe portable document format (.pdf) or Microsoft Word Document format (.doc or .docx)

Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. In addition to three hours per week of lecture there are three hours per week spent in lab. The case study and individual term project may require additional work for this course. Careful time management will help you keep up with readings and assignments and enable you to be successful in all of your courses.

Course Component	Student Work	Instructor Engagement
Lecture 2-units (1.5 hours per week in lecture plus 6 hours of independent student learning per week)	Readings, quizzes, case study, project, presentations, and exam, studying and preparation for active learning and in class assessments	- Class contact hours - Lectures - In-class active learning activities

		• Evaluate student work and offer actionable feedback • Meetings with students about project, exams and research poster
Lab 2-unit (1.5 hours per week in lecture plus 6 hours of independent student learning per week)	GIS laboratory experience	• Step-by-step computer lab instructions on multiple GIS techniques • Critique student data selections, methods, map products and visualizations and offer actional feedback

Grading Information

- *Quizzes:* During the first half of the semester there will be weekly low-stakes quizzes at the start of lecture. These are a combination of multiple-choice and short answer questions meant to assess your knowledge of content presented during the previous weeks' lecture and lab sessions.
- *Lab Exercises:* There will be weekly hands-on laboratory exercises (LE) where students will learn ArcPro (& QGIS if time allows) software and spatial data analysis techniques needed to create high-quality map products and data visualizations.
- *GIS in Action:* In small groups (no more than 5) students will give a formal GIS in Action presentation in front of the class lasting 10-15 minutes on an assigned application of GIS. This will be followed by 5-minutes of classmate and instructor questions. Diverse teams with students from different background and experiences will receive extra points. The goal is to demonstrate the history of how GIS technology changed an industry – this could be agricultural production, business location or marketing, political districting, military, transportation, environment, or emergency/hazards.
- *Individual Research Project:* Each student will develop a GIS research project that results in a professional quality research presentation and report with the following sections:
    o *Abstract*
    o *Introduction*
    o *Methods*
    o *Results and discussion*
    o *Conclusion sections*.
- Students will present a research proposal to the class for instructor consent early in the term. At the end of the term the poster will be submitted along with a 3,000-word, 12-point Times New Roman, 1" margins on all sides, literature review paper covering scholarship on this topic. Each student will conclude the project by presenting their project formally and discussing its key points for 7 minutes followed by a 5-minute question and answer session similar to expectations of the annual American Association of Geographers (AAG) poster session.

Final Examination

There will be a cumulative final exam covering all GIS principles taught this semester. Class lectures, readings, and weekly quizzes will be the source for final exam material. The exam format is scenario based and will require students to think through logical GIS methods to analyze each problem.

All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13–1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details. Late assignments

will be reduced 1% of the total of the assignment for each calendar day missed (one class session missed equals 7% reduction in grade). No late assignments will be accepted after the last full day of instruction.

Assignment	CLO Assessed	% of Grade	Points
7 Weekly Quizzes (WQ)	CLO 1	10%	105 (15-points each)
10 Lab Exercises (LE)	CLO 2	30%	300 (30-points each)
GIS In Action	CLO 3	10%	100
Final Project Proposal	CLO 4	5%	45
Final Project Report	CLO 4	30%	300
Final Project Presentation	CLO 4	5%	50
Final Exam	CLO 1, CLO 4	10%	100
TOTAL			1,000

Grade	Points	Percentage
A plus	980 to 1000	98 to 100%
A	940 to 969	94 to 97%
A minus	900 to 939	90 to 93%
B plus	860 to 899	86 to 89 %
B	830 to 859	83 to 85%
B minus	800 to 829	80 to 82%
C plus	760 to 799	76 to 79%
C	730 to 759	73 to 75%
C minus	700 to 729	70 to 72%
D plus	660 to 699	66 to 69%
D	630 to 659	63 to 65%
D minus	600 to 629	60 to 62%

Classroom Protocol

- Attend all lecture meetings, presentations, open lab sessions and discussion forums. Active participation is a vital element of the course.

- Attend all lab sessions. Instructor led step-by-step instruction cannot be made up outside of lab time. Each week during lab the content will build on skills developed during the prior week.

- The instructor will explain concepts and exercises during synchronous meetings. Recognizing that everyone works at a different pace. Please use the raise your hand feature in Zoom.

- Weekly Quizzes must be submitted and uploaded to Canvas in Microsoft Word or .pdf formats (.doc, .docx, .pdf)

- Respect for diversity and inclusivity: students from all diverse backgrounds and perspectives be well-served by this course and their learning needs be addressed both in and out of class. The diversity that students bring to this class is viewed as a resource, strength and benefit. My goal is to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. In this regard, your suggestions are highly encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups. Given the sensitive and challenging nature of the material in this course, I aim to have an atmosphere of trust and safety in the classroom and will attempt to foster such an environment; in which each class member is able to hear and respect each other. Hence, it is quite essential critical that each member of this class shows respect for all views expressed in class. Therefore, please let me know of something that is said or done in the classroom, by either myself or other students, which is particularly troubling or causes discomfort or offense. Although, I believe our intention may not be to cause discomfort or offense, the impact of such incidents throughout the course is very important and; therefore, deserving of attention. If and when this occurs, there are multiple ways to ease some of the discomfort you may experience:
    - Discuss the incident privately with me. I am open to listening to your experience and will work with students to find acceptable ways to process and address the issue.
    - Notify me of the issue through another source such as your academic advisor, a trusted faculty member, or a peer. If for any reason you do not feel comfortable discussing the issue directly with me, I encourage you to seek out another, more comfortable avenue to address the issue.

- Proctoring Software and Exams: Exams will be proctored in this course through Respondus Monitor and LockDown Browser. Please note it is the instructor's discretion to determine the method of proctoring. If cheating is suspected the proctored videos may be used for further inspection and may become part of the student's disciplinary record. Note that the proctoring software does not determine whether academic misconduct occurred but does determine whether something irregular occurred that may require further investigation. Students are encouraged to contact the instructor if unexpected interruptions (from a parent or roommate, for example) occur during an exam.

- Recording Zoom Classes: This course or portions of this course (i.e., lectures, discussions, student presentations) will be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through Canvas. The recordings will be deleted at the end of the semester. If, however, you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording). *Students are not allowed to record without instructor permission:* Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.
- Internet connection issues: Canvas autosaves responses a few times per minute as long as there is an internet connection. If your internet connection is lost, Canvas will warn you but allow you to continue working on your exam. A brief loss of internet connection is unlikely to cause you to lose your work.

However, a longer loss of connectivity or weak/unstable connection may jeopardize your exam. Immediately email the instructor a current copy of the state of your exam and explain the problem you are facing. Your instructor may not be able to respond immediately or provide technical support. However, the copy of your exam and email will provide a record of the situation. Contact the SJSU technical support for Canvas by ecampus@sjsu.edu or phone: (408) 924-2337 https://www.sjsu.edu/ecampus/support/

- Students who are suspected of cheating or plagiarizing will be referred to the Student Conduct and Ethical Development office and depending on the severity of the conduct, will receive a zero on the assignment or a grade of F in the course. Grade forgiveness does not apply to courses for which the original grade was the result of a finding of academic dishonesty.

University Policies

Per University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf)*, relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page (http://www.sjsu.edu/gup/syllabusinfo), which is hosted by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.

GEOG171 Advanced GIS, Spring 2021, Course Schedule

The schedule is subject to change with fair notice and how the notice will be made available on Canvas and announced in class.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines	Due (Every WED. noon, before weekly lecture starts)
1	01/24	**Introduction and Syllabus** Review Key Lessons from Intro to GIS Find Your GIS in Action Group GIS Research Design Read Chapter 1 *A Gentle Introduction to GIS* "Preamble"	
2	01/31	Lecture: 1. Navigating thru GIS Pro 2. Quasi-experimental Research thru GIS; Applications for Policy Analysis Projects Review Chapter 2 of *A Gentle Introduction to GIS*	*Discussion forum submission – Takeaways from Ewing and Hamidi (2014) Submit your GIS in Action Team*
2 Lab	01/31	ArcPro and QGIS software set up Getting Started with ArcGIS Pro - *LE#1*	
3	02/07	Review Chapters 3 and 4 of *A Gentle Introduction to GIS* Read Chapter 2 and 4 *Getting to Know ArcGIS Pro* GIS Data Wrangling and Management *WQ #1: ArcCatalog*	*LE #1*

Week	Date	Topics, Readings, Assignments, Deadlines	Due (Every WED. noon, before weekly lecture starts)
3 Lab	02/07	Exploring spatial join features/applications & data wrangling in attribute table - *LE #2*	
4	02/14	Lecture: Multivariate statistical analysis: Basics and GIS applications for multivariate analysis Read Chapters 10 and 11 of *A Gentle Introduction to GIS* *Read Chapters 9 & 12 of Basic Quantitative Research Methods for Urban Planners* Multivariate spatial data techniques *WQ #2*	*LE #2* WQ #1
4 Lab	02/14	Geospatial analysis, hypothesis testing for multivariate statistical analysis through GIS – *LE #3*	
5	02/21	Read Chapter 1 and 2 in *Intro to GIS Using Open-Source Software* Open source and mapping software packages WQ #4	*LE #3* WQ #2
5 Lab	02/21	Getting Started with QGIS – *LE #5*	
5	02/28	Read Chapter 9 *Getting to Know ArcGIS Pro* Review of raster data analysis (*ArcGIS Pro & QGIS*) *WQ #3*	*LE #4* WQ #3
5 Lab	02/28	Suitability analysis using raster data using QGIS – *LE #4*	
7	03/06	Read Chapter 3 in *Intro to GIS Using Open-Source Software* Coordinate systems & Geocoding WQ #5	*LE #5* WQ #4
7 Lab	03/06	Geocoding Addresses – *LE #6*	
9	03/13	Intro to geospatial analysis with R Read chapters 5, 6 & 7 of Analyzing US Census Data Methods, Maps, and Models in R *WQ #6*	*LE #6* WQ #5
9 Lab	03/13	Basic mapping with R - *LE #8*	
8	03/20	Automating GIS processes & Intro to Python for GIS Complete a 30-minute tutorial HERE *WQ #7*	*LE #7* WQ #6
8 Lab	03/20	Model building – *LE #7*	
10	03/27	Read Chapter 8 in *Getting to Know ArcGIS Pro* Introduction to Spatial Statistics: analyzing spatial and temporal patterns	*Research Project Proposal Presentation*
10 Lab	03/27	Spatial Clustering (Diagnosis and Hot Spot Analysis)	
		SPRNG BREAK	
11	04/10	Relational databases *GIS in Action Group 1*	*LE #8* WQ #7
11 Lab	04/10	Creating/editing Geodatabase – *LE #9*	
	04/17	No class – AAG 2024 Conference	

Week	Date	Topics, Readings, Assignments, Deadlines	Due (Every WED. noon, before weekly lecture starts)
12	04/24	Review Chapter 4 in *Intro to GIS Using Open-Source Software* Spatial data visualization *GIS in Action Group Presentations*	*LE #9*
12 Lab	04/24	From Pro to Web mapping - *LE #10* Final Project Progress – Open Lab	
13	05/01	Guest Speaker – Navigating a GIS career	*LE #10*
13 Lab	05/01	Final Project Progress – Open Lab	
14	05/08	*Final Project Presentation*	
15	05/15	*Final Examination*	
Important note: Your final project is not graded only upon the due time, frequent meet up with instructor, good progress during the open sessions and working with the have major role in your grade			