

**San José State University**  
**College of Social Science, Department of Urban and Regional Planning**  
**Geog239: Geographic Information Technology, Spring 2022**

**Course and Contact Information (Required - Delete the word “Required” in final draft)**

Instructor(s): Dr. Bo Yang  
Email: [Bo.Yang02@sjsu.edu](mailto:Bo.Yang02@sjsu.edu)  
Office Location: Washington Square Hall 113A  
Office Hours: Tuesdays 2:30 PM - 4:30 PM or by appointment on Zoom  
Class Days/Time: Tuesday 4:30 PM – 7:15 PM  
Classroom: Washington Square Hall 113  
Prerequisites: *Geog170 Intro GIS* or *Geog107 Mapping the world*

*\*NOTE: Due to the Omicron variant, all SJSU classes will be taught in a fully remote modality before February 14. In-person Instruction for most classes will begin on February 14 pending to further notification. Video may be in scheduled class meetings with real-time participation, or asynchronously via video on demand. The Zoom link will be provided for meeting in-class. If you lost lose internet access during the class, or if your webcam or monitoring software stops working, you can call-in the class via the phone number in the zoom invitation.*

**COURSE DESCRIPTION**

Geographic Information System (GIS) is the use of computers to manage, display and analyze spatial/geographical information. This Geographic Information Technology course focuses on the concepts, theories, methods, and practical applications of GIS technologies. It combines lectures with substantial practical lab components. The lectures and labs cover spatial thinking and analyses, working with vector and raster data, remote sensing data acquisition techniques, UAV/drone data acquisition and processing, terrain visualization, landform recognition and classification, python programming for GIS, WebGIS and Google Earth Engine. At the end of the course students will demonstrate the application of appropriate GIS methods and analyses using a variety of tools in solving a real-world problem. The course has a prerequisite of *Geog170 Intro GIS* or *Geog107 Mapping the world*. A requisite waiver will be given if completed other level of GIS class.

Geographic information systems and technologies surround us. GIS is extensively used by national and local level government agencies, and by large corporations. Geographic information is ubiquitously consumed through daily use of Google MAPS platform (Google Earth and Earth Engine), UAV/Drone mapping, Microsoft’s Virtual Earth, or GPS derived driving directions. Geotagged data is generated continuously by using credit cards, mobile phones, Twitter, YouTube, Facebook, Flickr, that can be easily mined and used. We consume and produce geospatial data in our everyday lives. In what ways will GIS actually affect and alter the society it is intended to represent and serve? How can various conceptions and representations of space, not based on traditional map formats or geometric views, be embedded within a GIS? Is GIS more appropriate for some cultures than others? Can GIS be developed to reflect complex and ambiguous perceptions of social and physical space? How will GIS affect the relationships among and within government agencies, and between them and the various citizen groups concerned with the environment, property rights, and advocating the needs of local communities? What are the interpersonal implications of GIS? Can GIS provide citizens with an increased ability to monitor and hold government accountable

for proposals and actions? Will GIS provide citizens with an understanding of their rights and interests in land? Can GIS be used to increase participation in public decision making? (<http://www.ucgis.org>).  
*This course aims to answer some of these questions and intends to develop spatial thinking skills in students' particular areas of interest, with an emphasis on learning to use Python. This course is organized as a mixed seminar/lab, with weekly readings and assignments, and a final research project.*

### **Student learning outcomes**

After successful completion of this course, the students will be able to:

1. Develop the knowledge of GIS concepts, available major GIS software packages, commonly used GIS and remote sensing data sources;
2. Understand two major GIS data structures, the components and functionalities of a GIS, and GIS Applications using various of data acquisition methods;
3. Conduct spatial analyses using GIS software, python GIS programming, and Google Earth Engine;
4. Design and complete a GIS project (data acquisition, data management, data manipulation, spatial analysis, and result visualization and interpretation).

### **Textbook:**

Below two textbooks are recommended. Relevant course material, reading, and programming demo will be posted on a weekly basis on the online canvas system.

*Bolstad, Paul. GIS Fundamentals: A First Text on Geographic Information Systems - (Third Edition preferred).*

*Lawhead, Joel. Learning Geospatial Analysis with Python - (Third Edition preferred).*

### **COURSE EVALUATION:**

#### **Regular Participation and discussion: 3 points**

This is an in-person course with extensive use of computer labs. Student participation in class discussion and intellectual interaction are encouraged and expected.

#### **Introduce yourself on the discussion board: 2 points**

The discussion board is created and serves as a platform for students to ask questions about the course. If you have any questions or concerns, please post a thread here and everyone in the class can respond and discuss. Please start learning to use the discussion board by posting an introduction at the beginning of the semester, which will take 2 points of grades.

#### **Lab assignments: 40 points**

In general, there will be lab assignments that use computer software (e.g. ArcGIS, PyScripter) to reinforce the techniques discussed in the lectures. Although class time has been allocated for lab instruction and assignments, additional work outside of scheduled classes may be necessary for successful course completion. Most lab exercises are due 1-2 weeks after they are assigned, unless stated otherwise by the instructor. Lab exercises will be graded on a 100 point scale. Late work will lose 10 points per day late, and will not be accepted after five days.

### **Mid-term literary essay: 15 points**

The students are expected to read the textbook and extra reading materials provided in the course. Read the work and analyze thoroughly, try to find connections between the ideas and plot, such as, which parts of the depict were useful and remarkable, what is the reason that author use these data or methods, and do you see the development of content. Write a 2-3 page (single space) Literary Analysis Essay to express thoughts and make an analysis of any part of the literature.

### **Research Proposal: 20 points**

As a culminating activity for this course, each student will be required to formulate a Final Project Research Proposal by the end of the Final Exam period. The draft Final Project will be turned in as a 6-page (excluding figures and images) Word Document during final week for comments and revisions by and to be presented in the final exam week.

Format of the Final Project for Graduate Students will be:

Abstract – 1 page (summary of problem, method, results, and conclusions)

Problem – 1 page (issue, location, date, importance, expected impact of products)

Method – 1 page (data, metadata, software, and processing)

Results – 1 page (project dependent)

Discussion/Conclusions – 1 page (meaning of results, impact, and relevance)

References – 1 page

### **Final Presentations: 20 points**

On the final day of the course, during exam week, students will present their research proposals in presentations no greater than 12 minutes in length. A rubric shall be provided for this assignment.

### **Extra Credit: 1-3 points**

Throughout the semester, Spatial Analytics and Visualization (SAVI) Center at SJSU will be holding Virtual Geospatial Technologies Colloquium (Time to be Announced). This online dialogue invited people from GIS field and talk with students who are interested in exploring more about GIS careers. For each event you attend and write a short reflection about your experience, you will be granted 1 point of extra credit to your overall grade (possible 3 points total). Your overall grade for the course shall not exceed 100%.

<b>Evaluation Components</b>	<b>Percent Value</b>
• Mid-term literary essay	15%
• Lab Assignments	40%
• Research Proposal	20%
• Final Project Presentation	20%
• Class Participation and Discussion Board	5%

### **Course Grade Scale:**

based on the weighted-sum points from the different components

A+ (96.99-100), A (93-96.99), A- (90-92.99),

B+ (87-89.99), B (84-86.99), B- (80-83.99),

C+ (77-79.99), C (74-76.99), C- (70-73.99),

D+ (67-69.99), D (64-66.99), D- (60-63.99)  
F (Below 60).

## WEEKLY CLASS SCHEDULE, READING AND LABS

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### Week 1, February 1:

- Introduction to the course and discussion – Syllabus and course expectations
  - Discuss guiding values for the course
  - Reading: Bolstad Chapter 1, 2; Sheppard 1995
  - **Warm-up exercise: Setup the ArcGIS environment**
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### Week 2, February 8:

- Lecture - *Spatial thinking and common geospatial analyses*
  - Reading: Bolstad Chapter 2-3; Lake 1993
  - **Lab 1 assignment - GIS Basic Premise**
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### Week 3, February 15:

- Lecture - *Geospatial data, ethics, and privacy*
  - Reading: Bolstad Chapter 8; GIS Code of Ethics; Li & Goodchild 2013
  - Extra reading materials
  - In-class demonstration/mini-fieldwork: use Garmin Handheld GPS to collect GIS data
  - **Lab 1 due February 18**
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### Week 4, February 22:

- Lecture - *Working with vector data*
  - Lab 1 Due on February 5
  - Extra reading materials, Bolstad Chapter 9
  - In-class demonstration: use Garmin Handheld GPS to collect GIS data
  - **Lab 2 assignment – Thematic Mapping**
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### Week 5, March 1:

- Lecture - *Raster data and remote sensing*
  - Extra reading materials
  - **Lab 2 assignment Due on March 4**
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### Week 6, March 8:

- Lecture - *Drone mapping and data collection*
  - Reading: Bolstad Chapter 10
  - In-class demonstration/mini-fieldwork: use DJI Unoccupied aerial vehicle to collect GIS data
  - **Lab 3 Drone data processing and visualizing**
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### Week 7, March 15:

- Lecture - *Digital Terrain analysis*
  - Reading: Bolstad Chapter 11
  - **Lab 3 assignment due March 11**
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### Week 8, March 22:

- Lecture - *GIS Technology Landscape and FOSS*,
- Reading: Bolstad Chapter 15
- **Lab 4 assignment – Raster data analysis**

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**Week 9, March 29:** Spring Recess – no class

- Self-study and review for the first half of the class
- **Lab 4 assignment Due April 1**
- **Mid-term literary essay due on April 4**

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**Week 10, April 5:**

- Lecture, *Python programming for GIS I*
- Extra reading materials
- **Lab 5 assignment - Python programming for GIS**

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**Week 11, April 12:**

- Lecture- *Python programming for GIS II*
- Readings and discussion
- **Lab 5 assignment due April 15**

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**Week 12, April 19:**

- Lecture - *WebGIS - ArcGIS online and Google Earth Engine*
- **Lab 6 assignment – WebGIS and Google Earth Engine**

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**Week 13, April 26:**

- Guest Lecture (Dr. Rohrmeier): *Topics on GIS for socioeconomic applications*
- Extra reading materials
- **Lab 6 assignment due April 29**

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**Week 14, May 3:**

- Instructor help with final research proposal
- Readings and discussion
- **Final research proposal due on May 5**

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**Week 15, May 10:**

- *Final project presentation I* - Students present the final project (15 minutes)

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**Week 16, May 17(Exam Week):**

- *Final project presentation II* - Students present the final project (15 minutes)

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**\*\*NOTE:** *The Schedule of Activities is subject to change. Minor changes will be announced in class, major ones provided in writing.*

## **CORE POLICY STATEMENTS:**

### **Attendance and Participation**

Attendance is the responsibility of the student. However, attendance itself may not be used as a criterion for grading. Students are expected to attend all meetings for their courses, as they are responsible for all material covered, and active participation is frequently essential to ensure maximum benefit to all class members. Participation may be used as a criterion for grading when the parameters and their evaluation are clearly defined in the course syllabus and the percentage of the overall grade is stated. The full policy language can be found at University Policy [F15-3 \[pdf\]](#).

### **Academic Integrity**

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy F15-7 \[pdf\]](#) requires you to be honest in all your

academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. Visit the [Student Conduct and Ethical Development](#) website for more information.

### **Accommodations for Students with Disabilities**

[Presidential Directive 97-03 \[pdf\]](#) requires that students with disabilities requesting accommodations register with the [Accessible Education Center](#) (AEC) to establish a record of their disability. AEC will contact the instructor with further details, if needed.

If special arrangements are needed in cases of emergency or if the building must be evacuated, please make arrangements with the instructor.

### **Consent for Recording of Class and Public Sharing of Instructor Material**

University Policy [S12-7 \[pdf\]](#) requires students to obtain instructor's permission to record the course. The following criteria define expectations relating to recording a course.

- Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without approval. You may not publicly share or upload instructor generated material such as exam questions, lecture notes, or homework solutions without instructor consent. This prohibition includes sharing information with third parties and on websites.
- You must obtain the instructor's permission to make audio or video recordings in class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.
- Permission from the instructor, whether in writing or orally, may extend to either a single class or the entire semester.
- In classes where active participation of students or guests may be on the recording, permission of those students or guests must be obtained as well

### **Writing Center**

The SJSU Writing Center offers a variety of free resources to help students become better writers. The center offers writing resources, workshops, and one-on-one and small-group tutoring sessions. Services support writing for students in all disciplines and at all levels. The SJSU Writing Center has two in-person locations, Clark Hall, Suite 126 and MLK Library, 2<sup>nd</sup> floor. Workshops and tutoring are also available through online platforms.

To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the Writing Center website at [sjsu.edu/writingcenter](http://sjsu.edu/writingcenter).

### **Student Technology Resources**

Computer labs and other resources for student use are available in:

- [Associated Students Print & Technology Center](http://as.sjsu.edu/asptc/index.jsp) at [as.sjsu.edu/asptc/index.jsp](http://as.sjsu.edu/asptc/index.jsp) on the Student Union (East Wing 2nd floor Suite 2600)
- [The Spartan Floor](http://library.sjsu.edu/services/services) at the MLK Library at [library.sjsu.edu/services/services](http://library.sjsu.edu/services/services) (Fourth floor)
- [Student Computing Services](http://library.sjsu.edu/student-computing-services/student-computing-services-center) at [library.sjsu.edu/student-computing-services/student-computing-services-center](http://library.sjsu.edu/student-computing-services/student-computing-services-center)
- [Computers at the Martin Luther King Library](http://www.sjpl.org/wireless) for public at large at [www.sjpl.org/wireless](http://www.sjpl.org/wireless)
- Additional computer labs may be available in your department/college

A wide variety of audio-visual equipment is available for student checkout from [Collaboration & Academic Technology Services](#) located in IRC Building. These items include DV and HD digital camcorders; digital still cameras; video, slide and, overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens, and monitors.