.San José State University
College of Social Science/Department of Geography
Geography 195, Spatial Analysis, Section 1, Fall, 2018
Geography 239, Geographic Information Technology, Section 1, Fall, 2018

Course and Contact Information

Instructor:	Maureen Kelley, PhD
Office Location:	Washington Square Hall 111A
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Office Hours:	Mondays 1400 to 1430 in Washington Square Hall 111A Wednesdays 1400 to 1430 in Washington Square Hall 113 And by appointment
Class Days/Time:	Mondays 1700 to 1950
Classroom:	Washington Square Hall 113
Prerequisites:	Geography 195: Geography 170 & Geography 171 or instructor consent Geography 239: Instructor consent. This course satisfies graduate-level GWAR in this master's program

Course Format

Faculty Web Page

Course materials such as syllabus, handouts, notes, assignment instructions, and so forth are found on the Canvas Learning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu and the Canvas website to learn of any updates.

Course Description

Geography 195: *Quantitative analysis of geographic information, including spatial statistics and analytical mapping; application of descriptive and inferential statistics to geographic problems.*

Geography 239: *Research in application of technology to the design and implementation of computer mapping, remote sensing, and geographic information systems. Includes spatial database design issues, spatial processing algorithms, and cartographic visualization. Research project and paper. May be repeated for credit when offered as a different technology.*

This course is a hybrid undergraduate/graduate Geographic Information Science course exploring quantitative analytical methods of automated GIS applications using the Arc modeler and Python scripting. Instructor- and graduate student-led lectures, exercises, class participation, and a research project and results in a formal academic poster will be used for determination of grades.

Course Goals

Students will understand the justification and necessity for automating, or programming for, GIS projects. Students will develop their ability to design, test, and implement an automated GIS process or customized GIS application.

Course Learning Outcomes (CLO)

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

CLO1: Demonstrate the ability to define a research problem and design and execute a research project.

A. All exercises and the final project are designed such that students must follow the standard procedure of defining the research problem, identify steps to manage the project, and produce an automated GIS procedure or customized GIS application.

CLO2: Demonstrate the ability to communicate research results in verbal, graphic, and written format.

A. All exercises will be presented to class in verbal and graphic format. The final project will be presented in verbal and graphic form via a slide presentation at the end of the semester. The research paper will be presented in the written word.

B. Students must demonstrate their ability to understand and communicate research results from peer-reviewed journal articles.

CLO3: Demonstrate understanding how automated processing and programming may be applied to a variety of problems.

A. Course readings, exercises, and the research paper are designed to expose students to the varieties of methods for automating or customizing a GIS project.

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

1. *Understand the necessity and philosophy of automating, programming, or customizing a GIS project*
2. *Design, test, and implement an automated or customized GIS application for quantitative analysis*
3. *Communicate research results verbally and textually*

Required Textbooks

Required Textbook

The following is available for purchase from Amazon or ESRI Press. The ISBN is 9781589483712. Alternatively, a digital pdf is available under the electronic ISBN 9781589484023 at http://girs.ir/wp-content/uploads/Python-Scripting-for-ArcGIS.pdf

Zandbergen, P. A. (2013). *Python scripting for ArcGIS* (1st ed). Redlands, CA: ESRI Press. Retrieved from http://girs.ir/wp-content/uploads/Python-Scripting-for-ArcGIS.pdf

Required Readings

Readings available on Canvas:

Jensen, J. R. & Jensen, R. R. (2012). GIS hardware/software and programming. *Introductory geographic information systems* (pp. 321–337). Boston, MA: Pearson.

Jensen, J. R. & Jensen, R. R. (2012). Statistics and spatial data measurements. *Introductory geographic information systems* (pp. 240–255). Boston, MA: Pearson.

McGrew Jr, J. C. & Monroe, C. B. (2000). Correlation. *An introduction to statistical problem solving in geography* (pp. 193–209). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Elements of inferential statistics. *An introduction to statistical problem solving in geography* (pp. 115–129). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Inferential spatial statistics. *An introduction to statistical problem solving in geography* (pp. 171–192). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Probability. *An introduction to statistical problem solving in geography* (pp. 65–81). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Regression. *An introduction to statistical problem solving in geography* (pp. 210–224). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Three-or-more-sample difference tests: Analysis of variance methods. *An introduction to statistical problem solving in geography* (pp. 146–153). Boston: MA, McGraw-Hill Higher Education.

McGrew Jr, J. C. & Monroe, C. B. (2000). Two-sample and matched-pairs (dependent-sample) difference tests. *An introduction to statistical problem solving in geography* (pp. 130–145). Boston: MA, McGraw-Hill Higher Education.

Graduate students are also required to contribute to course readings where noted. Sign-ups will start second day of class and be posted on Canvas.

Other technology requirements / equipment / materials

Computer Internet access is essential for accessing materials and uploading assignments on Canvas. All formally written assignments must be submitted and uploaded to Canvas in Adobe portable document format (.pdf) or Microsoft Word Document format (.doc) only. Other deliverable file formats, such as scripts, must be a compressed folder of essential files including a readme file.

Access to ArcGIS desktop or ArcGIS Pro as well as Python is essential for the class. An external storage device or access to a cloud computing service is required to save work in the geospatial lab.

Library Liaisons

Nyle Monday is the Geography area specialist and can be reached at nyle.monday@sjsu.edu. Susan Kendall is the Government Information area specialist and can be reached at susan.kendall@sjsu.edu. Kate Barron is the Data Services area specialist and can be reached at kate.barron@sjsu.edu. Please refer to the Martin Luther King Jr Subject Librarians website for the full list of area specialists at https://library.sjsu.edu/staff-directory/sjsu-library-subject-liaisons.

Course Requirements and Assignments

University Policy S16-9 (http://www.sjsu.edu/senate/docs/S16-9.pdf) states, "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 practica. Other course structures will have equivalent workload expectations as described in the syllabus."

Also, University Policy F15-12 (http://www.sjsu.edu/senate/docs/F15-12.pdf) notes, "Students are expected to attend all meetings for the courses in which they are enrolled as they are responsible for material discussed therein, and active participation is frequently essential to ensure maximum benefit to all class members. In some

cases, attendance is fundamental to course objectives; for example, students may be required to interact with others in the class. Attendance is the responsibility of the student."

Exercises

There will be seven laboratory exercises based on the topics for each module. The following is a breakdown of each exercise:

Exercises	Points
Preliminary Laboratory	25
1: Spatial Statistics	25
2: Hardware/Software	25
3: Arc Modeler	50
4A: Basic Python Scripting	25
4B: Basic Python Scripting in ArcGIS	50
5: Python Scripting	100
Total	**300**

Demonstration for all automated processes are essential to get full credit. A 20% reduction of grade will be assessed for non-demonstration. A 10% reduction in grade will be assessed for partial or faulty results. Demonstrations will be conducted during the second half of the class on the due date. All exercises add to 300 points and are worth 37.5% of the final grade.

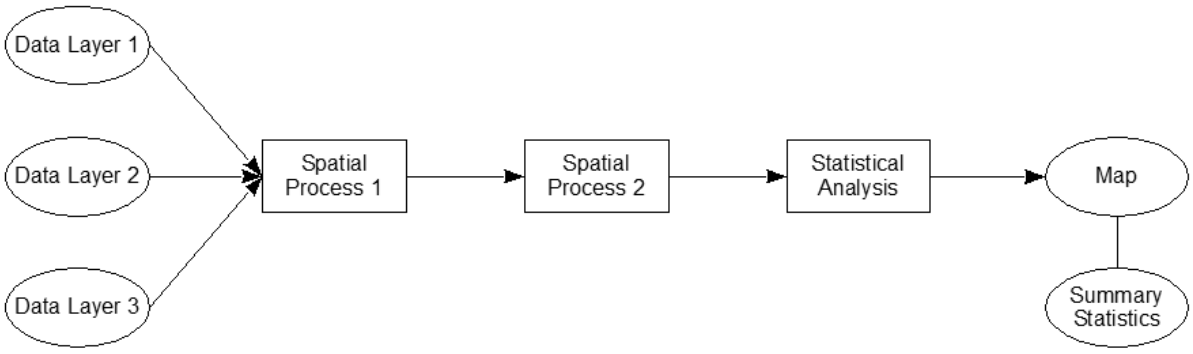
Class Participation

Class participation is mandatory for all graduate level courses and is a vital element of this course. Your class participation grade will include reading weekly assignments prior to attending class, being an active participant on Canvas, actively participating in class discussions, as well as contributing to course-related readings in the form of a conducting a lecture or leading a seminar discussion. Graduate students are required to contribute to a minimum of two lectures or seminar discussions.

Half of the participation points come from conducting a lecture or leading a seminar discussion. The other half of the participation points are earned by responding on the appropriate Canvas Participation page the answers to questions posed each class session. The questions will be posted on the Canvas website. Class participation is worth 200 points or 25% of your final grade.

Final Project

A final project is required for this course. The final project is to familiarize students with designing and implementing a GIS project from inception to final output. Students are free to select the appropriate automated GIS project directly related to analyzing quantitative data. A minimum of three data layers are required for input. A minimum of two spatial processes and a minimum of one statistical analysis procedure are required for automated processing. The output results must be a map graphic plus numeric summary statistics.



Graduate students are required to submit a formal academic poster or how-to manual (2,500 words) at the end of the term. This instructor uses the American Psychological Association (APA) style.

Task	Points
Preliminary proposal (Proposal 1)	10
Annotated bibliography	25
Final proposal, project timeline, & bibliography (Proposal 2)	40
First draft of formal academic poster/manual	75
Results as a formal academic poster/manual	100
Results/report as 5-minute slide presentation	50
Total	**300**

The final project is worth 300 points, 37.5%, of the final grade.

Final Examination or Evaluation

Determination of Grades

A strong performance in all areas of assessment is necessary to achieve the highest grade in this course. You will not be graded on attendance. However, it is not possible to do well if you are not present in class and on Canvas to join in discussions and complete essays and exercises.

You are responsible informing me in advance if you know you must miss a class for a valid reason. Excused absences refer to illness, family responsibilities, and similar necessities. Exceptions to these policies will be made only in the case of officially documented emergencies. Contact me regarding emergencies as soon as possible—before an assignment is due rather than after it is already late—so special arrangements may be made.

Grade Breakdown

Assignments	Points	Percent
Exercises (7)	300	37.5
Participation	200	25.0
Final Project	300	37.5
Total	**800**	**100.0**

Letter Grades: Percentage Ranges & Point Ranges

Letter Grade	Percent Range	Points Range	Letter Grade	Percent Range	Points Range
A+	97.00 to 100.00	776.0 to 800.0	C+	77.00 to 79.99	616.0 to 639.9
A	93.00 to 96.99	744.0 to 775.9	C	73.00 to 76.99	584.0 to 615.9
A−	90.00 to 92.99	720.0 to 743.9	C−	70.00 to 72.99	560.0 to 583.9
B+	87.00 to 89.99	696.0 to 719.9	D+	67.00 to 69.99	536.0 to 559.9
B	83.00 to 86.99	664.0 to 695.9	D	63.00 to 66.99	504.0 to 535.9
B−	80.00 to 82.99	640.0 to 663.9	D−	60.00 to 62.99	480.0 to 503.9
			F	0.00 to 59.99	0.00 to 479.9

Note that "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.

Penalty for Late or Missed Work

Assignments not submitted on the due date and assigned time will be marked down. There will be a 2% reduction in grade for each calendar day that your assignment is late. Any assignment that is overdue by two weeks (four class meetings, 14 calendar days) is considered late and will receive a zero (0).

Extra Credit

Documented and verified participation in at least one non-course-related GIS event is worth 25 points. This extra credit assignment can be used only once prior to the last day of regularly scheduled classes.

Classroom Protocol

We all want to be in a positive learning environment. Course content can be challenging. I expect everyone to be respectful of opinions, other students, and the instructor. I will make every effort to be prepared for class, start and end class on time, and be available during my office hours for help.

I expect my students to be prepared for class, come to class on time, and turn in assignments on time. I expect all students to refrain from reading non-course-related materials during class, no passing notes, no talking, no

sleeping, and other disruptive activities. The use of geospatial laboratory equipment for non-course-related activities is strictly prohibited.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/" Make sure to review these university policies and resources.

Please take advantage of the San José State Writing Center (http://www.sjsu.edu/writingcenter/index.html) located in Clark Hall 126 and Martin Luther King Jr second floor.

First Week Partial Participation Credit

Email me via the Canvas mailing system a picture of a ferocious bear acknowledging you read the course syllabus and understand the content.

.Geography 239
Geographic Information Technology, Fall 2018, Course Schedule

Schedule is subject to change due to unforeseen circumstances. Notices will be made available via Canvas messaging and emails via mysjsu and Canvas.

Week	Date	Topics	Readings	Activities	Due
2	08/27	Introduction		Preliminary Lab	
	08/31	LAST DAY TO DROP			
3	09/03	LABOR DAY			
4	09/10	Descriptive Statistics Probability/Inferential Statistics Instructor/Graduate Student-led Discussion	Jensen & Jensen (2012) p. 240–255 McGrew & Monroe (2000) p. 65–81, 115–129 Determined By Graduate Student		Preliminary Lab
5	09/17	T-test, ANOVA, Goodness of Fit	McGrew & Monroe (2000) p. 130–170		
6	09/24	Interential Spatial Statistics Correlation & Regression Instructor/Graduate Student-led Discussion	McGrew & Monroe (2000) p. 171–192 McGrew & Monroe (2000) p. 193–224 Determined By Graduate Student	Lab. 1	
7	10/01	Introduction to Automated GIS	Jensen & Jensen (2012) p. 321–337 TBD	Lab. 2	
8	10/08	Introduction to Arc Modeler (Instructor/Graduate Student-led Discussion)	Zandbergen (2013) Ch. 1, 3, 4 Determined By Graduate Student		Lab. 2
9	10/15	Arc Modeler (Instructor/Graduate Student-led Discussion)	Determined By Graduate Student	Lab. 3	
10	10/22	Introduction to Python	Zandbergen (2013) Ch. 1	Lab. 4a	
11	10/29	Python for GIS	Zandbergen (2013) Ch. 4 & 5	Lab. 3 Demonstrations	Lab. 3
12	11/05	Python for Spatial Data	Zandbergen (2013) Ch. 6, 7, 8, 9	Lab. 4B Lab. 4A Demonstrations	Lab. 4A
13	11/12	VETERANS DAY			
14	11/19	Python for GIS (Instructor/Graduate Student-	Zandbergen (2013) Ch. 6, 7, 8, 9	Lab. 5 Lab. 4B Demonstrations	Lab. 4B

Week	Date	Topics	Readings	Activities	Due
		led Discussion)	Determined By Graduate Student		
15	11/26	Error handling (Instructor/Graduate Student-led Discussion)	Zandbergen (2013) Ch. 11 Determined By Graduate Student		
16	12/01	Python for scripting (Instructor/Graduate Student-led Discussion)	Zandbergen (2013) Ch. 12, 13, & 14 Determined By Graduate Student		
17	12/10	Open Lab Day		Lab. 5 Demonstrations	Lab 5
FINAL EXAM	12/17	**PRESENTATIONS (1715 to 1930 WSQ113)**			
FINAL EXAM	12/18	**Finalized Final Projects 1700**			Finalized Final Projects