SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Introduction to Data Visualization

CS 133

Fall 2025 Section 01 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/20/2025

Contact Information

Instructor: Jessica Huynh-Westfall

Email: jessica.westfall@sjsu.edu

To contact me, please, contact me through Canvas mail, not my SJSU email.

Office Hours: Zoom or in-person by appointment (https://calendly.com/jessica-westfall-sjsu/office-hours)

- Tuesday 1:00 PM - 2:00 PM
- Wednesday 2:00 PM - 3:00 PM

Course Information

- This is an in-person course
- You are required to bring your wireless laptop to each class.
- Exams will be in-class, hand-written, closed-book.
- Course materials such as syllabus, handouts, notes, hands-on exercise, project instructions, etc. can be found on Canvas Learning Management System course login website at
- https://sjsu.instructure.com. You are responsible for regularly checking with the Canvas messaging system to learn of any updates.

Course Description and Requisites

Topics in data analysis and visualization. Covers tools and techniques to efficiently analyze and visualize large volumes of data in meaningful ways to help solve complex problems in fields such as life sciences, business, and social sciences.ï¿½

Prerequisite(s):ï¿½CS 146 with a grade of "C-" or better, or CS 22B and graduate standing. Computer Science or Software Engineering majors only.

Letter Graded

Classroom Protocols

- We shall alternate between the two modes. A typical class will begin with a lecture, followed by a hands-on.
- Regular class attendance is highly recommended and strongly encouraged.
- Please arrive to class on-time so that you benefit fully from the course experience and you do not disturb classmates and the instructor while class is in session.
- Students are responsible for knowing all materials covered in class lectures, readings, assignments, and other course-related work.
- Please do not use mobile phones during class time. Laptops, tablets and other devices should only be used for course-related purposes.

Student Conduct Code

Students are expected to adhere to the Student Conduct Code found at https://www.sjsu.edu/studentconduct/policies.php (https://www.sjsu.edu/studentconduct/policies.php). Additionally, students should regularly attend lectures, treat instructors and peers with respect, and refrain from the use of cell phones during any classroom activities.

Communication with the instructor

Students are requested to use the Canvas message function to contact the instructor. Private messages sent to the instructor's email address get lost due to the large volume of emails received. The instructor does not write messages after normal business hours, on weekends or holidays.

Reviewing code for the homework and technical trouble-shooting should be done during the office hours.

Never send your entire code for an assignment to the instructor. The instructor will not fix all the bugs in your code.

Class Attendance

Regular class attendance is expected. Students are responsible for all material presented in all classes.
Regrading Procedure

Grades

Grades assigned are final, unless there was an error in the grading. If a student wants to request a regrade of a homework or test, please follow instructions on the "Regrade request" page on Canvas. A request for a regrade is not a technique to drum up a few more points. If the course instructor thinks a component was scored too generously the first time, it may be lowered in a regrade. Thus, regrading may result in a lower grade.

Academic Integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf (http://www.sjsu.edu/senate/docs/S07-2.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. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/ (http://www.sjsu.edu/studentconduct/) . Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, AI generated answers, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your

assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Anyone caught cheating (including sharing answers with others during exams) in the class will receive a failing grade on the exam or assignment, in addition to other sanctions that are permitted by the University, including but not limited to the filing of a report with the Dean of Student Services and expulsion from the University.

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf

(http://www.sjsu.edu/senate/docs/S12-7.pdf) , requires students to obtain instructor's permission to record the course. Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this 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.

Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor-generated material for this course such as exam questions, lecture notes, hands-on exercises or homework solutions without instructor consent.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

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Upon successful completion of this course, students will be able to:
CLO 1 Manipulate large datasets and handle missing or inconsistent values in datasets.

- CLO 2 Perform statistical analysis using packages such as Numpy and Scipy.
  CLO 3 Analyze and visualize datasets using packages such as seaborn and
- matplotlib.
- CLO 4 Develop interactive visualization using packages such as Plotly and Shiny.
  CLO 5 Recognize and reduce data and spatial biases.

Student Learning Outcomes (SLO)
Upon successful completion of this course, students will be able to:

- SLO 3 Describe and implement, at an introductory level, data analysis concepts, models, and algorithms in machine learning and artificial intelligence.
- SLO 4 Explain and summarize, at a developed level, results and report findings in oral and written forms.

Program Learning Outcomes (PLO)
Upon successful completion of this course, students will meet the student learning outcomes that support the following program learning outcomes of the BS Data Science Program:

- PLO 2 Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements.
- PLO 3 Communicate effectively in a variety of professional contexts.
- PLO 6 Apply theory, techniques, and tools throughout the data lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.

Course Materials

Required Reads:

Biological data exploration with Python, pandas and seaborn by Martin Jones. June, 2020.[Author's page (https://pythonforbiologists.com/biological-data-exploration-book.html) , ISBN-13: 979- 8612757238]

Recommended Reads:

Hands-On Data Visualization: Interactive Storytelling From Spreadsheets to Code by Jack Dougherty and Ilya Ilyankou, 2021.[Free open-access web edition (https://handsondataviz.org/), ISBN-13: 978-1492086000] .

Cole Nussbaumer Knaflic. Storytelling with data: A data visualization guide for business professionals. (2019) [ISBN: 978-1-119-00225-3]

Technology requirements:

Students will need to have either a personal laptop/desktop with Internet service or access to an on campus computer lab.

Practice of data visualization will be done in Python 3.7 or 3.8 programming environment Google Colab (https://colab.research.google.com/) with Chrome or any supported web browser Anaconda (https://www.anaconda.com/products/individual) (optional) for local installation of Jupyter notebook.

Course Requirements and Assignments

Exams:

Three term exams will be conducted during the regular class hours in addition to a final exam. The dates for the term exams are **September 16**, **October 21**, and **November 20.**

The exams are in-person and hand-written. Exams are comprehensive and will contain multiple choice questions, true/false, short response, coding questions, and oral coding exams.

No make-up exams will be given if a student misses the midterm exam submission deadline (except for a legitimate excuse or other personal emergencies and students can provide documented evidence).

Assignments:

There will be in-class and take-home assignments. The purpose of assignments is to develop students' understanding of the material and the skills in problem-solving. Assignments include code exercises, oral presentations, and projects.

- Hands-On Classwork: These assignments will be in class and graded on completion. The exams will contain questions based on the hands-on assignments, so it is highly recommended students put effort into them.
- Problem Sets:All assignment solutions that you submit must be completely your own work (i.e., your solution cannot be copied from another source, such as other students, the internet, etc.). While it is fine to discuss the worksheet/assignment solutions with other students, solutions submitted on Canvas should reflect your own efforts. All homework should be submitted on Canvas and GitHub, not by e-mail.

Term project and presentation

The term project and presentation will be used to assess student's understanding of the course materials over the course of the semester. Information on the term project can be found in the course website in Canvas. It is a group project. Each team consists of three-four students (no solo projects) that will have a unique problem to solve.

Final exam

Final exam will be given on **Tuesday, December 16th at 8:30-10:30 AM.** If there is a time conflict, please inform the instructor at least two weeks in advance for rescheduling.

✔ Grading Information

Assignment	Grade Weigh
Term Exam 1	15%
Term Exam 2	15%
Term Exam 3	15%
Final Exam	15%
Participation (in-class activities)	5%
Homework Assignments	10%
Group Project (incl code, write-up, & oral presentation)	25%

Extra-credits and Reworks:

No extra-credit assignments or rework opportunities will be given.

Late Submission:

Late submissions within 24 hours will be deducted 10% of its final grade. Submissions over 24 hours late will have 20% grade deducted. Late submissions over 2 days will not be accepted.

Missed Assignments or Exams:

When students need to miss an assignment deadline or exam due to health conditions or any other emergency, it should be reported within ONE week after the due date.

Final Grade Table:

Total Grade	Letter Grade
97% and above	A plus

92% to 96%	A
90% to 91%	A minus
87% to 89%	B plus
82% to 86%	B
80% to 81%	B minus
77% to 79%	C plus
72% to 76%	C
70% to 71%	C minus
67% to 69%	D plus
62% to 66%	D
60% to 61%	D minus
59% and below	F

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. Other course structures will have equivalent workload expectations as described in the syllabus.

University Policies

Per University Policy S16-9 (PDF) (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 the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

The tentative course schedule is subject to change with one week notice (see Canvas for updated syllabus), except for Term Exam and Final Exam dates.

Week	Date	Topic
Module 01 - Introduce Data visualization and Colab notebook		
1	21-Aug	Syllabus, Course expectations Introduction to data visualization
2	26-Aug	Introduction to GitHub, markdown, and Colab
Module 02 - Pandas and Seaborn		
2	28-Aug	Series and DataFrame
3	2-Sep	Exploration of data using pandas
3	4-Sep	Exploration of data in dataframe
4	9-Sep	Advance features in pandas
4	11-Sep	Introduce project (in-class) Introduction to seaborn
5	**16-Sep**	**TERM EXAM 1**
Module 03 - Regression and problem solving		
5	18-Sep	Plotting bars, scatterplot, histograms
5	23-Sep	Categorical data
6	25-Sep	Transforming data and reshaping data
6	30-Sep	Complicated data
7	2-Oct	Problem solving data with pandas and seaborn
7	7-Oct	Matrix and heatmaps
8	9-Oct	Large dataset
Module 04 - Interactive plots		
8	14-Oct	Interactive plots with plotly

9	16-Oct	Geopy
9	**21-Oct**	**TERM EXAM 2**
Module 05 - Machine learning		
10	23-Oct	Introduce machine learning
10	28-Oct	Visualizing data to gain insights
11	30-Oct	Preparing data for machine learning algorithm
11	4-Nov	Scikit-Learn
12	6-Nov	Feature scaling data
12	11-Nov	NO CLASS - VETERAN'S DAY
13	13-Nov	Train a models
13	18-Nov	Fine-tune model
14	**20-Nov**	**TERM EXAM 3**
14	25-Nov	Project workday
15	27-Nov	NO CLASS - THANKSGIVING
16	2-Dec	Project Presentations
16	4-Dec	Project Presentations
18	**16-Dec**	**FINAL EXAM on Tues, Dec 16th at 8:30-10:30 AM**