SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Python Programming for Data Analysis

CS 22B

Fall 2026 Section 02 In Person 3 Unit(s) 08/19/2026 to 12/07/2026 Modified 08/19/2026

Contact Information

Instructor: Jelena Segan
Email: jelena.segan@sjsu.edu
Office: DH282

Office Hours

Tuesday, Thursday, 10:30 AM to 11:30 AM, DH 282
Please schedule your time here: https://calendar.app.google/aqFQSNQqX7Ny62zX9 (https://calendar.app.google/aqFQSNQqX7Ny62zX9)

Course Information

Lecture

Tuesday, Thursday, 9:00 AM to 10:15 AM, Sweeney Hall 241

Course Description and Requisites

Hands-on Python programming skills for data analysis. Skills include finding a solution for a given problem and casting it as an algorithm, translating an algorithm to executable code, and debugging and testing code. Applications focus on computational techniques to understand, analyze, and visualize data.

Prerequisite(s): CS22A with a grade of "C-" or better, or consent of the instructor; Allowed Majors: Data Science, Biology (all) or Chemistry (all).

Letter Graded

Classroom Protocols

Student Conduct Code

Students are expected to adhere to the Student Conduct Code found at 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 assigned are final, unless there was an error in the grading. A request for a regrade is technique to drum up a few more points. If the course instructor thinks a component was 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 to be honest in all your academic course work. Faculty members are required to report all office of Student Conduct and Ethical Development. The Student Conduct and Ethical is available at http://www.sjsu.edu/studentconduct/ Instances of academic dishonesty will not Cheating on exams or plagiarism (presenting the work of another as your own, AI generated the use of another person's ideas without giving proper credit) will result in a failing grade and 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 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)

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

- CLO 1 Write programs using various data types and basic techniques such as function calls, loops, and conditionals.
- CLO 2 Use and manipulate several built-in data structures such as lists, arrays, and dictionaries, including nested data structures.
- CLO 3 Break a medium-sized problem down into smaller parts and solve each sub-problem individually.
- CLO 4 Test and debug programs.
- CLO 5 Implement objects and associated methods.
- CLO 6 Learn about sorting algorithms and complexities.

Course Materials

Recommended Reads:

Biological data exploration with Python, pandas and seaborn by Martin Jones. June, 2020.[(https://pythonforbiologists.com/biological-data-exploration-book.html), ISBN-13: 979-8612757238] Ceder, Naomi. The quick Python book. Simon and Schuster, 2025 [ISBN: 9781633436336]

Technology requirements:

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

- Python practice will be done in Python 3.7 or 3.8 programming environment
- Terminal or Command prompt
- Google Colab (https://colab.research.google.com/ (https://colab.research.google.com/)) with Chrome or any supported web browser

Course Requirements and Assignments

Exams including final exam

Two midterm exams will be conducted during the regular class hours. A tentative schedule can be found in the syllabus and on Canvas.

Final exam will be given on Thursday, December 10, from 8:30 AM-10:30 AM. If there is a time conflict, please inform the instructor at least two weeks in advance for rescheduling.
The exams are in-person. The exams are comprehensive and will contain multiple choice questions, true/false, short answer, and coding questions.
No make-up exams will be given if a student misses the midterm exam date (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. Please check the tentative schedule below.
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. Oral examination might be requested. All homework should be submitted on Canvas, not by e-mail.

Term project and presentation

Final project and presentation will be used to assess student's understanding of the course materials at the end of the semester. Each team will have a unique problem to solve for the term project. Assignments will include project associated assignments in addition to final submission of code, written report, and oral presentation.

Grading Information

Grade Distribution

Item	Weighed Grade

Midterm exam 1	20%
Midterm exam 2	20%
Final Exam	20%
Participation (in-class activities)	5%
Homework Assignments	10%
Group Project (project associated assignments, code, write-up, & oral presentation)	25%

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
98% and above	A plus
92% to 97.99%	A
90% to 91.99%	A minus
88% to 89.99%	B plus

82% to 87.99%	B
80% to 81.99%	B minus
78% to 79.99%	C plus
72% to 77.99%	C
70% to 71.99%	C minus
60% to 69.99%	D
59.99% 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 course schedule is subject to change with fair notice. Changes will be announced in Canvas.

Class #	Week	Day	Date	Topic
1	W1	Thursday	August 20	Course Introduction. What Is Data Analysis? Syllabus, Data Analysis vs. Data Science
2	W2	Tuesday	August 25	CS 22A Review: strings, lists, dictionaries, tuples, sets, nested data structures

3	W2	Thursday	August 27	CS 22A Review: conditionals, loops, functions, reading/writing files
4	W3	Tuesday	September 1	Complex Data Structures. Comprehensions- list/dictionary/set comprehensions
5	W3	Thursday	September 3	Functions & Functional Programming-functions as objects, map(), filter()
6	W4	Tuesday	September 8	Lambda Functions & practical data examples
7	W4	Thursday	September 10	Generators & Iterators
8	W5	Tuesday	September 15	Exception Handling- try, except, else, finally, raising exceptions
9	W5	Thursday	September 17	Testing & Debugging - debugging strategies, assertions, testing functions
10	W6	Tuesday	September 22	Regular Expressions-patterns, matching, searching, extracting and cleaning real text data
11	W6	Thursday	September 24	Object-Oriented Programming I - classes, objects, attributes, methods, __init__
12	W7	Tuesday	September 29	Object-Oriented Programming II - methods, encapsulation, practical examples
13	W7	Thursday	October 1	Midterm 1 prep & comprehensive coding practice
14	W8	Tuesday	October 6	**Midterm 1**
15	W8	Thursday	October 8	Searching & Sorting - linear/binary search, basic sorting concepts
16	W9	Tuesday	October 13	NumPy I - arrays, dimensions, indexing, slicing
17	W9	Thursday	October 15	NumPy II - vectorization, operations, filtering, descriptive statistics
18	W10	Tuesday	October 20	Pandas I - Series and DataFrames
19	W10	Thursday	October 22	Pandas II - selecting, indexing, filtering
20	W11	Tuesday	October 27	Pandas III - Data Exploration: sorting, grouping, aggregation
21	W11	Thursday	October 29	Data Cleaning: missing values, duplicates, invalid values, outliers
22	W12	Tuesday	November 3	Data Visualization I: Seaborn, distributions, basic plots
23	W12	Thursday	November 5	Data Visualization II: scatterplots, categorical plots, choosing appropriate visualizations
24	W13	Tuesday	November 10	Reshaping & Combining Data: merge, concat, pivot/melt
25	W13	Thursday	November 12	Relational Databases: SQL + Python/Pandas
26	W14	Tuesday	November 17	Midterm 2 prep
27	W14	Thursday	November 19	**Midterm 2**
28	W15	Tuesday	November 24	Final Review
—	W15	Thursday	November 26	Thanksgiving - no class
29	W16	Tuesday	December 1	Final project presentations *(final report due)*
30	W16	Thursday	December 3	Final project presentations