SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Python Programming for Data Analysis CS 22B

Fall 2025 Section 02 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/23/2025

Course Information

Class Days/Time:

Tuesday and Thursday 07:30AM-08:45AM

- Classroom: MH 225
- August 21, 2025 - December 4, 2025

Office Hours/Location:

- Group Office Hours: 7:00-8:00 pm Thursday & Individual Office Hours: 8:00 - 9:00 PM
  - Email Required by the day of at 11:59 AM
  - Zoom Link will be provided in the response email to your email

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

1. Attendance is highly recommended. Be Punctual.
2. Please avoid disturbing the class: turn-off cell phones (or put them on silent or vibrate mode), no text messaging in class or during exams, no taking pictures and video, and avoid coming late.
3. Office Hours:
   - Mute: Unless you are speaking, keep your microphone on mute. Mute upon entry.
   - Strongly recommend and encourage video to be on.

    - If your video is on, be mindful of background distractions.
    - If there are distractions, use an appropriate and professional virtual background that is NOT objectively offensive or demeaning.
4. Stay on top of coursework
5. Accessibility
    - Students needs accommodations should work with the **Accessible Education center (AEC)** and the instructor
6. Email Policy
    - Emails are generally responded to within 1-2 days
    - Students are responsible for responding to any email in the same timeframe.
    - **Formal requests** (e.g. delayed submissions, project issues, date changes) mist be submitted via Canvas messaging system
7. You are not allowed to publicly share or upload material for this course such as exam questions, lecture notes, or solutions without the instructors' consent.
8. Registered students should view the CoS COVID-19 and Monkeypox Training slides for updated CoS, SJSU, county, state and federal information and guidelines, and more information can be found on the SJSU Health Advisories website.
    - By working together to follow these safety practices, we can keep our college safer.
    - Failure to follow safety practice(s) outlined in the training, the SJSU Health Advisories website, or instructions from instructors, TAs or CoS Safety Staff may result in dismissal from CoS buildings, facilities or field sites.
9.

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 Goals

Learning hands-on Python programming skills.
Skills include:

- Casting a problem as an algorithm
- Translating an algorithm to executable code
- Debugging and testing code

Applications focus on computational techniques to understand, analyze, and visualize data.
This course is very heavy on programming if not entirely.

Course Learning Outcomes (CLOs)

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

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

Course Materials

Not required:

- *Advanced Python for Biologists* by Martin Jones (2017)
  ISBN-13: 978-1495244377
  ISBN-10: 1495244377

Note: All course readings, examples, exercises, etc., will be assigned and provided by the instructor.

Python Programming Environment:

- **Primary Tool:** Google Colab
  Link: https://colab.research.google.com
- **Browser:** Chrome or any supported browser
- **No additional software required**

Optional (Local Setup): Jupyter Notebook

Course Requirements and Assignments

Canvas Learning Management:

Copies of slides and other material will be available through Canvas for enrolled students. Canvas Learning Management System is your main source for information: https://sjsu.instructure.com. You will be responsible for checking Canvas regularly for updates.

Important Notes

Include your name, initials, or any identifying features in any assignments/files that you submit online or offline as in cases of regarding or cross-checking it makes it easier to trace back your submissions.

Email Policy

- Emails are generally responded to **within 1–2 days**
- Students are responsible for responding to any emails in the same timeframe.

Formal requests (e.g., delayed submissions, project issues, date changes) must be submitted via Canvas messaging system

Technology Requirements:

Students are required to have an electronic device (laptop, desktop or tablet). SJSU has a free equipment loan program available for students.

If students are unable to have reliable Wi-Fi, they must inform the instructors, as soon as possible. See Learn Anywhere website. for current Wi-Fi options on campus.

Consent for Recording of Class and Public Sharing of Instructors Material

University Policy S12-7, h ttps://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructors' 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 instructors' 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 instructors; you have not been given any rights to reproduce or distribute the material.

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

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 https://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic coursework. 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 https://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, 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 course, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.
- Anyone caught cheating (including copying the work of others) on any assignment in the class will receive a failing grade for the 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.

✔ Grading Information

- Participation: 15%
  - Point are given for attendance and answering questions in class
  - The iClicker questions are in the form of multiple choice and true-false questions. Students are expected to participate with iClicker.
  - Credit is given for participation, and it is not necessary to get the correct answer to get credit. Every class (except for the first class, midterms, and final exam) will have one iClicker session
  - https://join.iclicker.com/AWCK

- Midterm Exam: 40% (20% each)
  - The exam should take only one hour.
    - You will have the whole time to take the exam.
  - The exams will be in-class and comprehensive.
  - You will get back your exams within one week.

    - There will be a chance to redo the Midterm exam to regain 50% of the lost points **if ALL** the Hands-on for the respective midterm have been completed by their due date.
    - We will have eight hands-on exercises throughout the semester.
    - The purpose of the hands-on exercises is to develop your understanding of the material. You will get feedback for these exercises from me or the grader.
    - A hands-on can contain verbal and coding questions to complete.
        - Submissions will be submitted in .pdf and/or .ipynb format.
        - All submissions are **due 11:59 AM on the due date**

- Final Exam: 15%
    - The exam should take only one hour and thirty minutes long.
    - You will have the whole time to take the exam.
    - The Final will be Dec 12, 2025 at 7:15-9:30 AM

- Final Project/Topic Preliminary Results: 30%
    - There will be a group-term Project/Topic at the end of the semester where students get hands-on experience with current Bioinformatics tools and questions.
    - Will include a paper and your group's code
    - Presentations will take between ten to fifteen minutes long.

Incomplete work:

Points will be deducted for incomplete question responses and solutions that are partially functional. All problems must be attempted to receive any points.

Late assignments:

No late assignments (ie, presentation, and project) will be accepted. Exceptions are limited to documented health and family emergency issues.

Breakdown

Point Range	Letter Grade	Point Range	Letter Grade
97.0 - 100	A plus	72.0 - 76.99	C

93.0 - 96.99	A	70.0 - 71.99	C minus
90.0 - 92.99	A minus	67.0 - 69.99	D plus
87.0 - 89.99	B plus	62.0 - 66.99	D
82.0 - 86.99	B	60.0 - 61.99	D minus
80.0 - 81.99	B minus	<60.0	F
77.0 - 79.99	C plus		

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

This schedule is tentative and subject to change weekly with the topics covered during class.

Week	Date	Topic	Assignment Due
1	8/21 (Th)	Syllabus. Introductions. Course Expectations. Google Colab	
2	8/26 (Tu)	Complex Data Structures. Hands-On #1	
2	8/28 (Th)	Complex Data Structures. Hands-On #1	
3	9/2 (Tu)	Iterators, Comprehensions, and Generators. Hands-On #2	Hands-on #1

3	9/4 (Th)	Introduction to pandas. Hands-On #3	
4	9/9 (Tu)	Data Visualization. Hands-On #3	Hands-On #2
4	9/11 (Th)	Data Visualization. Hands-On #3	
5	9/16 (Tu)	Exception Handling. Hands-On#4	Hands-on #3
5	9/18 (Th)	Functional Programming. Hands-On #5	
6	9/23 (Tu)	Functional Programming. Hands-On #5	Hands-on #4
6	9/25 (Th)	Midterm Review	
7	9/30 (Tu)	Midterm #1	
7	10/2 (Th)	Explanation of Midterm #1 Functional Programming. Hands-On #5	
8	10/7 (Tu)	Object-Oriented Programming. Hands-On #6 Introduction to Project	
8	10/9 (Th)	Object-Oriented Programming. Hands-On #6	Hands-On #5
9	10/14 (Tu)	Object-Oriented Programming. Hands-On #6	
9	10/16 (Th)	Trees. Hands-On #7	
10	10/21 (Tu)	Trees and Recursion. Hands-On #8	Hands-On #6
10	10/23 (Th)	Recursion. Hands-On #8	
11	10/28 (Tu)	Recursion. Hands-On #8	Hands-On #7

11	10/30 (Th)	Working groups & Consultation	
12	11/4 (Tu)	Working groups & Consultation	Hands-On #8
12	11/6 (Th)	Working groups & Consultation	
13	11/11 (Tu)	No Class	
13	11/13 (Th)	Midterm Review	
14	11/18 (Tu)	Midterm #2	
14	11/20 (Th)	Explanation of Midterm #2 Working groups & Consultation	
15	11/25 (Tu)	Final Review	
15	11/27 (Th)	Thanksgiving Break: No Class	
16	12/2 (Tu)	Presentations Part #1 (attendance is mandatory or 2% deduction from participation)	All Project and Presentations Are Due on 12/1 11:59 PM
16	12/4 (Th)	Presentations Part #2 (attendance is mandatory or 2% deduction from participation)	
–	12/12 (Friday)	Final Exam: 7:15 AM – 9:30 AM	