

San José State University
Computer Science Department
Computer Science / Biology 123A: Bioinformatics I, Fall 2026

Course and Contact Information

Instructor: James Casaletto
Office Location: Duncan Hall 282
Email: james.casaletto@sjsu.edu
Office Hours: Mon 06:45 – 07:30 (in person)
Weds 12:00 – 13:00 (Zoom link - <https://sjsu.zoom.us/my/james.casaletto>)
Class Days/Time: M/W 07:30 – 08:45
Classroom: Macquarrie Hall 225
Prerequisite: CS 46B or BIOL 31

TA: TBD

Course Description

Introduction to bioinformatics algorithms, tools, databases. Biological background; central dogma; biomedical open data sources and formats; differential gene expression analysis; genome-wide association study; classification, regression, and clustering transcriptomic data; pairwise sequence alignment; BLAST; phylogenetics; big-O analysis; next-gen sequencing.

Course Format

Sessions will be either lecture format, hands-on exercises, or a combination.

Course Learning Outcomes

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

- Define the central dogma of molecular biology
- Identify and describe sources of open biomedical datasets
- Perform a basic genome-wide association study
- Perform differential gene expression analysis
- Use machine learning algorithms to analyze gene expression data.
- Describe next-gen sequencing technologies
- Align pairs of sequences using Smith-Waterman and Needleman-Wunsch algorithms.
- Use BLAST to identify DNA, RNA, and protein sequences.
- Induce phylogenetic trees using UPGMA and WPGMA algorithm.
- Characterize the runtime of an algorithm using big-O analysis.

Recommended Textbook

"Introduction to Bioinformatics" by Arthur M. Lesk, 5th edition, Oxford University Press, 2019, ISBN 13: 9780199277872.

Other technology requirements / equipment / material

Students must bring a charged wifi-enabled laptop computer to all in-person sessions.

Course Requirements and Assignments

Hands-on Assignments:

Hands-on assignments must be uploaded to Canvas by the due date/time. No late homework will be accepted except by prior arrangement with the instructor or in cases of documented emergency.

Quizzes:

Quizzes on canvas will be assigned to reinforce lecture and reading material. They may be retaken as many times as you like.

Term Project:

Students will do a term project individually or in teams of 2. Graduate students and students in CS 123A must do a project that includes programming, in the language of their choice. Students in Biology 123A may do the same or may do a project involving acquiring published data and then analyzing the data using bioinformatics tools. Projects include a written report and an oral presentation.

Midterm Exams:

There will be 2 midterm exams – each covering 1/3 of the course material. Note that the exam dates given in the schedule below are approximate and are subject to change.

Final Exam:

The final exam will cover the last third of the course material and will be given on the date and at the time assigned by the university for this class (Tuesday December 11, 2026 08:30-10:30 am).

Grading:

Hands-on: 30%

Exams: 30%

Quizzes: 10%

Term project: 30%

At least	Letter Grade
97%	A plus
93%	A
90%	A minus
87%	B plus
83%	B
80%	B minus
77%	C plus
72%	C

70%	C minus
67%	D plus
62%	D
60%	D minus
<60%	F

Classroom Protocol

Students are expected to attend all class sessions for their assigned section unless they have a personal emergency. During lectures, students' devices may only be used for course-related purposes such as performing hands-on exercises. Disruptive behavior, including using devices for purposes unrelated to the course, is not allowed. The consequence for the first incident of disruption is a reduction of 1/3 grade point from the final letter grade (e.g. B minus becomes C plus). The consequence for the second incident is a reduction of 2/3 grade point from the final letter grade (e.g. B minus becomes C). The consequence for the third incident is an F in the course. All incidents will be reported to the university, which may impose further sanctions.

Academic Integrity and the use of AI

Students are expected to be familiar with the University's Student Conduct Code (<https://www.sjsu.edu/studentconduct/docs/SJSU-Student-Conduct-Code-2016.pdf>). Cheating, plagiarism, and other forms of misconduct will not be tolerated and will have appropriate consequences. All prose submitted must be in the student's own words. Text composed by anyone other than the student (including large language models such as ChatGPT and Claude) will not be accepted, *even if it is quoted and cited*. The penalty for the first incident of cheating or plagiarizing is zero points on the assignment or exam, and a reduction of a full grade point from the final letter grade (e.g. B minus becomes C minus). The penalty for the second incident is an F in the course. All incidents will be reported to the Office of Student and Ethical Conduct.

All assignments submitted are expected to be the students' own original work. The instructor may, at any time, ask a student to explain the meaning of any part of any answer that they submit. If the student can't explain the answer to a question, the penalty for the first incident will be loss of all points on the question. The penalty for the second and subsequent incidents will be loss of all points on the assignment and a report to the Office of Student and Ethical Conduct. A similar policy will apply to the project report and any related code; the policy will be explained in the project assignment doc later in the semester.

All course materials, including slides, homework assignments, lab assignments, exams, and instructor's solutions, are the instructor's intellectual property and may not be distributed without permission. Distribution includes posting to social media sites and Chegg. Distribution is grounds for failing the course, and all incidents will be reported to the university, which may impose further sanctions.

University Policies

Per University Policy S16-9 (<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 Syllabus Information web page (<http://www.sjsu.edu/gup/syllabusinfo>), which is hosted

by the Office of Undergraduate Education. Make sure to visit this page to review and be aware of these university policies and resources.

College of Science COVID-19 and Monkeypox Safety

Students registered for a College of Science (CoS) class with an in-person component 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. Updates will be implemented as changes occur (and posted to the same links).

Computer Science / Biology 123A Fall 2026 Course Schedule

Course Schedule

All dates and topics are estimates and are subject to change. Date changes for exams will be announced 2 weeks in advance. Guest speakers often reschedule at the last minute!

Week	Date	Topics
1	8/19	Course intro
2	8/24	Central dogma I
2	8/26	Central dogma II
3	8/31	Biomedical data I
3	9/2	Biomedical data II
4	9/7	No class (labor day)
4	9/9	Machine learning I
5	9/14	Machine learning II
5	9/16	Machine learning III
6	9/21	Midterm I
6	9/23	Guest speaker (Ryan Scott): OSDR
7	9/28	DGEA I
7	9/30	DGEA II
8	10/5	DGEA III
8	10/7	GWAS I
9	10/12	GWAS II
9	10/14	GWAS III
10	10/19	Phylogenetics I
10	10/21	Phylogenetics II
11	10/26	Midterm II
11	10/28	BLAST
12	11/2	Sequence alignment I

Week	Date	Topics
12	11/4	Sequence alignment II
13	11/9	Sequence alignment III
13	11/11	No class (veteran's day)
14	11/16	Next-gen sequencing I
14	11/18	Next-gen sequencing II
15	11/23	Guest speaker (Walter Alvarado): foundation models
15	11/25	No class (non-instructional day)
16	11/30	Student presos I
16	12/2	Student presos II
17	12/7	Final review
17	12/9	No class (finals prep)
17	12/11	Final exam (08:30-10:30am)