

**San José State University**  
**Computer Science Department**  
**Computer Science / Biology 123A: Bioinformatics I, Section 1, Fall 2016**

**Course and Contact Information**

<b>Instructor:</b>	Philip Heller
<b>Office Location:</b>	MacQuarrie Hall 211
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<b>Office Hours:</b>	Tu/Th 10:30 – 11:30
<b>Class Days/Time:</b>	Tu/Th 9 – 10:15
<b>Classroom:</b>	Duncan Hall 450
<b>Prerequisites:</b>	CS 23, and BIOL 115 or CHEM 130A; or CS 46B and a molecular biology course.

**Course Description**

Introduction to the main public domain tools, databases and methods in bioinformatics. Analysis of algorithms behind the most successful tools, such as local and global sequence alignment packages, and the underlying methods used in fragment assembly packages. Solution of complex biological questions requiring modification of standard code.

**Course Learning Outcomes**

Upon successful completion of this course, students will be familiar with the following concepts and will be able to apply them in appropriate situations:

1. Pairwise and multiple sequence alignments, and the dynamic programming algorithms that compute them.
2. Computation and interpretation of sequence homology.
3. Phylogenetic trees, and the algorithms that compute them (UPGMA, Neighbor-Joining).
4. Public DNA and protein databases, and how to use them.

**Required Texts/Readings**

**Textbook**

“Understanding Bioinformatics” by Marketa Zvelebil and Jeremy Baum, 1<sup>st</sup> edition, Garland Science, 2008, ISBN 0-815-34024-9.

## Other technology requirements / equipment / material

Students must bring a wifi-enabled laptop computer to every class meeting except exam sessions.

## Course Requirements and Assignments

**Homework Assignments:** There will be 5 substantial homework assignments. Homework is only accepted in hardcopy. No late homework will be accepted except by prior arrangement with the instructor or in cases of documented emergency. Homework is due in class in hardcopy at 9:00 AM on the due date.

**Term Project:** Students will do a term project in teams of 2. 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 3rd-party bioinformatics tools.

**Exams:** Two in-class midterm exams (15% each) and one final exam (25%). Missed exams cannot be made up except for reasons of illness as certified by a doctor, or documentable extreme emergency. Makeup exams may be oral.

## Grading:

Homework: 25%

Midterm 1: 15%

Midterm 2: 15%

Project: 20%

Final: 25%

At least	Letter Grade
97%	A+
93%	A
90%	A-
87%	B+
83%	B
80%	B-
77%	C+
72%	C
70%	C-
67%	D+
62%	D
60%	D-
<60%	F

## 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](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

# Computer Science / Biology 123A Section 1, Fall 2016 Course Schedule

## Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/25	Course mechanics. Bioinformatics: historical development, current challenges.
2	8/30	Background: Molecular biology
2	9/1	Background: Molecular biology
3	9/6	Background: Molecular biology
3	9/8	Homework #1 due. Pairwise alignment.
4	9/13	Homework #1 answers. Pairwise alignment.
4	9/15	Pairwise sequence alignment.
5	9/20	Homework #2 due. Pairwise sequence alignment. Project team formation due.
5	9/22	Homework #2 answers. Pairwise sequence alignment.
6	9/27	Review.
6	9/29	Midterm #1. Multiple sequence alignment.
7	10/4	Midterm #1 answers. Multiple sequence alignment. Project topic selection due.
7	10/6	Multiple sequence alignment.
8	10/11	Multiple sequence alignment.
8	10/13	Multiple sequence alignment.
9	10/18	Homework #3 due. Multiple sequence alignment.
9	10/20	Homework #3 answers. Multiple sequence alignment.
10	10/25	Phylogenetic inference. Project report due.
10	10/27	Phylogenetic inference.
11	11/1	Phylogenetic inference.
11	11/3	Phylogenetic inference.
12	11/8	Phylogenetic inference.
12	11/10	Homework #4 due. Review.
13	11/15	Midterm #2.
13	11/17	Midterm #2 and Homework #4 answers. Project presentations.
14	11/22	Project presentations.
14	11/24	Thanksgiving holiday.
15	11/29	Homework #5 due. Project final report due. Project presentations.
15	12/1	Homework #5 answers. Project presentations.
16	12/6	Project presentations.

<b>Week</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
16	12/8	Project presentations. Last class meeting before final.
Final Exam	12/16 (Friday)	Duncan Hall 450 (same room as lectures). 7:15 AM – 9:30 AM.