

**San José State University**  
**Computer Science Department**  
**Computer Science / Biology 123A: Bioinformatics I, Fall 2017**

**Course and Contact Information**

<b>Instructor:</b>	Philip Heller
<b>Office Location:</b>	MacQuarrie Hall 211
<b>Telephone:</b>	(408) 924-8145
<b>Email:</b>	Philip.Heller@sjsu.edu
<b>Office Hours:</b>	Th 11:00 – 12:00
<b>Class Days/Time:</b>	M/W 10:30 – 11:45
<b>Classroom:</b>	MacQuarrie Hall 422
<b>Prerequisites:</b>	Biol 30 and 31, or CS 46A and 46B.

**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:

- Pairwise and multiple sequence alignments, and the dynamic programming algorithms that compute them.
- Computation and interpretation of sequence homology.
- Phylogenetic trees, and the algorithms that compute them (UPGMA, Neighbor-Joining).
- 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 have a wifi-enabled laptop computer, which must be brought to in-class lab sessions. Lab sessions will take place during regular class times, on days to be announced in lecture and on the course Canvas site.

## Course Requirements and Assignments

**Homework Assignments:** There will be approximately 6 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 by 11:45 AM on the due date.

**Term Project:** Students will do a term project individually or 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. Projects include a written report and an oral presentation.

**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 emergency. Makeup exams may be oral.

### Grading:

Homework: 20%

Midterm 1: 15%

Midterm 2: 15%

Participation: 5%

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 Fall 2016 Course Schedule

### Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/23	Course mechanics. Bioinformatics: historical development, current challenges.
2	8/28	Background: Molecular biology
2	8/30	Background: Molecular biology
3	9/4	Labor Day
3	9/6	Pairwise alignment.
4	9/11	Pairwise alignment.
4	9/13	Pairwise sequence alignment.
5	9/18	Pairwise sequence alignment. Project team formation due.
5	9/20	Pairwise sequence alignment.
6	9/25	Review.
6	9/27	Midterm #1.
7	10/2	Midterm #1 answers. Multiple sequence alignment. Project topic selection due.
7	10/4	Multiple sequence alignment.
8	10/9	Multiple sequence alignment.
8	10/11	Multiple sequence alignment.
9	10/16	Multiple sequence alignment.
9	10/18	Multiple sequence alignment.
10	10/23	Phylogenetic inference. Project report due.
10	10/25	Phylogenetic inference.
11	10/30	Phylogenetic inference.
11	11/1	Phylogenetic inference.
12	11/6	Phylogenetic inference.
12	11/8	Review.
13	11/13	Midterm #2.
13	11/15	Midterm #2 answers. Project presentations.
14	11/20	Project presentations.
14	11/22	Thanksgiving holiday.
15	11/27	Project presentations.
15	11/29	Project presentations.

<b>Week</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
16	12/4	Project presentations.
16	12/6	Project presentations.
17	12/11	Project presentations, final review. Last class meeting before final exam.
Final Exam	12/15 (Friday)	MacQuarrie Hall 422 (same room as lectures). 9:45 AM – noon.