Learning Outcomes

Upon successful completion of this course, students will:

1. **SLO-1: De Novo Genome Assembly:** The theory, method, and practice of de novo genome assembly. DeBruijn Graphs, and using Spades to assembly genomes from read datasets.
2. **SLO-2: Single Cell Sequencing Methods:** SmartSeq2, SmartSeq, STRT, CEL-Seq…and others
3. **SLO-3: SCS Applications:** Understanding human disease mechanisms, genetic variation, therapeutic screening …
4. **SLO-4: SCS Computational Challenges:** Computational tools, algorithms, methods used to carry out differential expression, trajectory analysis
5. **SLO-5: Insights into T-cell Receptors via SCS:**

Each SLO above corresponds to a learning module that is described in the course calendar below.

Required Texts

Yanagida, T., Ishii, Y. (eds.) Single Molecule Dynamics in Life Science 2008
ISBN: 978-3-527-31288-7

Miodrag Guzˇvic et al. Methods in Molecular Biology ISBN 978-1-0716-3620-6ISBN
978-1-0716-3621-3 (eBook) https://doi.org/10.1007/978-1-0716-3621-3

Xiangdong Wang et al., Translational Bioinformatics ISBN 978-94-017-9752-8
ISBN 978-94-017-9753-5 (eBook) DOI 10.1007/978-94-017-9753-5

Guo-Cheng Yuan, Computational Methods for Single-Cell Data Analysis, ISBN 978-1-4939-9056-6
ISBN 978-1-4939-9057-3 (eBook) https://doi.org/10.1007/978-1-4939-9057-3

NOTE: The field is advancing so rapidly that the above required textbook will be supplemented with more recent publications as appropriate.

Other Optional Reading Material

A Primer of Genome Science, Greg Gibson, Spencer V. Muse, Publisher Sinauer Associates, 2009, Edition #3, ISBN-10: **0878932364** | ISBN-13: **978-0878932368**

Introduction to Computational Biology: Maps, Sequences and Genomes, Michael S. Waterman, CRC Press. (A statistical oriented view of bioinformatics)

Week and Class Mtg #	Tue	Thur	Module # & Name	TOPIC	Assignment See Canvas For Module & Weekly Assignment Details and Due Dates
Week 1	N/A	8/22	#1 De Novo Genome Assembly	**8/22:** - Course Intro, Class background survey/skills assessment - Theory, method, and practice of de novo genome assembly.	Module #1
Week 2	8/27	8/29	#1 De Novo Genome Assembly	**8/27:** - DeBruijn graphs **8/29:** - DeBruijn graphs	Module #1
Week 3	9/3	9/5	#1 De Novo Genome Assembly	**9/3:** - DeBruijn graphs **9/5:** - Quartz, STRT, CEL-Seq	Module 12 .
Week 4	9/10	9/12	#1 De Novo Genome Assembly	**9/10:** - Using Spades to assemble genomes **9/12:** - **In-Class Exercise 1** Topics Covered **Week-1 to Week-3:**	Module #1

Week 9	10/15	10/17	#3 SCS Applications	**10/15:** - Therapeutic Screening (cont.) **10/17:** - **Midterm (Full period): Covers Topics Week 1 thru Week 8**	Module #3
Week 10	10/22	10/24	#3 SCS Applications	**10/22:** - Therapeutic Screening (cont.) **10/24:** - Therapeutic Screening (cont.)	Module #3
Week 11	10/22	10/24	#4 SCS Computational Challenges	**10/22:** - SCS computational tools and algorithms for differential expression & trajectory analysis (cont.) **10/24:** SCS computational tools and algorithms for differential expression & trajectory analysis (cont.)	Module #4
Week 12	11/5	11/7	#4 SCS Computational Challenges	**11/5:** - SCS computational tools and algorithms for differential expression & trajectory analysis (cont.) **11/7:** - **Quiz 2 Covers Topics From Quiz 1 thru Week 11**	Module #4
Week 13	11/12	11/14	#4 SCS Computational Challenges	**11/12:** - SCS computational tools and algorithms for differential expression & trajectory analysis (cont.) **11/14:** - **In-Class Exercise 3**	Module #4
Week 14	11/19	11/21	#5 SCS T-Cell Receptors	**11/19:** - SCS T-Cell Receptors **11/21:** - SCS T-Cell Receptors (cont.)	Module #5

| Week 15 | 11/26 | 11/28 | #5
SCS T-Cell
Receptors | **11/26:**
-   **In-Class Exercise 3**
  Work on Team
  Projects, Q&A)

11/28:   **THANKSGIVING HOLIDAY** | Module #5 |
| Week 16 | 12/3 | 12/5 | #5
SCS T-Cell
Receptors | **12/3:**
-   SCS T-Cell Receptors (cont.)

12/5:
Quiz 3 (~45 mins):
  Covers From Quiz 2
  thru Week 16 | Module #5 |

Final Project Code and Project Report Due To Canvas
Dec 11, 2024 By 11:59PM

No Final Exam.

SCHEDULE FOOTNOTES:
NONE AS OF Fall 2024

Grades *

WRITTEN HOMEWORK (4 at 10 points each)	40 pts
QUIZZES (3 at 40pts each)	120 pts
MIDTERM	100 pts
IN-CLASS EXERCISES (4 at 50pts each)	200 pts
WEEKLY COURSE FEEDBACK (12 at 5pts each)	60 pts
PROGRAMMING ASSIGNMENTS (2 @ 40pts each)	80 pts
FINAL EXAM & PROJECT REPORT & CODE	400 pts

Total Course Points   =   1,000 pts Total

* The total points for each category might change depending on the number of project teams and assignments. The instructor reserves the right to adjust, with sufficient advanced notice, the above point distribution by ± 5 pts. Such adjustments might be based on the difficulty or simplicity of assignments or quizzes or exams.

Grading Information
Grading Percentage Breakdown
(NOTE: Ranges might change if point totals change)

Grading Percentage Breakdown		
Percent of Total Points	Points	Letter Grade
96.66%	t 967	A plus
93.33%	t 933	A
90.00%	t 900	A minus
86.66%	t 867	B plus
83.33%	t 833	B
80.00%	t 800	B minus
76.66%	t 767	C plus
73.33%	t 733	C
70.00%	t 700	C minus
66.66%	t 667	D plus
63.33%	t 633	D
60.00%	t 600	D minus
59.99%	600	F

HOW TO CALCULATE/ESTIMATE YOUR GRADE
If students would like to calculate their numeric grade percentage, the formula is as
follows:

Numeric CS 224 Grade Percentage =

$$\frac{Total\ Points\ Earned\ on\ Assignments}{Total\ Course\ Points} \times 100\%$$

There is no guarantee that grades will be curved. If so, it will be done at the end of the
semester. The instructor is already aware that graduate students need to maintain an
overall GPA of B or better. Just because a student NEEDS a particular grade doesn't
mean that the instructor will automatically GIVE the student that grade. Students must
EARN a passing grade based on submitted and evaluated course work.

Extra Credit Options, If Available
There are no extra credit assignments in this course except for completing designated
"Advanced" assignments. However, homework assignments and exams might contain
extra credit options.

Late Assignment Submission
Late assignments will receive a 25% point deduction of a graded assignment for each 24hr period after the
submission deadline. For example, if an assignment is worth 10 points, and the grade for the assignment is 8/10,
and the assignment is submitted one day late, then the point deduction equals 2.5, and the final grade for the
assignment is MAX(0, 8 – 2.5) = MAX(0, 5.5) = 5.5 .

Missed Assignments, In-Class Exercises, Quizzes, and Exams

    A. QUIZZES:
        a. The grade for one missed quiz will be replaced with the average of the remaining two quizzes. The
            average is calculated as the sum of current quiz grades / the number of quizzes for the semester.
            For example, if quiz 1 = 85, quiz 2 = 95, and quiz 3 is missed, the quiz 3 grade will be replaced by
            (85+95)/3 = 60.
        b. More than one missed quiz will result in a grade of incomplete provided the total missed points for
            the semester is less than 20% of the total course points.

    B. MIDTERM:
        a. The grade for a missed midterm exam will be 75% of the average score for quizzes, programming
            assignments, and homework assignments provided the total missed points for the semester is less
            than 20% of the total course points. Or, provide acceptable documentation of the reason for missing
            the midterm as described in version 1 of this course syllabus and a makeup exam will be provided.

    C. HOMEWORK ASSIGNMENTS:
        a. The grade for one missed homework assignment will be replaced with the average of the remaining
            three homework assignments. The average is calculated as the sum of current homework grades /
            the number of homework assignments for the semester.

     b. The grade for the second missed homework assignments will be replaced with 75% of the average of the remaining two homework assignments.

     c. More than two missed homework assignments will result in a grade of incomplete provided the total missed points for the semester is less than 20% of the total course points. An alternative is to accept zeros for the missed homework assignments, or if acceptable documentation of the reason for missing the homework assignments is provided, makeup assignments will be provided.

D. PROGRAMMING ASSIGNMENTS:

     a. The grade for one missed programming assignment will be replaced with 50% of the remaining programming assignment.

     b. Two missed programming assignments will result in a grade of incomplete provided the total missed

S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf and University Grading System Policy F18-5 at http://www.sjsu.edu/senate/docs/F18-5.pdf. More detailed information on

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 at http://www.sjsu.edu/gup/syllabusinfo/ and Syllabus Information web page at https://www.sjsu.edu/curriculum/courses/syllabus-info.php. Make sure to review these policies and resources.

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 requires you to be honest in all your academic course work. 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 http://www.sjsu.edu/studentconduct/.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at https://sjsu.edu/president/docs/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.