Last Updated Spring 2025

San José State University
Computer Science Department
CS286-02 Computational Epigenetics

Course Information

Instructor:	Leonard Wesley
Office Location:	MH 212
Telephone:	408.924.5287 (Office, however, I will not be on campus very frequently during the Spring 2025 semester. I suggest contacting me via email.)
Email:	Leonard.Wesley@sjsu.edu
Office Hours:	Tuesdays 7:00AM – 9:00AM, Zoom Link For Office Hours For Spring 2025 https://sjsu.zoom.us/m eeting/85152031440?occurrence=1738076400000&meetingMast erEventId=obIP9RmR Rue3ddxxFv2p5A PASSCODE: 168356
Class Days/Time:	TuTh 10:30AM – 11:45AM
Classroom:	

Course Description

4. CLO-4: Know how to use selected epigenetic databases to help answer transcriptional, chromatin, and methylation related questions of interest.

5. CLO-5: Know how to design and implement epigenetic pipelines that use the APIs to methylation and transcriptional DBs to identify potential causes of neurodegenerative or cancer-related diseases.

Each CLO above corresponds to a learning module that is described in the course calendar below. That is, there are five (5) learning modules that cover the CLOs described above.

Required Texts
Computational Epigenetics and Diseases (2019) Edited by Loo Keat Wei, Academic Press, an imprint of Elsevier 125 London Wall, London EC2Y 5AS, United Kingdom ISBN: 978-0-12-814513-5

The epigenetic field is evolving very rapidly. The required textbook material will be supplemented with relevant publications. Selected research articles and reviews will be provided on various topics. Examples include:

1. Epigenetics and Metabolism in Health and Disease Tzika, Evangelia ; Dreker, Tobias ; Imhof, Axel, *Frontiers in Genetics*, Sept 18, 2020.

2. Epigenetics in Gastrointestinal Health and Disease: Spotlight on DNA Methylation in the Intestinal Epithelium Zilbauer, Matthias ; Kraiczy, Judith Nestle, *Nutrition Institute Workshop Series*, 2017, Vol.88, pp.35-44
3. Epigenetics, the environment, and children's health across lifespans 2016.

4. Epigenetic Gene Expression and Regulation (2016) Edited by S.Huang, M.Litt, and C.Blakey, Elsevier Academic Press, 525 B Street, Suite 1800, San Diego, CA 92101-4495, USA.

These and other relevant articles and text books will be accessed via the on-line library or provided as pdf files.

Other Optional Reading Material

Epigenetics 2 nd Edition by C. David Allis, Marie-Laure Caparros, Thomas Jenuwein, and Danny Reinberg, Cold Fall Harbor Laboratory Press, 2015, ISBN 978-1-936113-59-0 Hardcover. Electronic versions available from Cold Fall Harbor Laboratory Press.

From Molecular Biology Prerequisite – Molecular Biology of the Gene , 6th/7th ed., by Watson, James D., et al. Pearson/Benjamin Cummings, 2008/2013.

Course Requirements and Assignments

Course Logistics

Students should expect to spend approximately 3 hours of lecture per week plus nine or more (9+) hours per week (on average) outside of the classroom preparing for and completing the assigned course work. This includes reading papers, viewing videos as appropriate, completing homework and programming exercises, and so forth. The amount of time that a student actually spends studying and completing assignments will depend on individual skills and the time allocated to the course. The nine+ (9+) hours per week estimate is based on previous experiences of the instructor and students. So please plan and schedule accordingly.

Previously, students have asked for special exception to policies and procedures for this course. An example includes asking the instructor for extra assignments or work to help improve a grade. Even if such a request is reasonable in the opinion of the instructor, no exception will be given to a student unless it can be made available to the entire class, AND does not constitute significant extra work on the part of students, instructors, graders and so forth. Students should have no concern that other students will receive special exceptions that will not be available to the entire class.

NOTE: University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but

Lab Mode:

toward the final grade. There will be 4 In-class Exercise sessions. These will typically involve forming teams of 2-3 students that work on assigned exercises in the classroom. They provide an opportunity to get started on homework or programming assignments that are to be submitted on a designated due date. Participation is mandatory, and scores will count toward the final grade.

Computational Resources

Students are required to make sure that they have access to sufficient UNIX,

Week 2	1/28	1/30	#2 Epigenetic Methods	1/28: - Epigenetic methods of eukaryotic chromatin, DNA, and RNA regulation, and computational models of eukaryote chromatin, DNA, and RNA regulation. (Wei Chaps 1 & 2) 1/30: - CONTINUED epigenetic methods of eukaryotic chromatin, DNA, and RNA regulation, and computational models of eukaryote chromatin, DNA, and RNA regulation. (Wei Chaps 1 & 2)	Module #2
Week 3	2/4	2/6	#2 Epigenetic Methods	2/4: - Whole Genome Bisulfite Sequencing (Wei Chap 4) 2/6: - ChIP & Data Analysis of ChIP-Seq Experiments (Wei Chap 5)	Module #2
Week 4	2/11	2/13	#2 Epigenetic Methods	2/11: - Computational Tools for microRNA Target Prediction (Wei Chap 6) 2/13: In Class Exercise 1 Topics Covered Week 1 to Week 4	Module #2

Week 5	2/18	2/20	#3 Epigenetic Imprinting	2/18: - CONTINUED Computational Tools for microRNA Target Prediction (Wei Chap 6) 2/20: - Mechanisms of epigenetic imprinting and impact of the environment on epigenetic control.	Module #3
Week 6	2/25	2]/27	#3 Epigenetic Imprinting	2/25: - CONTINUED Mechanisms of epigenetic imprinting and impact of the environment on epigenetic control. 2/27: Quiz 1 (~45 mins): Covers Topics Week 1 thru Week 5	Module #3
7	3/4	3/6	#4 Epigenetic Databases	3/4: - Epigenetic Databases: transcriptional, chromatin, and methylation (Handouts APIs to epigenetic DBs) 3/6: - In-Class Exercise 1 Topics Covered Week 3 to Week 6	Module #4
8	3/11	3/13	#4 Epigenetic Databases	3/11: - CONTINUED Epigenetic Databases: transcriptional, chromatin, and methylation (Handouts APIs to epigenetic DBs) 3/13: - CONTINUED Epigenetic Databases: transcriptional, chromatin, and methylation (Handouts APIs to epigenetic DBs)	Module #4

9	3/18	3/20	#4 Epigenetic Databases	3/18: - KEGG & Epigenetic DBs (Handouts APIs to KEGG and Epigenetic DBs) 3/20: Midterm (Full period): Covers Topics from Week 1 thru Week 8	Module #4
10	3/25	3/27	#4 Epigenetic Databases	3/25: - CONTINUED KEGG & Epigenetic DBs (Handouts APIs to KEGG and Epigenetic DBs) 3/27: - Stem Cell reprogramming & Plant Epigenetics (Handouts)	Module #4
	3/31	4/4		SPRING BREAK	
11	4/8	4/10	#5 Epigenetic pipeline	4/8: - In-Class Exercise 3 Topics Covered Week 7 to Week 10 4/10: - Design and implement epigenetic pipelines that use the APIs to methylation and transcriptional DBs to identify	

12	4/15	4/17	#5 Epigenetic pipeline	4/15: - CONTINUED Design and implement epigenetic pipelines that use the APIs to methylation and transcriptional DBs to identify potential causes of neurodegenerative or cancer-related diseases. (Wei Chap 9) 4/17: Quiz 2 (~35 mins): Covers Topics Week 5 thru Week 11	Module #5
13	4/22	4/24	#5 Epigenetic pipeline	4/22: - CONTINUED Design and implement epigenetic pipelines . . .. Breast Cancer (Wei Chap 15) 4/24: - CONTINUED Design and implement epigenetic pipelines . . .. Breast Cancer (Wei Chap 15)	Module #5
14	4/29	5/1	#5 Epigenetic pipeline	4/29: - CONTINUED Design and implement epigenetic pipelines . . .. Breast Cancer (Wei Chap 15) 5/1: - CONTINUED Design and implement epigenetic pipelines . . .. Breast Cancer (Wei Chap 15)	Module #5
15	5/6	5/8	#5 Stem Cell Reprogramming & Plant Epigenetics	5/6: In-Class Exercise 4 (Work on Projects, Q&A) 5/8: Quiz 3 (~35 mins): Covers Topics Week 9 thru Week 14	Module #5

	Final Project Report and Code Due To Canvas Wednesday May 14, 2025 By 11:59PM No Final Exam. The Project Takes The Place Of The Final Exam

SCHEDULE FOOTNOTES:
NONE AS OF AUGUST 2022

Grades *

WRITTEN HOMEWORK (4 at 20 points each)	80 pts
QUIZZES (3 at 50 pts each)	150 pts
MIDTERM	100 pts
IN-CLASS EXERCISES (4 at 50pts each)	200 pts
WEEKLY COURSE FEEDBACK (14 at 5pts each)	70 pts
PROGRAMMING ASSIGNMENTS (2 at 100pts each)	200 pts
FINAL PROJECT REPORT & CODE	300 pts
Total Course Points	= 1,100 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 plus or minus 5 pts. Such adjustments might be based on the difficulty or simplicity of assignments or quizzes or exams.

Grading Policy

Grading Percentage Breakdown

Grading Percentage Breakdown		
Percent of Total Points	Points	Letter Grade
96.66%	greater than or equal 1063	A plus
93.33%	greater than or equal 1027	A

90.00%	greater than or equal	990	A minus
86.66%	greater than or equal	953	B plus
83.33%	greater than or equal		

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

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 points for the semester is less than 20% of the total course points. An alternative is to accept zeros for all missed programming assignments, or if acceptable documentation is provided, makeup assignments can be provided

E. IN-CLASS EXERCISES:

a. The grade for one missed In-Class Exercise will be replaced with the average of the remaining three In-Class Exercises. The average is calculated as the sum of current in-class exercise grades / the number of in-class exercises for the semester.
b. The grade for two missed In-Class Exercises will be replaced with 75% of the average of the remaining two In-Class Exercises.
c. More than two missed In-Class Exercises 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 all missed in-class exercises, or if acceptable documentation of the reason for missing the IN-Class Exercises is provided, a makeup assignment can be provided.

F. WEEKLY FEEDBACK:
    a. All missed weekly feedback assignments will receive zero points.

G. FINAL PROJECT REPORT & CODE:
    a. The grade for a missed final project report and code will be 75% of the average of all other course assignments, exams, and quizzes provided the total missed points for all other assignments is less than 5% of the total course points.
    b. If the total missed points for all other assignments is more than 5% but less than 20% of the total course points, a grade of incomplete will be given.

H. TOTAL MISSED POINTS MORE THAN 20% BUT LESS THAN 30% OF TOTAL COURSE POINTS AND TOTAL MISSED POINTS MORE THAN 30%.
    a. Missed between 20% and 30% of total course points: A

- It is suggested that the Syllabus include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.

- In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.

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

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/. 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 http://www.sjsu.edu/president/docs/directives/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.