

Bio 184: General Genetics

4 units, Fall 2009, Section 8

Instructor:	Dr. Adam Telleen
Email:	atelleen@saclink.csus.edu
Office Hours:	120C Sequoia Hall Monday/Wednesday, 10:30-11:45 am, or by appointment
Text Books:	<i>Genetics: Analysis and Principles</i> , by Brooker There is also an e-book version available at the bookstore <i>Bio 184 Laboratory Manual</i> , by Ballard et al. Also available electronically at: http://www.csus.edu/indiv/h/hollandb/genetics.home.stm
Website:	http://www.csus.edu/indiv/t/telleena/adam.html
Prerequisites:	Bio 1, Bio 2, and Chem 1A (or equivalents) Proof of completion required by second lab meeting
Class Times:	Lecture: Tuesday/Thursday 10:30-11:45 am in 338 Sequoia Hall Laboratory: all sections meet in 220 Humboldt Hall Section 9 – Tuesday/Thursday 12-1:15 pm Instructor for section 9 is Dr. Peavy Section 10 – Tuesday/Thursday 1:30-2:45 pm Section 11 – Tuesday/Thursday 3-4:15 pm

Course Description: General Genetics. Principles of inheritance as they relate to microorganisms, plants, animals, and humans. Genetic mechanisms are analyzed according to evidence derived from both classical and current research. The nature, structure, and function of the genome are considered at the molecular level.

Learning outcomes: By the end of this course you should be able to:

1. Understand a historical perspective of genetics, identifying significant discoveries and the scientists involved in these breakthroughs.
2. Use problem-solving skills to predict genetic outcomes.
3. Describe basic inheritance patterns and the chromosomal basis of heredity.
4. Explain mutation as a source of genetic variability.
5. Understand the role of sex chromosomes in sex determination, sexual dimorphism, and chromosome inactivation.
6. Understand how cells reproduce through DNA and nucleic acids.
7. Describe the Central Dogma of Molecular Genetics.
8. Articulate some of the major issues related to modern biotechnology and genetic manipulation.
9. Develop skills in analysis, problem-solving, communication, and ethical perspectives as they apply to genetics.

Course Policies

I. Course Structure:

Lecture will provide students with the conceptual framework of genetics and develop problem-solving skills. Particular emphasis will be given to understanding the scientific method and science as a way of knowing through hypothesis-driven research. Some lecture materials (including practice problems) will be available online through SacCT. Be sure to contact me as soon as possible if you are having trouble accessing online course materials.

Laboratory will be a combination of learn-by-doing exercises illustrating central concepts in genetics, five lab practical quizzes (testing comprehension of lab exercises), and student presentations on current genetics-related topics. Students may complete the service-learning option instead of giving a presentation (see below).

II. Evaluation and Grading:

The lecture portion of the course is worth 70% of the final grade and the laboratory portion is worth 30%. Point totals are estimates and subject to change, but lecture and laboratory scores will still be weighted 70/30 for your final grade.

Each portion is expected to be broken down as shown below:

Lecture:

Homework/quizzes (6 @ 10pts each)	60 pts
Exams (3 @ 100 pts each)	300 pts
Total Lecture Pts	360 pts

Laboratory:

Lab Participation	15 pts
Lab Practical Quizzes (5 @ 10-20 pts each)	80 pts
Student Presentation/Service-learning	40 pts
Total Laboratory Pts	135 pts

Final grades are assigned as shown below (less than 60% will receive an F):

90.0-100% → A 80.0-89.9% → B 70.0-79.9% → C 60.0-69.9% → D

Plus/minus grades will be assigned based on percentage range within each grade

(e.g. 80.0-82.9% is a B-, 83.0-86.9% is a B, and 87.0-89.9% is a B+)

Homework/quizzes will be available on SacCT and must be completed online by the due date indicated (pay attention in class for any changes). I will let you know when homework/quizzes are available, but you can also check SacCT periodically for announcements. Students are responsible for completing their homework/quizzes on time to receive credit (whether I remind you in class or not!). **No late work is accepted and No makeups are allowed.** Due to budget issues and mandatory furloughs for faculty, there is a possibility that homework/quizzes may not be graded. In this case, the assignments will still be posted as practice problems.

Exams will be taken during the lecture period as indicated on the course schedule. Each exam will be worth 100 pts and cover material from lectures and homework. The format is variable and may include multiple choice, short answer, problem-solving, and/or essay questions (or whatever I feel like when I'm putting together the exams, but I'll give you a general outline of the structure in class prior to each exam). Each exam is non-cumulative and will cover material since the previous exam. However, you may still need to know material from earlier in the course to properly answer some questions. I will try to hold a review session during the lecture prior to each exam unless we get behind in the lecture material. Students are expected to come prepared for review sessions with specific questions. The only resources that may be used on exams are a writing implement and exam materials provided by me. No calculators, PDAs, cell phones, etc. are allowed unless I instruct you otherwise. Makeup exams will only be allowed for compelling reasons (e.g. medical emergencies) and will require written documentation. I usually do not allow makeup exams unless I have been contacted about it *before* the exam date regardless of the circumstances.

Lab participation points are awarded based on attendance, effort in lab, and participation in discussions. Students who miss *even a single lab session* without letting me know in advance may lose all lab participation points for the semester. Students that miss more than *two* lab sessions will receive a WU grade for the course. Students may be able to make up missed labs *if you have contacted me prior to the missed lab and have a valid excuse* (including written documentation) by attending the same lab session taught by another Bio 184 instructor (subject to their approval, which you must obtain prior to showing up for their lab). If you have any questions or concerns about this policy please talk to me about it as soon as possible.

Lab practical quizzes are designed to test student comprehension of lab activities. Questions are based on the lab exercises leading up to the quiz and therefore are not cumulative. Questions may be presented at laboratory stations where students rotate through sequentially. Alternatively, some lab quizzes may be all or in part on SacCT. My policy for makeup quizzes is the same as for lecture exams.

Student presentations will consist of a 10 minute slide show presentation (using PowerPoint, PDF, Open Office, etc.) followed by a 5 minute question period. Students will identify a current topic in the field of genetics and perform library research. Students must present enough background material for their peers to understand the topic. In addition, each student will hand in a 1-2 paragraph abstract of the topic which also includes full citations for their references. Each student is responsible for coming up with their own topic, which must be approved by me *at least one week prior to the presentation*. You will sign up for a presentation time slot during lab in the first two weeks of class. Instead of giving a presentation in lab, you can choose the service-learning option (see below).

Service-Learning option can be chosen in lieu of a presentation. If you choose the Service-Learning option, you will volunteer for a total of 20 hours (2 hours per week for 10 weeks) at Project RIDE, in Elk Grove. Students who choose this option will be EXEMPT from the Student Presentation in the laboratory and instead earn the same 40 points through the assessment of ten Service-Learning Journal Entries (one journal entry for each week of the Service-Learning experience, 4 points per Journal Entry =40 pts). *No late journal entries will be accepted.* Further information about our community partner Project R.I.D.E. (<http://www.projectride.org/>) will be provided during the first week of class. Students participating in the service learning option need to login to the SacCT website regularly for updates (e.g. forms, deadlines, service learning journal downloads). *If you commit to the service-learning option, you will be expected to follow through, so make sure that you can before choosing this option.* Due to limited time during lab for presentations, you may not be allowed to give a presentation if you choose service-learning but later decide that you could not complete the service.

III. Student Conduct:

No communication is permitted between students during exams or quizzes. No materials other than writing implements and exam materials may be used during an exam. Students may not leave the room during an exam without my permission. Evidence of cheating or plagiarism will be immediately reported to the Department of Biological Sciences Chair and the CSUS Dean of Students for disciplinary action. If you have any questions or concerns, please ask me so that we can discuss it. CSUS has a formal statement on “Academic Dishonesty Policy and Procedures.” It includes a section on “Definitions of Academic Honesty.” I suggest that you carefully review it if you have not already. Otherwise, just use common sense (e.g. be respectful, don't cheat, turn off cell phones during class, etc.) and we won't have any problems. If you need special accommodations for exams or other parts of the course please see me as soon as possible (preferably the first week of class).

IV. Add/Drop Policy

The Add/Drop policy as detailed in the CSUS Class Schedule will be followed for this course. See me for specific questions or concerns.

Lecture Schedule: (this is tentative and subject to change)

Date	Topics and homework (HW) due dates	Reading (Brooker)
9/1	- Course Introduction	- Ch 1
9/3	- Molecular Structure of DNA and RNA	- Ch 9
9/8	- Molecular Structure of DNA and RNA cont.	- Ch 9
9/10	- Chromosomal Organization and Structure	- Ch 10
9/15	- DNA Replication	- Ch 11
9/17	- DNA Replication cont.; HW #1 DUE Sun 9/20	
9/22	- Gene Transcription	- Ch 12
9/24	- Translation of mRNA	- Ch 13
9/29	- Translation cont.	
10/1	- Review Session for Exam 1; HW #2 DUE Sun 10/4	
10/6	- Exam 1	
10/8	- Mutations	- Ch 16
10/13	- Prokaryotic Gene Regulation	- Ch 14
10/15	- Gene Reg. cont.	
10/20	- Eukaryotic Gene Regulation	- Ch 14
10/22	- Transmission of DNA; HW #3 DUE Sun 10/25	- Ch 3
10/27	- Chromosome Structure and Recombination	- Ch 8
10/29	- Recombination cont.	
11/3	- Variations in Chromosome Number	
11/5	- Review session for Exam 2; HW#4 DUE Sun 11/8	
11/10	- Exam 2	
11/12	- Independent Assortment vs. Linked Genes	-Ch 2
11/17	- Linked Genes cont.	
11/19	- Sex-linked Transmission; HW #5 DUE Sun 11/22	- Ch 3
11/24	- Genetic Mapping	- Ch 5
11/26	- Mapping cont.	
12/1	- Human Genetics and Pedgrees	- Ch 2
12/3	- Extensions of Mendelian Inheritance	- Ch 4
12/8	- Extensions cont.	
12/10	- Review session for Exam 3; HW#6 DUE Sun 12/13	
12/17	- Exam 3 (final exam) , 10:15 am -12:15 pm	

Laboratory Schedule:

Date	Lab Exercise(s), Presentations, and Lab Practical Quizzes	Lab Manual
9/1	- Course Orientation	
9/3	- Lab Safety and Student Introductions	
9/8	- Experiment 1 , Day One: Introduction of Recombinant DNA	1-7
9/10	- Exp 1, Day Two: Transformation of recombinant DNA into bacteria	7-8
9/15	- Exp 1, Day Three: Extraction of recombinant plasmids	8-9
9/17	- Exp 1, Day Four: Restriction enzyme analysis and electrophoresis	9-13
9/22	- Exp 1, Day Five: Analysis of agarose gels; Oral presentation demo	13-15
9/24	- Experiment 2 , Day One: Introduction to human DNA identification; LAB PRACTICAL QUIZ 1	16-27
9/29	- Exp 2, Day Two: Isolation of cheek cell DNA	27-29
10/1	- Exp 2, Day Three: Set up PCR Reactions	29-30
10/6	- Exp 2, Day Four: Analysis of CGE run and profiling results	30-34
10/8	- Student Oral Presentations Group 1; LAB PRACTICAL QUIZ 2	
10/13	- Experiment 3 , No laboratory	35-36
10/15		37-40
10/20	- Experiment 4 , Day One: Intro to light microscope; mitosis in <i>Allium</i>	41-47
10/22	- Exp 4, Day Two: Human karyotyping	47-51
10/27	- Exp 4, Day Three: Abnormal human karyotypes	52-54
10/29	- Student Oral Presentations Group 2; LAB PRACTICAL QUIZ 3	
11/3	- Experiment 5 , Day One: <i>Drosophila</i> genetics and recombination	55-59
11/5	- Exp 5, Day Two: Probability	60-62
11/10	- Exp 5, Day Three: Chi-square analysis	62-68
11/12	- Exp 5, Day Four: Handling <i>Drosophila</i> , identifying mutants, and scoring F2 flies	68-72
11/17	- Exp 5, Day Five: Finish scoring F2 flies; create a linkage map	72-73
11/19	- Exp 5, Day Six: Discussion of results	
11/24	- Student Oral Presentations Group 3; LAB PRACTICAL QUIZ 4	
11/26	- Thanksgiving Holiday	74-79
12/1	- Experiment 6 , Day One: Introduction to heritability and regression	79-81
12/3	- Exp 6, Day Two: Regression analysis of height data; Room TBA	81-82
12/8	- Exp 6, Day Three: Discussion of results; Student Oral Presentations Group 4	
12/10	- LAB PRACTICAL QUIZ 5 ; Service-Learning students discuss Project RIDE	