



BIOLOGY
COLORADO STATE UNIVERSITY

BZ 350

Molecular and General Genetics

Course Title and Meeting Information

BZ 350: Molecular and General Genetics

Spring 2024

CRN: 10951

Canvas Page: <https://colostate.instructure.com/courses/180951>

Lectures

MWF 9-9:50 am. Yates 104

Recitations

Bio 132. See details below.

Instructors

Lecture Instructors

Rachael DeTar: rachael.detar@colostate.edu

Office Hours: Mon Wed 10-11am*. Bio 355 or Zoom: <https://zoom.us/j/96052781682>

Erik Arthun: Erik.Arthun@colostate.edu

Office Hours: TBD

*To make an appointment outside of these times, send the lecturer an e-mail with multiple options for when you can meet.

Recitation Instructors

	E-mail	Office Hours
Chris deRoux	chris.deroux@colostate.edu	10:00 am -12:00pm Fri, Bio 355
Carlos Juarez	carlos.juarez-guzman@rams.colostate.edu	11:30am -1:30pm Fri, Plant Sci C033
Jacob Lamb	jakelamb74@gmail.com	12:00 - 1:50pm Thu, TBD
Devin Mosswood	mossde@colostate.edu	9:00 am -11:00 am Thu, Bio 228

Recitations

Attendance and participation in weekly recitation sections are required. These sessions will be used to emphasize key course material and work on group problem solving exercises in preparation for three one-hour exams and the final exam.

CRN	Section	Day	Time	Instructor
10840	R01	Tue	2:00 - 2:50 PM	Devin Mosswood
10841	R02	Tue	3:00 - 3:50 PM	Devin Mosswood
10842	R03	Tue	4:00 - 4:50 PM	Chris deRoux
12870	R04	Wed	2:00 - 2:50 PM	Jacob Lamb
12871	R05	Wed	3:00 - 3:50 PM	Carlos Juarez
12872	R06	Wed	4:00 - 4:50 PM	Carlos Juarez
12873	R07	Thu	2:00 - 2:50 PM	Jacob Lamb
12874	R08	Thu	3:00 - 3:50 PM	Chris deRoux

TILT Tutoring

Free tutoring specifically dedicated to BZ 350 is available for this course through the Arts & Sciences Tutoring Program. The schedule will be announced at the beginning of the semester.
<https://tilt.colostate.edu/Learning/Tutoring/Biology>

Communication Policy

Students are encouraged to e-mail the lecture instructor or their recitation instructor with any questions regarding course logistics, policies, grading, etc. We will attempt to respond promptly and within 24 hrs on weekdays if at all possible. Note that we generally do not address questions about genetic concepts and course content via e-mail. We have over 20 scheduled hours per week (see above) in which students can interact directly with instructors or tutors, and we ask that students make use of these to answer their genetics questions. There is also a discussion board available on Canvas where students can post and answer questions. Instructors and Teaching Assistants will check the discussion board to answer questions once per weekday. Do not share answers to problem sets on the discussion board.

Course Description

The goal of this course is to provide an understanding of biological inheritance. Simply put, we will explore why offspring tend to look like their parents and why this resemblance is often incomplete. This is a broad course. Among other things, we will address the statistical methods that are used to study inheritance in entire populations all the way down to the level of the specific molecules and molecular mechanisms that are involved in the transmission of biological information. In the end, the goal is to produce an integrated view of inheritance across these levels and make it clear why genetics is at the core of so many different fields within the biological sciences.

Learning Goals

After taking this course, students should be able to...

- Apply statistical techniques to interpret genetic data from controlled crosses and natural populations.

- Interpret data from seminal experiments that elucidated processes associated with genetic inheritance and the central dogma of molecular biology.
- Relate the molecular processes associated with central dogma to biological inheritance (genotype and phenotype).
- Explain how the flow of information from DNA to protein is regulated at each step.
- Explain similarities and differences in molecular processes associated with the central dogma and gene regulatory mechanisms in prokaryotes and eukaryotes.
- Express complex genetic paradigms through problem-solving and writing.
- Make connections between the field of genetics and important societal issues, including human health, conservation, agriculture, and genetic engineering.

Textbook

Genetics: From Genes to Genomes 7th Edition, Goldberg et al, 2021.

This course uses Inclusive Access, which means that you automatically have access to the online textbook from the first day of class. Find more information about Inclusive Access at the CSU Bookstore Inclusive Access web page: <https://www.bookstore.colostate.edu/inclusive>

Technical Support

Need technical assistance with your Canvas course?

- Visit the Canvas Student Orientation site:
<https://colostate.instructure.com/courses/18480>
- Visit Central IT Technical Support Helpdesk for technical support:
<https://www.acns.colostate.edu/technical-support-services/>
- Call the Central IT Helpdesk: 970-491-7276
- Email Helpdesk Support: help@colostate.edu

Course Content

	Approx. # of Lectures	Readings
1. Introduction to Genetics	1	
2. Mendelian Inheritance	4	Chapters 1 and 2
3. Quantitative Genetics	2	Chapter 25.1
4. Cytogenetics	2	Chapter 3
5. Linkage, Association, and Genetic Mapping	4	Chapter 5.1-5.4 and 25.2
6. Population Genetics	6	Chapter 24.1-24.2
7. Non-Mendelian Inheritance	1	Chapter 14.3, 17
8. Sex-Linked Inheritance and Expression	1	Chapter 4.1-4.4
9. Why Study Molecular Genetics	1	Posted Material
10. DNA Structure, Replication, & Recombination	4	Chapter 6,13.4
11. Mutation and DNA repair mechanisms	1	Chapter 7.2 and 7.3
12. Transcription & Translation	4	Chapter 9
13. Gene Regulation in Prokaryotes	2	Chapter 18.1-18.4

14. Eukaryotic Chromosome Structure	1	Chapter 13.1-13.3
15. Gene Regulation in Eukaryotes	3	Chapter 19. 20.1
16. DNA cloning and sequencing	2	Chapter 10, 11.1, 11.3
17. Editing of eukaryotic genomes	2	Chapter 21.1 and 21.2
18. Applications of genetic engineering in Medicine and Agriculture	1	Chapter 21.4 and assigned reading

Assignments and Grading

Exams (400 pts)

There will be four non-comprehensive exams.

<u>Exam</u>	<u>Date</u>	<u>Time</u>	<u>Covered Material</u>	<u>Points</u>
1	Feb 16	9:00-9:50am	Weeks 1-4	100
2	Mar 22	9:00-9:50am	Weeks 5-8	100
3	Apr 12	9:00-9:50am	Weeks 9-11	100
4	May 9th	11:50am-1:50pm	Weeks 12-15	100

The fourth exam will be conducted during the scheduled final exam period on Thurs May 9th 11:50-1:50 pm, room assignment is TBD. It will cover material from the final four weeks of the course. It will not be comprehensive.

Students are responsible for bringing their own calculators to exams. These calculators should be capable of calculating powers and factorials, e.g., the TI30AX, the TI30XIIS, or the TI30XS available at the CSU Book Store. Smart phones or other internet-connected devices are NOT allowed for tests. Use of a smart phone during an exam is considered cheating with the penalties associated with it (see below).

Problem Sets (165 pts)

Problem sets (15 pts each) will be assigned each week and posted on Canvas no later than the Sunday night preceding the week. They will be due and submitted on Canvas by Monday 9am following that week (i.e., eight days later). There will be a total of 13 problem sets, and students may drop their two lowest problem set scores. The reason for dropping the two lowest problem set grades is to accommodate for unforeseen events, including those that prevent on-time submission. Therefore, late problem set submissions will not be accepted and will have to count towards these two drops.

Recitation Attendance and Participation (45 pts + 5 pts extra credit)

All students must be enrolled in a recitation section, which will meet every week, including the first week of class. Recitation periods will involve answering questions, working problems, and expanding on themes related to the previous week's material and the graded problem sets that were just returned. Recitation will not be used to discuss the current week's problem set that has not yet been turned in. Students will be graded on attendance and participation in recitation sections (3 pts per week; 45 pts total). To obtain full credit, students must attend and remain through the whole period and participate in the discussion of problem sets and related genetic concepts. Student may miss 1 recitation no questions asked and still receive full points. Otherwise, if students have a valid excuse that prevents them from attending recitation section,

they must make arrangements with their TA (in advance) to attend another section that week, or in the case of illness, be excused.

Each student is also allowed (not required) to make one short presentation (5 minutes maximum) on a “Genetics in the News” article at the beginning of a recitation period. To do this, a student must give a copy of the article to the TA and arrange for a time when the presentation will be made to the recitation class. Making a presentation will be rewarded by the addition of 0 to 5 extra credit points, depending on the quality of the presentation. No more than two students can make Genetics-in-the-News presentations each week, so students must sign up in advance for slots on a first-come, first-served basis.

iClicker Participation (40 pts)

We will use iClicker Cloud technology to ask interactive questions during the in-person lectures. These will be graded for completion, so students will receive full credit (1 pt per lecture) for submitting answers even if those answers are incorrect. We will drop the three lowest scores for iClicker participation, so students can still receive full credit (40 pts) if they miss up to three classes. The reason for dropping the three lowest grades is to accommodate for unforeseen events that prevent attendance and participation in individual lectures. Therefore, missed classes will have to count towards these three drops (except for cases of illness; see below). Visit the [Student iClicker Information](#) page for instructions on setting up an iClicker Cloud account. This technology allows you to answer polling questions with a personal device such as a smart phone or a laptop. If you do not have access to such a device, iClicker remotes can also be purchased from the bookstore, but the specialized remotes are otherwise not required for participation in iClicker Cloud.

Regrading of Exams and Assignments

If students have concerns about grading, they must present the assignment for regrading within one week of when it was returned. Regrade requests for exams should be sent to the lecture instructor. Regrade requests for problem sets should be submitted to the recitation instructor (TA). We are happy to discuss how an assignment was graded at any point, but formal regrade requests will only be accepted within the one-week time window. For any regrade requests, the entire assignment (not just individual questions) will be regraded. Therefore, it is possible to lose points on a regrade if we find that credit was mistakenly given for incorrect answers.

Assignment Policy for Covid and Other Illnesses

During the ongoing pandemic, it is all the more important that students not come to class when sick. Your grade will not be penalized if you cannot attend in-person class meetings because of an illness or Covid quarantine order. We have the following course policies in place to deal with missed attendance or assignments due to illness.

- **iClicker participation.** If you miss lecture due to illness or quarantine, watch the lecture(s) you missed (either live or recorded) on Echo360 and send the lecture instructor a single e-mail when you return to class with your iClicker answers for all lectures you missed while you were ill. Note that any missed sessions due to illness will not count against the three “free” missed iClicker sessions that all students are given for the semester.
- **Recitation participation.** Everyone gets one free “no questions asked” absence from Recitation. Otherwise, If you cannot attend an in-person recitation due to illness or quarantine, notify your TA and you will be excused from the participation requirement for that week.

- **Problem sets.** We will allow you to drop your two lowest problem set grades for the semester. Therefore, if you are unable to turn in a problem set due to illness for one or two weeks, these scores can be dropped without affecting your grade.
- **Exams.** If you are unable to attend an exam due to illness or quarantine, let the instructor know as soon as possible, and we will schedule a make-up for you.
- **Long-term illness.** The above policies are intended to account for disruptions and occasional missed assignments/attendance from short-term Covid or other illnesses. If you experience more severe and long-term disruptions for health reasons that prevent participation in the course for multiple weeks, contact the instructor to work out a customized plan on how best to proceed in the course.

Grading Summary

Grades will be calculated according to the following breakdown:

Exams (4)	400
Problem Sets	165
Recitation Attendance/Participation	45
iClicker Participation	40
Total	650

Individual student's fractional grades will be rounded to the nearest whole number (e.g., 69.6 = 70 and 69.4 = 69). Then grades will be assigned on the following scale:

97-100	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
70-76	C
60-69	D
0-59	F

Academic Integrity

Exams are to be completed by each student on their own without assistance from other individuals, including other students in the course. For problem sets, it is permitted to work with other students to arrive at an answer for each problem. However, it is not acceptable to copy answers verbatim from another student's problem set, the text, online sources, computational tools, or a solutions manual. Written answers must be provided in your own words. Recognizably copied answers will receive zero credit and be considered cheating. The use of online "homework helper" sites is not permitted in this course. Use of these types of resources will be considered receiving unauthorized assistance and, therefore, a violation of the student conduct code. This course will adhere to the CSU Academic Integrity Policy as found on the [Student Responsibilities page of the CSU General Catalog](#).

At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

On each exam, you will have the opportunity to sign the following honor pledge.

Honor Pledge: I have not given, received, or used any unauthorized assistance, nor will I do so.

You are not required to sign the pledge, nor is there any penalty for not signing. It is simply a reminder that your integrity is the most valuable personal asset that you possess.