BI 320, MOLECULAR GENETICS (CRN 31527)
Spring 2023

David Garcia, PhD, Instructor	dmgarcia@uoregon.edu OH: 11:30am-12:30pm Thurs, Streisinger 312
Acadia DiNardo, BA, GE	acadiad@uoregon.edu OH: 10-11am Wed, Streisinger 225
Saumya Keremane, BS, GE	saumyak@uoregon.edu OH: 3:30-4:30pm Tues, Streisinger 225
Stevana Schauer, BS, GE	stevanas@uoregon.edu OH: 2-3pm Thurs, Straub 258

BI 320 is an advanced undergraduate course covering gene expression and gene regulation in both prokaryotic and eukaryotic organisms. A prerequisite for your success is mastery of the material presented in BI 214/BI 282H and a basic understanding of protein and nucleic acid biochemistry. We will explore how the genome and the transcriptome is organized and physically structured, and how different sets of genes are selectively activated in different circumstances. Emphasis will be placed on the experimental approaches that established fundamental principles in molecular genetics found throughout nature.

Major Learning Objectives:
In this class you will:

- Become familiar with prokaryotic and eukaryotic gene architecture and how it relates to regulation of gene expression. There will be an emphasis on eukaryotic systems.
- Understand the applications and limitations of common molecular genetics techniques and be able to interpret data from application of these techniques.
- Apply the above concepts to propose a means of testing hypotheses regarding gene expression regulation.

Required Course Material:
(1) *Molecular Biology: Principles and Practices,* 2nd edition (Cox, Doudna, and O'Donnell) Readings are listed below. Copies of the textbook will be available in the Science Library. Scanned pages of the textbook readings will also be uploaded to Canvas.
(2) iClicker

Lectures:
Tuesdays and Thursdays
10:00–11:20am in Chapman 220
Content presented in lectures is mandatory and will be presented in assessments.
A live Zoom option will *not* be offered.
Attendance in-person is mandatory and will constitute 2.5% of your grade (see policy below).

Discussion Sections:
Fridays
Mandatory Discussion Sections in Volcanology 101
9:00–9:50am (31528, Saumya); 2–2:50pm (31529, Stevana); 3:00–3:50pm (31530, Acadia)
The discussion sections will include brief review of core material from lectures of the week, as well as active learning for problem solving. Sessions close to exams will provide a review of pertinent material.
Attendance is mandatory and will constitute 2.5% of your grade (see policy below).

Exams:
EXAM 1: during class time on Tuesday 4/25
EXAM 2: during class time on Thursday 5/18
FINAL: 8:00–10am on Monday 6/12 in Chapman 220 (location to be confirmed later in term)

Course Communication:
The UO Canvas Site will be used to distribute all announcements and information for the class. Please familiarize yourself with the site, download and print the lecture notes and readings, and consult it frequently for

announcements and updates. ***Please make sure that your Canvas settings allow Canvas to email you when new announcements are posted.***

Academic Honesty:
Academic dishonesty includes various forms of cheating and will not be tolerated. Academic dishonesty includes but is not limited to:

1. Copying another person's answers to exam, quiz, or problem set questions.
2. Utilizing materials otherwise not allowed on exam.
3. Having someone else take your exams, quizzes, or problem sets.
4. Altering your answers for a regrade.
5. Obtaining/distributing previous exams/quizzes/problem sets if those materials are not made available by the instructor to everyone in the class.
6. Posting course material (exams/quizzes/problem sets/any submitted work) on outside public or private websites (e.g. Course Hero, Chegg, etc.)
7. Misrepresenting circumstances leading to missed attendance, exams, quizzes, or problem sets.
8. Using ChatGPT or similar algorithms for the essay.

Note that *we take this extremely seriously* and should we determine that cheating has occurred, consequences can be severe, such as receiving a **zero** for an entire exam/assignment. These cannot be made up.

Furthermore, these activities can be reported to the Dean of Students office, which would result in a failing grade and other serious consequences for your academic standing. For further definitions of cheating and its penalties, consult the University of Oregon Student Conduct Code https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code.

Honor Code:
I will ask you to certify that your problem sets, quizzes, essay, and exams are your own work.

Student Health:
I ask that you consider the health of your classmates and instructors in the actions that you take. If you are feeling unwell, please use your best judgement. I will make every effort to make sure each student has a good learning experience, regardless of these circumstances. Thank you for your commitment to this policy.

Grading Policy:
The final course grade will be calculated by the distributions below. Please make note of the due dates.

Assignment	**% of final grade**	**Due date**
Problem Sets (4)	10%	see schedule
Importance of Diversity in Science (short paper)	2.5%	**4/10**
Quizzes (7, lowest grade will be dropped)	22.5%	see schedule
Exam 1	17.5%	**4/25**
Exam 2	20.0%	**5/18**
Final Exam	22.5%	**6/12**
Attendance to Lecture	2.5%	
Attendance to Discussion Section	2.5%	

Letter grades will be determined based on total points. Getting:

- >90% of the points guarantees an A-
- >80%, B-
- >70%, C-
- >60%, D-
- And <60%, F

In the event that scores are skewed downward, the final scores will be curved with breaks between each bin determined by “jumps” in the grade data that separate groups of students. This curve is designed so that it can only help you. If the entire class receives >90%, every student would receive an A- or better.

- Problem Sets that are turned in late cannot receive full credit, and this is because we will post keys for these soon after the deadline. Quizzes cannot be taken late either (see policy below).

KEEP ALL OF YOUR GRADED WORK UNTIL FINAL GRADES ARE POSTED.
Be aware that under certain circumstances, and for byzantine reasons, your current grade reported on Canvas may not perfectly match reality, although in most cases it is expected to be close.

Problem Sets (10%): Problem set due dates are indicated on the Syllabus. Answers must be typed (with the exception of illustration, which can be hand drawn), and should be concise. Problem sets must be turned in via the Canvas website by 5pm on the indicated due date. GEs will not provide detailed written feedback on grades so please check the answer key for details about the answers.

Importance of Diversity in Science (short paper, 350-500 words, typed; 2.5% of course grade): A self-reflection on how your background influences your scientific interests and opportunities. Also mention a barrier that you see toward the goal of increasing the diversity of the people practicing science in the United States, and a way that this could be addressed. Citations welcome. For full credit, give a demonstrative effort. Do not use ChatGPT or similar algorithms. Essays will be screened for clear similarities to AI-outputs and if a close match may receive zero credit. **Due 5pm on Monday 4/10**.

Quizzes (22.5%): Quizzes will be taken **at the beginning of class (10:00am) on Canvas** on indicated days and be timed. They will cover lecture material presented from the lecture date of the previous Quiz up through and including the most recent lecture. There will be seven quizzes in total and the lowest quiz score will be dropped automatically. You may use *your own* notes and textbook to answer the questions but you cannot consult with other students as you take it.

Exams (60%): Exams will be administered in person and will be open book and open notes. You may not consult with anyone while taking the exam, nor may you utilize any other resources (including from the internet). The emphasis will be on testing your understanding of the concepts. If you feel that you have been graded unfairly **after** viewing the answer key, you must submit your reasoning to David in writing, within one week of the day the exam is returned to you. Attach an image of the original exam question to your request. We reserve the right to change this rule if we determine this option is being abused.

EARLY EXAMS WILL NOT BE GIVEN UNDER ANY CIRCUMSTANCES.

Exam 1 (17.5%): This exam will cover material from the beginning of the course through **Lecture 6**. You will have the entire scheduled class time to take your exam. You are not allowed to consult with anyone else while taking this exam. If you take your exams through the accessible education center (AEC), then you must sign up with the AEC at least a week in advance.

Exam 2 (20%): This exam will cover material from **Lectures 7 through 11** but also incorporate methods taught in the "Studying genes" lectures as well. You will have the entire scheduled class time to take your exam. You are not allowed to consult with anyone else while taking this exam. If you take your exams through the accessible education center (AEC), then you must sign up with the AEC at least a week in advance.

Final Exam (22.5%): 8:00–10:00am on Monday, June 12th. This exam will cover material from Lectures 12 through 18 but also incorporate methods taught in the "Studying genes" lectures as well. You will have 2 hours to take your exam. You are not allowed to consult with anyone else while taking this exam. If you take your exams through the accessible education center (AEC), then you must sign up with the AEC at least a week in advance.

Materials permitted during exams: writing instrument for writing answers on paper; physical notepaper for making your own notes during exam (not typed); your lecture/reading notes (pre-handwritten or pre-printed or pre-typed, but they must be yours); textbook (either physical copy, e-copy, or pdfs of scanned readings provided on Canvas); calculator (physical or electronic); either a laptop or tablet PC, (but not both) only for viewing assigned readings or pre-written notes. Thus the only apps that you may use on a device are those required to access what is listed above (e.g. Adobe Reader,

Preview, etc.) or a calculator app—absolutely **no** other apps will be allowed including internet browsers (other than required to view e-book).

Materials NOT permitted during exams: anything else, ***including cell phones***—turn your cell phone off and leave it in your bag below your desk, no cell phone access during exams.

Attendance/Participation (5% total): This is a face-to-face course. Attendance is important because we will develop our knowledge through in-class activities that require your active engagement. You won't be able to benefit if you are not there. *Students may miss four lectures this term and two discussion sections*, regardless of the reason with no penalty. This means we do not have "excused" or "unexcused" absences. Please stay home and use one of your absences if you are sick.

There are 18 lectures and 9 discussion sections. Your attendance at both will be monitored by your participation in iClicker questions. Thus attendance and participation at up to 14 lectures is equal to (2.5%) / 14 = ~0.18% of your grade. Attendance and participation at up to 7 discussion sections is equal to (2.5%) / 7 = ~0.36% of your grade. (If you attend every session, it will certainly improve your learning and performance on other assessments, but you won't receive additional participation credit.)

Some students will need to use some of their absences to isolate and rest if they get COVID. We made our absence policy with this in mind, so please use your absences with care so they're there for you if you need them. Students with COVID are encouraged to seek guidance and resources at UO's COVID-19 Safety Resources webpage.

Your success is genuinely important to us. If challenges come up for you this term around attendance, please contact us as soon as you can. Together we can identify what resources or strategies might be available to support you and your learning.

Exam 1 and 2 extra-credit haikus:
Compose a haiku about a molecule or concept learned in preparation for the exam. *Be creative and whimsical*, but please follow rules for number of lines and syllables in order to receive full credit.

Some examples here:
https://www.scq.ubc.ca/cell-biology-via-seventeen-syllables-lessons-through-haikus/

Submit your haikus via the Canvas website **by 5pm on the day following exams 1 and 2**. Only a single haiku per exam may be submitted. Note that duplicate haikus from two or more students may receive no credit and place additional scrutiny on your other work, therefore do not depend on "poem generators" or take existing ones you find on the internet. Have fun with it!

Learning Environment:
The University of Oregon and I are working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact the UO Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu

Reporting:
The instructor of this class is a Student-Directed Employee. As such, if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you. As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. I will only report the information shared to the university administration when you as the student requests that the information be reported (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes I keep.

Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at titleix.uoregon.edu.

Class Courtesy:
Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter so that I may address you properly.

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful also includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

Date	**Event**	**Reading Cox, Doudna, O'Donnell 2nd ed.** *tentative page numbers*	**Assessment or work due**
Week 1			
Tu 4/4	**Lecture 1** Foundations of molecular genetics	43-54	
Th 4/6	**Lecture 2** Studying genes	212-217, 220-223, 226-232	
Fri 4/7	**Discussion section 1**		
Sat 4/8	*Last drop day w/o "W"*		
Week 2			
Mon 4/10			**Diversity paper due @ 5pm**
Tu 4/11	**Lecture 3** Studying genes continued	239-243, 246-248 (CRISPR)	**Quiz 1**
Th 4/13	**Lecture 4** Genome organization in eukaryotes vs. prokaryotes, DNA mutations	246-248 (CRISPR), 260-269, 414-420	
Fri 4/14	**Discussion section 2**		**Problem Set 1 due @ 5pm**
Week 3			
Tu 4/18	**Lecture 5** Chromosomes, chromatin, nucleosomes	298-305, 332-342	**Quiz 2**
Th 4/20	**Lecture 6** Chromatin, nucleosomes	343-353	
Fri 4/21	**Discussion section 3**		**Problem Set 2 due @ 5pm**
Week 4			
Mon 4/24	GE-lead review session for Exam 1		
Tu 4/25	**EXAM 1**		**EXAM 1**
Wed 4/26			**Extra Credit 1 due @ 5pm**
Th 4/27	**Lecture 7** Transcription in bacteria	520-536	
Fri 4/28	**Discussion section 4**		

Week 5			
Tu 5/2	**Lecture 8** Transcription in eukaryotes	537-545	**Quiz 3**
Th 5/4	**Lecture 9** Transcriptional regulation in eukaryotes I	727-736	
Fri 5/5	**Discussion section 5**		
Week 6			
Tu 5/9	**Lecture 10** Transcriptional regulation in eukaryotes II	736-743	**Quiz 4**
Th 5/11	**Lecture 11** RNA processing I	554-562	
Fri 5/12	**Discussion section 6**		**Problem Set 3 due @ 5pm**
Week 7			
Tu 5/16	**Lecture 12** RNA processing II	562-569, 577-579, 580-582 (16.5)	
Wed 5/17	GE-lead review session for Exam 2		
Th 5/18	**EXAM 2**		**EXAM 2**
Fri 5/19	***No Discussion section today***		**Extra Credit 2 due @ 5pm**
Sun 5/21	*Last day to withdraw from classes*		
Week 8			
Tu 5/23	**Lecture 13** The genetic code	590-600	**Quiz 5**
Th 5/25	**Lecture 14** Protein synthesis I	618-630	
Fri 5/26	**Discussion section 7**		
Week 9			
Tu 5/30	**Lecture 15** Protein synthesis II	630-638, 648	**Quiz 6**
Th 6/1	**Lecture 16** Protein synthesis III	639-649	
Fri 6/2	**Discussion section 8**		**Problem Set 4 due @ 5pm**
Week 10			
Tu 6/6	**Lecture 17** Translational control in the cytoplasm	650-652, 765-768	**Quiz 7**
Th 6/8	**Lecture 18** Translational control continued and RNA interference	771-779, 791-793	
Fri 6/9	**Discussion section 9**		
Finals Week			
Mon 6/12	**8:00–10am FINAL EXAM**		