

SYLLABUS FOR BIOL203: Molecular Biology and Genetics-SPRING 2020

Room W615, T-Th, 5:35-6:50.

Instructors

Professor Laurel Eckhardt
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Office: 830 Hunter North
Office Hours: Tuesday 12-2 PM

Professor Diego Loayza
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Office: 913 Hunter North
Office Hours: Wednesday 3-5 PM

It is highly encouraged to make an appointment with the relevant instructor by e-mail.

Walk-ins are not guaranteed a meeting!

Peer tutoring (Skirball Science Learning Center, Hunter College Library, 7th floor Hunter East)
Peer tutoring will begin Monday, February 3.

Polina Safovich (PS) and *Adam Berri* (AB)

Mondays: 9:30am to 12pm (AB)
2-3pm (AB)
7:00pm to 8:30pm (PS)

Wednesdays: 7:00pm to 8:30pm (PS)

Thursdays: 9:00am to 11:00am (PS)
4:00pm to 5:00pm (PS)

Fridays: 2:00pm to 4:30pm (AB)

Class Location & Time:

Tuesday and Thursday, 5:35-6:50 PM. Room W615.

Course outline

This course includes a detailed examination of the fundamental principles of gene expression. The processes of DNA replication, transcription, mRNA processing, and translation will be extensively covered. Prokaryotic and eukaryotic systems will be described. Classical Mendelian as well as molecular genetics principles will be covered in the lecture through a discussion of several model systems. Important genetic processes such as recombination, transposition and DNA repair will be discussed in-depth. The course will provide a modern view of the concept of the gene, and gene transcriptional and post-transcriptional regulatory mechanisms. Hands-on laboratory experiments will reinforce bacterial and eukaryotic genetic concepts as well as provide basics in recombinant DNA technology.

Course format:

The lectures will be based on assigned textbook readings as detailed in the semester schedule, attached. Students are advised to prepare for each lecture by reading the required chapters and by examining the lecture slides, provided through the course's Blackboard (Bb) site. Class attendance is mandatory for all students. A few additional reading assignments may be given. On occasion, we will post narrated versions of parts of our lectures for you to play before you come to lecture. This material will not be emphasized in class (because you've seen it before) and therefore the lectures will rely on your studying it on your own. We will let you know ahead of time if this is the case.

Homework will be assigned each week and will be due usually each Monday by midnight (see course calendar for exact due dates).

Hands-on laboratory experiments will reinforce bacterial and eukaryotic genetic concepts as well as provide basics in recombinant DNA technology. The laboratory exercises will be coordinated with the topics covered in class.

The final grade will be based on:

1. Two midterm classroom exams (20% each). The dates are February 27 for Midterm 1, and April 2 for midterm 2.
2. A final classroom exam (30%), non cumulative, on May 19, 2020. Consult the schedule at the end of this document for lectures included in each exam.
3. Weekly, graded homework assignments (10%). There will be 13 assignments (one is simply a login assignment). Each assignment is due usually on a Monday before midnight. The dates for each assignment are indicated on the lecture calendar shown on the last page. These assignments require your purchasing and logging in to the 'Mastering Genetics' resource from the publisher, Pearson Education Inc. (bundled with the textbook, see below). We will instruct you on how to do this during the first lecture if you have problems doing it on your own.
4. Lab attendance and lab reports (20%). There will be 4 lab reports during the semester. Lab reports 1,2 and 4 are worth 100 points each, and lab report 3 is worth 50 points. There will be 3 "exercise" sessions in lab, prior to each course exam. Each of those sessions will have "quizzes" that will be worth 25 points each.

We will provide detailed instructions on the expected content and format of the lab reports. The lab reports must be the result of your own work: plagiarism is not tolerated and will be reported to Hunter's Office for Academic Integrity. Plagiarism is easily noticed, so do make sure that you do not use someone else's work, and do not allow anyone to copy your lab reports: both the student whose work is copied and the student copying will be reported to the Office of Academic Integrity.

5. Extra points: using the 'clicker' for classroom questions

We will use the 'iclicker' system during the lectures, which will be our way to ask you questions in the classroom and test immediately for understanding. You may connect to the system through your personal device (phone or tablet) or you may purchase a 'clicker' (remote from the manufacturer). The fee without the clicker (using the app on your e-device) is \$11.99, and \$41.99 if you purchase the clicker. The 'iClicker 2' remote is for sale at the Shakespeare library, but is a bit more expensive there (\$55.85). It is on sale on Amazon for \$43.74 (link: https://www.amazon.com/iClicker2-student-remote-iClicker/dp/1498603041/ref=sr_1_1?ie=UTF8&qid=1516995530&sr=8-1&keywords=iclicker). Your participation will allow you to collect extra points that will be added to your total at the end of the semester, so it will allow you to improve your grade.

Purchase of the iClicker system is required for the course. Use your Hunter ID number as your Student ID.

We will post information on Blackboard on how to register and how to use this system. We will provide information in class as well, during the first week.

We expect that by the second week you will have your Mastering Genetics and iClicker accounts set up.

FINAL EXAM: Tuesday, May 19, 5:20pm – 7:20pm

There will be no make-up mid-term exams. Failure to appear for a mid-term exam will result in a grade of 0. Missing lab reports shall be given a grade of 0.

A make-up final exam will only be administered to those students with a documented emergency, deemed acceptable by the instructors, and only in extreme cases.

Important: The withdrawal deadline for Spring 2019 courses is Wednesday April 1, 2020.

You will have to decide whether to take a W based on the scores available to you at that time. You are encouraged to discuss your options with the instructors and your TA ahead of time if you are considering withdrawing from the class.

Pre-requisite

BIOL100 and 102 or equivalent, and general chemistry I and II (lecture + lab), corresponding to CHEM102, CHEM104 and CHEM106 at Hunter.

Students should have basic knowledge in DNA and protein structure, gene expression, mitosis, meiosis and chromosome transmission, at the level of a general introductory Biology class. Students are highly encouraged to review these concepts in a fundamental Biology textbook prior to the semester's start.

Specifically, students are advised to review the relevant chapters covered in BIOL100:

- Unit one: p.77-89 (polypeptides-nucleic acids), Chapter 12, and Unit

three (Chapters 13-21) in:

“BIOLOGY” 8th ed., Campbell & Reece, Pearson Cummings ed.

or:

• Part 2, Ch. 7-14, in “Principles of Life”, Hillis, Sadava, Heller, Price, Freeman & Co.

or:

equivalent material, covering nucleic acids, proteins, mitosis, meiosis, basics in chromosomal inheritance, and fundamentals in gene expression, in other texts.

Learning outcomes

1. Describe the multiple processes associated with gene expression and regulation in prokaryotic and eukaryotic systems.
2. Use fundamental genetic concepts to determine the heritability of traits and to develop gene linkage maps.
3. Answer questions regarding gene function by applying appropriate methods in forward and/or reverse genetics.
4. Compare the structures of DNA and RNA and associate each with their roles in gene expression.
5. Use an understanding of DNA and RNA structure to carry out techniques in recombinant DNA technology (e.g. DNA cloning, siRNA design, gene knock-outs, etc.)
6. Evaluate and interpret datasets obtained through experimentation.

How to succeed:

Review the material distributed via Blackboard ahead of time and read the book chapters in a timely fashion. The distributed material includes (but is not limited to) the slides used during the lecture. By reviewing these materials, students should come to class prepared, will have a good overall vision of the topic that will be covered in class, and will be ready to take notes on the slides (arriving at class with a printout of 4 slides/page works well to this effect). The class and tests focus on understanding and logic, rather than on pure memorization. Do not wait for the week of the exam to review. Ask questions and study! A little bit of reviewing, studying and discussion (see office hours policy), every week, over the course of the semester, is a much better strategy than to study the material all at once. Students who study for the exams exclusively during the 2-3 days before the exam date do not do well. We have also found that the highest-scoring students are also those who attend every class.

Peer mentoring sessions: Two former Biol 203 students will hold review/tutoring sessions each week in the Skirball Science Learning Center (Hunter Library). TAKE ADVANTAGE OF THIS SERVICE and don't wait until an exam.

The peer mentors are **Polina Safovich** and **Adam Berri**. See days/times of tutoring on first page of syllabus.

Required Text:

PLEASE NOTE: you need to purchase BOTH the book AND the access card. Make sure your ISBN matches the one shown below. The book alone has another ISBN.

MasteringGenetics, bundled with Genetic Analysis: An Integrated Approach. Third Edition.

Mark F. Sanders and John L. Bowman

Editor: Pearson Education, Inc.

If you want the hardcover, bundled with the Mastering Genetics access code, here is the ISBN:

ISBN-13: 978-0134807799

The loose leaf version is also available. You may have to purchase the access card separately from the publisher.

The book, access card and iClicker are available at the Shakespeare bookstore.

The book and access card are also available from the publisher's site www.mypearsonstore.com, from other online retailers (Amazon, Barnes and Noble etc.) or the Shakespeare bookstore.

Note: required homework assignments will be made and graded through MasteringGenetics.

It is essential that you purchase access to the companion web resource called Mastering Genetics (the "access card"). The bundled version gives you an access code to Mastering Genetics. We will give you instructions on how to register to the site in class.

Also required:

Register for iClicker system – required in order to receive “extra points” in course. Instructions on how to register will be posted on Blackboard and in first class.

Academic Dishonesty

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

Special Accommodations

In compliance with the American Disability Act of 1990 (ADA), Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and/ or Learning) consult the Office of AccessABILITY located in Room E1124 to secure necessary academic accommodations. For further information and assistance please call (212- 772- 4857)/TTY (212- 650- 3230). The website for Hunter’s AccessABILITY is: <http://www.hunter.cuny.edu/student-services/access/welcome>

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444). All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123. CUNY Policy on Sexual Misconduct Link: <http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

Lecture topics: refer to the last page of this document.

**Lecture Schedule, Biol 20300
Spring 2019**

Eckhardt (LE) & Loayza (DL)

Lecture	Date	Hwk due (by midnight on date indicated)	Topics (subject to change)	Chapter readings	
1	Tues, 1/28	Saturday, 2/1 (Login)	Course description & start of DNA structure	1&7	LE
2	Thurs, 1/30	Monday, 2/3 (lecture 1&2)	DNA structure & replication	7	LE
3	Tues, 2/4		Same as above	7	LE
4	Thurs, 2/6	Monday, 2/10 (lectures 3&4)	Transcription and mRNA processing	8	LE
5	Tues, 2/11		Transcription and mRNA processing, cont.	8	LE
6	Thurs, 2/13	Monday, 2/17 (lectures 5&6)	Translation	9	DL
7	Tues, 2/18		Cell division and chromosome heredity	3, 10.1, 10.6, pp. 543-545	DL
8	Thurs, 2/20	Monday, 2/24 (lectures 7&8)	same as above	3, 10.1, 10.6	DL
9	Tues, 2/25		Gene regulation in eukaryotes	13	LE
	Thurs, 2/27		FIRST MID-TERM EXAM (lectures 1-8)		
10	Tues, 3/3		Gene regulation in eukaryotes, cont.	13	LE
11	Thurs, 3/5	Monday, 3/9 (lectures 9-11)	Transmission genetics	2	LE
12	Tues, 3/10		Same as above	2	LE
13	Thurs, 3/12	Monday, 3/16 (lectures 12&13)	Gene interactions	4	DL
14	Tues, 3/17		Linkage and mapping in eukaryotes	5	DL
15	Thurs, 3/19	Monday, 3/23 (lectures 14&15)	Mutations, DNA repair, Homologous recombination	11, pp546-548	DL
16	Tues, 3/24		Chromosome aberrations and transposition	10	DL

**Lecture Schedule, Biol 20300
Spring 2019**

Eckhardt (LE) & Loayza (DL)

17	Thurs, 3/26	Monday, 3/30 (lectures 16&17)	Sickle cell anemia: phenotype to gene	Review: 1.4, 5.5, 7.5	LE
18	Tues, 3/31		Genetic analysis in prokaryotes	6	DL
	Thurs, 4/2		SECOND MID-TERM EXAM (lectures 9-17)		
	Tues, 4/7	NO CLASS	WEDNESDAY SCHEDULE		
	4/8-4/16		SPRING BREAK		
19	Tues, 4/21		Gene regulation in prokaryotes	12	DL
20	Thurs, 4/23	Monday, 4/27 (lectures 18-20)	Same as above	12	DL
21	Tues, 4/28		Forward and reverse genetics	14, 15	LE
22	Thurs, 4/30	Monday, 5/4 (lectures 21&22)	Forward and reverse genetics, cont.	14, 15	LE
23	Tues, 5/5		Same as above	14, 15	LE
24	Thurs, 5/7	Monday, 5/11 (lectures 23&24)	Developmental genetics	18	DL
25	Tues, 5/12		Same as above	18	DL
26	Thurs, 5/14	Monday, 5/18 (lectures 25&26)	Same as above	18	DL
	Tues, 5/19	5:20pm – 7:20pm	FINAL EXAM (lectures 18-26)		