

BIOS S-1a: Introduction to Molecular and Cellular Biology

Harvard Summer School 2017

Course Syllabus

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Office hours:	TBA	
Website:	https://canvas.harvard.edu/courses/26757	
Lecture:	Tuesday and Thursday, 8:30 – 11:30am, Science Center Hall C Additional required class on Friday, July 7 th , 8:30 – 11:30am, Hall C	
Laboratory section:	Thursday afternoons from 1:00 – 4:00pm. Rooms TBA.	
Discussion section:	Tuesdays from 1:00-2:30pm or 7:00-8:30pm. Rooms TBA	

COURSE DESCRIPTION

The principles of molecular and cellular biology are covered in this course, with a focus on molecular mechanisms, energy and metabolism, and genetics. The emphasis is on cells as evolved systems for the capture and transformation of energy, the processing of molecular information, and the relationship between form and function. Laboratory sections scheduled throughout the series allow students to reinforce concepts covered in lecture. BIOS S-1a is part of an introductory biology series (BIOS S-1a and BIOS S-1b) that fulfills the medical school admission requirement of two semesters of biology.

Prerequisites:

High school mathematics (satisfactory completion of algebra), chemistry, and biology. College-level chemistry is not required but is strongly recommended. Students are assumed to be familiar with atomic structures, types of bonding, electronegativity, pH, redox reactions, and chemical and structural formulas.

Textbook (required):

- 1) Life: The Science of Biology, 11th edition, by Sadava, Hillis, Heller, and Hacker. ISBN-13: 978-1-319-01016-4
- 2) LaunchPad, the associated online resource that students will use to take pre-class quizzes

The most cost effective method to access these resources is to purchase the LaunchPad-ebook package online for \$99. This includes access to the electronic version of the textbook, as well as online assessments that will be used in the course and other study resources.

LaunchPad access to the course is available at:

<http://www.macmillanhigher.com/launchpad/life11e/5513276>

LECTURE

Students are required to complete the assigned reading and pre-class quiz prior to every lecture. Given the fast pace of the course, it is important that you do not fall behind.

Pre-class quizzes:

Pre-class quizzes will count towards 5% of your grade and must be completed before the start time of the associated lecture. Students can access quizzes on the LaunchPad platform. Each quiz will be assigned a minimum point value that students must reach to receive full credit. Students can attempt as many questions as necessary to achieve the minimum point value assigned to each quiz. Because you are not penalized for incorrect answers, pre-class quizzes should be considered opportunities to assess your understanding of the reading and ensure that you are prepared for class.

Class:

Students are expected to arrive on time and to be prepared to participate in class activities by completing the reading and pre-class quizzes in advance of class. During class, material will be presented using a combination of lecture and in-class activities, so preparation is essential. If you are unable to attend a class session for any reason, you will still be held responsible on all assignments and exams for the content that was covered during that class period.

LABORATORY

Labs will start during the first week of class, and lab attendance is **mandatory**. Lab attendance, participation, assignments, and quizzes comprise 15% of your grade. The experiments that you complete will provide you with opportunities to gain hands-on experience working with laboratory equipment, to further explore topics discussed in lectures, and to analyze real data. You must come to each lab prepared:

- Bring a pair of lab safety glasses or goggles (available from the COOP; if you wear eyeglasses, make sure you purchase a pair that fits over them)
- Wear clothing covering at least to your knees, and closed-toe and heel shoes
- Read through the lab that you will be performing that day (posted on the “Laboratory” page of the course website) and any relevant appendices

Lab Sections:

You will sign-up for a lab during the first week of class using the online sign-up posted to the course calendar on the website. Lab sections will be filled on a first-come, first-served basis.

Conflicts:

There are no make-up laboratory sessions. If you have an emergency or illness, contact your TF as soon after as possible. If you miss a lab and do not contact your lab section TF and the course instructors with supporting documentation, you will receive a zero for that lab.

Lab manual:

Laboratory protocols will be available to download from the course website prior to lab.

Lab assignments:

Each lab session will begin with a pre-lab quiz, with questions based on the preparations you should have made for that day's lab and on concepts from prior labs. In addition, each lab will have an accompanying post-lab write-up that must be completed and submitted before you leave.

Grading:

The laboratory grade consists of attendance in laboratory sessions, good laboratory practice, and laboratory reports, assignments, and quizzes. The last lab session consists of a lab practical, which is a timed, cumulative test covering all the lab experiments that you perform during the course. The format is different from that of a standard written exam. Questions will be set up as stations, with exhibits requiring you to use information, skills, and reasoning learned in each lab. Your lab TF will explain the process in more detail.

The lab grade distribution is as follows:

Lab	Points
Safety Quiz	10
Enzymes	50
PCR	50
Mitosis & Meiosis	50
Lac Operon	50
Photosynthesis	50
Lab Practical	140
Total	400

Total earned out of 400 points for laboratory assignments will count toward 15% of final grade.

DISCUSSION SECTIONS

Discussion section attendance and participation is mandatory. Sections will be led by teaching fellows once per week. The grades on your problem sets and your participation in discussion sections will total 10% of your grade. TFs will lead these sessions, which will include opportunities to review material from lecture and ask questions. You will sign-up for a discussion section online during the first week of class.

Problem Sets:

Problem sets will be assigned approximately once a week to give you an opportunity to apply the concepts covered in the textbook and class sessions. Problem sets will consist of questions which are similar in scope and difficulty to the types of questions that will be asked on the exams. Thus, completion of the problem sets will assist you in testing your understanding of the material and preparing for exams. Problem sets should be submitted online through the course website by the stated deadlines. Late submissions will not be accepted.

EXAMINATIONS

Exams will consist of questions from material covered in lecture and assigned readings from the textbook. Learning goals and objectives presented at the start of each lecture should serve as a study guide for each exam. There are no make-up exams. Students who miss two exams will not

be able to earn a passing grade in the course. The cumulative final exam will consist of material from Unit 3 (75%) and material from Units 1 and 2 (25%).

Exam corrections:

To encourage students to use exams not only to assess their knowledge but also as learning opportunities, students will be able to submit a written exam correction to one of the questions where they lost points. Students will be able to earn back up to 50% of the points deducted on the question for which they submit an exam correction. More details about exam corrections will be posted after the first exam.

GRADING

There are two options for calculation of the final grade, and the higher of the two will be selected for each student. As described above, in the event the instructor excuses absence from one midterm exam, option B will be utilized to calculate the final grade, and the one midterm score will count for 30% of final grade. Unexcused absences from an exam will result in utilization of option A, with a grade of zero on the missed exam, for calculation of final grade. Therefore, students who miss an exam, regardless of excuse, will forfeit their choice of options. Students are strongly encouraged to attend and complete all exams on the scheduled dates.

Component	Option A	Option B
Pre-class Quizzes	5%	5%
Problem Sets and Discussion Sections	10%	10%
Laboratory	15%	15%
Midterm 1	20%	15%
Midterm 2	20%	15%
Final Exam	30%	40%

To promote a collaborative, instead of a competitive, learning environment, grades in this class are **not** determined by a curve. Therefore, it is in your best interest to help each other learn. Students' final course letter grades will be determined by the follow scale:

*Range	Letter grade
90 – 100%	A-, A
75 – 89%	B-, B, B+
60 – 74%	C-, C, C+
50 – 59%	D-, D, D+
0 – 49%	F

*The exact cutoffs for each grade boundary are at the discretion of the instructors.

ACADEMIC INTEGRITY

Even though you will be working with classmates in discussion section and lab, any written work that you submit for a grade must be your own. You may discuss your work with others, but make sure to write everything in your own words, and make your own figures and tables (with titles and captions). Anyone caught plagiarizing or cheating on a lab, quiz, or exam may be subject to a grade penalty and/or sent before the Administration Board for additional sanctions.

You are responsible for understanding Harvard Summer School policies on academic integrity (<http://www.summer.harvard.edu/policies/student-responsibilities>) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting the wrong draft, or being overwhelmed with multiple demands are not acceptable excuses. To support your learning about academic citation rules, please visit the Resources to Support Academic Integrity (<http://www.summer.harvard.edu/resources-policies/resources-support-academic-integrity>) where you will find links to the Harvard Guide to Using Sources and two free online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools. The midterm exams and final exam must be taken individually, and you will not be allowed to refer to any books or notes during these exams.

ACCESSIBILITY SERVICES

Harvard Summer School is committed to providing an accessible academic community. The Accessibility Office offers a variety of accommodations and services to students with documented disabilities. Please visit <http://www.summer.harvard.edu/resources-policies/accessibility-services> for more information.

Date		Topic	Instructor	Reading
6/20	Tues	Biochemistry Basics, Proteins and Enzymes	MV	2.1-2.4, 3.1-3.2, 8.1, 8.3-8.5
6/22	Thurs	Carbs, Lipids, Nucleic Acids	MV	3.3-3.4, 4.1, 13.1-13.2
6/22	Thurs	Lab: Enzymes	TFs	
6/27	Tues	DNA Replication, PCR; Intro to Central Dogma	MV	13.3-13.5, 14.1-14.2
6/29	Thurs	From DNA to Protein: Gene Expression; Regulation of Gene Expression	MV	14.3-14.6, 16.1-16.2, 16.4-16.5
6/29	Thurs	Lab: PCR Part 1	TFs	
7/4	Tues	<i>Holiday – No Class</i>		
7/6	Thurs	MIDTERM EXAM 1 Gene Regulation Continued; Mutation and Molecular Medicine	MV	15.1-15.3
7/6	Thurs	Lab: Lac Operon & PCR Part 2	TFs	
7/7	*Fri	Cells: The Working Units of Life; Membranes	DL	5.1-5.5, 6.1-6.5
7/11	Tues	Mitosis and Meiosis, The Cell Cycle and Cancer	DL	11.1-11.7
7/13	Thurs	Mendelian Genetics	DL	12.1-12.5
7/13	Thurs	Lab: Mitosis & Meiosis	TFs	
7/18	Tues	Energy and Photosynthesis	DL	9.1, 10.1-10.4
7/20	Thurs	MIDTERM EXAM 2 Intro to Cellular Respiration	DL	9.2-9.3
7/20	Thurs	Lab: Photosynthesis	TFs	
7/25	Tues	Cellular Respiration Continued and Cell Signaling	DL	9.4-9.5, 7.1-7.5
7/27	Thurs	Recombinant DNA and Biotechnology	MV	18.1-18.6
7/27	Thurs	Lab: Lab practical	TFs	
8/1	Tues	Review	TFs	
8/3	Thurs	FINAL EXAM		