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2020

Biological Foundations I

Fardad Firooznia
CUNY City College

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BIO 10100
Biological Foundations I
Fall 2020

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Instructor contact information

Fardad Firooznia, Ph.D.

Office: Marshak 517

Tel: (212) 650-6580

E-mail: firooznia@ccny.cuny.edu

Course meeting times

- Lectures: Mon and Wed 5-6:15 pm, via Zoom (see Blackboard for Zoom link). The class meets synchronously. You are expected to attend the lectures as scheduled.
- Labs: There are 10 different lab sections. Each section meets at the scheduled time synchronously. You are expected to attend the labs as scheduled.
- Office Hours: Tue 1:00-4:00 pm, via Blackboard Collaborate Ultra. If the office hours do not work for your schedule, please contact me via e-mail to make an appointment for another time during the week.

Course communications through e-mail and Blackboard

- E-mail: From time to time, you will receive e-mail messages about the course through Blackboard. These emails are not sent to individual addresses. Please make sure your email address on Blackboard is current. Please check your e-mail regularly. If you have questions about course content or the practice questions (see below), post your questions on the Discussion Board on Blackboard. If you need to schedule a make-up lab or discuss an exam absence, feel free to send an email to me. However, you should not expect immediate responses. Please allow 24 hours, not including weekends, for a response before you send a reminder email. In your email please identify yourself and your lab section. **Emails without names and lab sections will not receive a response.**
- Blackboard: Blackboard will provide you with an online forum for discussions related to course topics, including questions you may ask about the practice questions or other course content material. Some of your assigned readings are posted on Blackboard. Written lab assignments will be submitted through Blackboard. We may also use Blackboard to share other course related information throughout the semester. I post practice questions, questions for class discussion, suggestions of what to look up in your readings ahead of time, and copies of lecture slides on Blackboard. You may be asked to post information to the Blackboard site in order to share what you have learned with your classmates (e.g., lab material). As your first assignment in Blackboard, take a minute and introduce yourself to the rest of the class in our Blackboard space on the discussion board under the 60 sec biography. For more information on Blackboard, please visit [this web site](#).

Textbook and readings

- This course is a Zero Textbook Cost (ZTC) course. We are using selected Chapters in the following textbook: [Biology 2e CCNY F2020](#). **Note:** this is an edited version of the book and is different than the copy you find on the OpenStax web site. There is also a link to access the book on Blackboard.
- For each topic under lecture material on Blackboard, see “What you should focus on” as you read the book chapters.
- Some additional course readings are listed in the syllabus. Lab instructions are available on Blackboard.

Course description and goals

This introductory course is the first of the core courses in the biology curriculum as a foundation for upper level courses in the major. The course emphasizes primarily the cell and molecular levels of organization. The course guides students in fundamentals of critical thinking and technical skills that are essential for mastering the content areas and being successful in upper-level courses. These include: critical thinking, collaborative learning, vocabulary skills, collection and handling of scientific data, and elements of scientific investigation, especially experimental design. Throughout the course we will do the following:

- Present key experiments underlying major findings in Biology.
- Analyze experiments to identify what questions are asked, what hypotheses are tested, what elements are included in an experimental design, what predictions are made based on the hypotheses and the experimental design, and whether the data match the predictions and support the hypotheses.
- Familiarize students with graphical representation of data in Biology, use of math for measurements and data analysis, and use of drawing for illustrating biological ideas.
- Introduce natural selection and evolution as fundamental concepts in Biology.

At the end of the course students should be able to do the following

1. Formulate an hypothesis and design a controlled experiment to answer a scientific question.
2. Compare and contrast the basic structure of prokaryotic and eukaryotic cells and discuss their evolutionary relationship.
3. Recognize the basic structure and function of biological molecules and describe how they relate to cell structure and function.
4. Describe the basic structure of cell membranes and the function of biological membranes in the control of transport.
5. Describe the basic structure and function of enzymes.
6. Compare and contrast photosynthesis and aerobic respiration and fermentation.
7. Describe the basic steps in signal transduction pathways involved in cell-to-cell communication.
8. Describe the steps in mitosis and meiosis and their role in cell and organism growth and reproduction.
9. Define a gene and explain its relationship to chromosomes, genetic variation, and the genetic basis of inheritance.
10. Explain basic mechanisms used to control gene expression in eukaryotes and prokaryotes.

Suggested study schedule for Bio 10100 during the semester

- Readings: on average 2-3 hours per week
- Reviewing class notes: on average 2-3 hours per week
- Practice questions: on average 2-3 hours per week
- Lab assignments: on average 2-3 hours per week

A note about time management

The academic skills center at Dartmouth College has put together a [web page](#) that will be very helpful to anyone in need of help in managing his/her time while in college. The link is also available on Blackboard, in the MERGED section under resources along with other useful links.

How to succeed in this class

In Lecture

- Read assigned pages in the textbook and the supplementary readings before class.
- Attend lecture and participate actively.
- Review your notes after class to clarify any points you do not fully understand.
- Gauge your mastery of the material by reviewing the practice questions on a weekly basis.
- Attend the optional review sessions. Come prepared with questions. Do not be passive.
- Participate on the discussion board on Blackboard. Ask questions, post answers, and comment on answers posted by others.
- Learn how to study for conceptual understanding. That is, while there are some terms the definitions of which you will have to memorize (for example, gene, chromosome), your overall approach to studying should not be simply to memorize the textbook. You need to make sure you understand concepts, understand how to read graphs and charts, understand how to interpret data, and understand how to come up with hypotheses and design experiments to test them. We will work on these ideas in this class.

In Lab

- Attend every lab and arrive on time for every lab.
- Prepare for lab by reading the lab material in advance.
- Take lab notes in a lab notebook.
- If there are any pre- or post-lab writing assignments, be sure to complete them on time.
- During lab, be sure you understand the principles underlying the experiments. If you do not, ask questions. When working in small groups, consider yourself part of a team. Listen to each group member.
- If the group is making a presentation, do not do all the work yourself, and do not let someone else do all the work. Collaborate.
- Think about how lab activities relate to lecture material.

Course Policies

The course consists of three interrelated components: lecture, laboratory, and reading assignments. The topics in lecture and laboratory are complementary; both require a review of the reading assignments in advance.

Attendance

Class and lab attendance, and your ability to work constructively with your classmates and instructors are all important for your success in the course. Lectures and labs will begin promptly on schedule and latecomers are responsible for any missed material. Unexcused absence from any lab will result in a grade of zero for that lab and any associated lab assignment. If you miss more than **30 minutes** of any lab, that is considered an absence. If you miss the laboratory due to sickness or extenuating circumstances (a letter from the appropriate university official, a medically certified reason, official notification of death in the family, or police report of an accident), make sure you let your lab instructor know ASAP so that we can determine how best to accommodate your immediate needs with the overall framework of the course. **Anyone with more than two absences from lab without prior arrangement will be unofficially withdrawn from the course (grade of WU).**

There will be no make-up exams or quizzes. If you miss an exam or quiz due to extenuating circumstances (a letter from the appropriate university official, a medically certified reason, official notification of death in the family, or police report of an accident) your other exam and quiz grades will be adjusted accordingly. Unexcused absence from any exam or quiz will result in a grade of zero for that exam or quiz. If you intend to miss an exam or lab due to a **religious observance** that is not officially observed by CCNY you must notify your course and lab instructor well ahead of time, not after the fact. Such absences will not be excused if they are not discussed with the instructors ahead of time. **Family trips are not considered excused absences**, unless they are due to a documented emergency or due to a death in the family. Any other foreseeable absence (presenting research at an academic conference, a CCNY athletic match, etc.) must be discussed with the instructor ahead of time. If you miss two lecture exams, or you have an unexcused absence for the final exam (exam 3), you will receive a grade of WU (unofficially withdrawn) for the course. If you cannot attend lecture and lab or the exams when they are scheduled, I suggest you do not take Bio 101 this semester.

Laboratory work

Always read the lab handout before the lab. It is essential that you read and understand the lab material before lab. We will need to work efficiently to accomplish everything in the lab period, and you will find it difficult to complete the assigned tasks if you have not prepared adequately. Evaluation of your performance in the lab will be based on your participation and several pre and post lab assignments, including written reports and oral presentations.

It is expected that all group members participate equally in both the preparation and execution of an oral presentation. Thus, group oral presentations are graded as one effort and the students who present will receive one grade and feedback form from the instructor. Complaints about how some members of the group may or may not have carried their respective weights are not acceptable excuses for a poor group presentation.

For written assignments, please submit a **typed copy** of the lab assignment through Blackboard by the due date and time. All written lab assignments are due by the **beginning of the lab period** on the assigned date, unless otherwise stated. The penalty for unexcused lateness will be 10 points for up to 24 hours after the deadline (from 1 minute to 24 hours), an additional 10 points for tardiness after the first 24 hours up to the second 24 hours (from 24 hours + 1 minute to 48 hours), etc., which will include the weekend. I encourage you to work with others in studying for any aspect of the class including the discussion of your laboratory work. **However, each person must turn in her/his own written work in which s/he acknowledges the contribution of others, if any, to her/his thought processes as evidenced in her/his writing. You may not copy any part of somebody else's written lab work. You also may not hand over your lab report to somebody else as a "guide" that they may copy.** Both of these actions will result in a grade of zero for the lab report for all parties involved, even if you acknowledge that you did so! Jointly written lab assignments will not be accepted and will receive a grade of zero. See citation guidelines provided to see how you must properly cite your sources. Plagiarism will not be tolerated.

Let us be clear: if you violate the rules above, for example, you plagiarize or copy any part of anybody's lab report at all, or give your lab report to somebody else to use, **all parties involved** will receive a grade of zero for the entire assignment, you will not have the chance to rewrite such an assignment, and **a report will be filed with the Office of the Academic Integrity Official** to document your case.

Lecture exams

There will be a total of 3 lecture exams (including the Final Exam) for this course. They will cover material presented in class, information from the assigned readings, and other supplemental material. The exams may include multiple choice questions, short answer questions, short essays, problem solving, and evaluation of data. See the schedule for the dates for the exams. The final exam is not cumulative in the traditional sense; however, you must realize that the topics on the course build on top of each other as we go through the semester.

Take-home lecture assignments

There will be several take-home assignments that you will submit on Blackboard. You are expected to submit your own, individual work. These are not meant to be for group work or for group discussion. For each assignment, you will have 1 week to complete and submit the assignment. Each assignment will be due before the start of lecture a week after the lecture during which the work is assigned. There will be no extensions.

Evaluation and course grade

Course assessment component	% of grade
Lowest lecture exam grade	7%
Highest lecture exam grade	20%
The other lecture exam grade	13%
Take-home lecture assignments	10%
Lab assignments	15%
Lab reports	20%
Oral lab assignments	10%
Lab participation	5%

At the end of the semester, I review all lab grades to determine whether any of the lab instructors was a particularly tougher grader than the others. If that is the case, I will adjust the grades for that instructor's students when letter grades are assigned.

Letter grades will be assigned at the end of the semester. The range of grades will be:

A range: A⁻: 90.0-94.9%, A: 95.0-100%

B range: B⁻: 80.0-83.9%, B: 84.0-86.9%, B⁺: 87.0-89.9%

C range: C⁻: 70.0-73.9%, C: 74.0-76.9%, C⁺: 77.0-79.9%

D: 60.0-69.9%

F: less than 60%

Academic Integrity

The CUNY Policy on Academic Integrity can be found [here](#). This policy defines cheating as “the unauthorized use or attempted use of material, information, notes, study aids, devices or communication during an academic exercise.” The policy says the following about plagiarism: “Plagiarism is the act of presenting another person’s ideas, research or writings as your own.”

I suggest that you review the policy very carefully. If we suspect any breaches of academic integrity, including plagiarism, we will follow the procedure for addressing violations of academic integrity as approved by The City College Faculty Senate, no exceptions made; i.e., we will report you to the Academic Integrity Official. Disciplinary sanctions range from failing the class to expulsion from the college. If you are unclear about what may or may not constitute academic dishonesty, please ask. At this point in your academic career, you should expect little tolerance for breaches of academic integrity.

Fostering an Inclusive Learning Environment

As stated by the Office of Affirmative Action, Compliance and Diversity: “The City College of New York, as part of the City University of New York, is proud that our students represent a variety of cultures, backgrounds and ideas. CUNY's goals include: continuing commitment to workforce diversity and development, and in keeping with this principle, CCNY strives to be a genuinely inclusive community, one where those with differing backgrounds and allegiances feel valued, and one where civility, respect and reasoned debate prevail.”

The faculty in the department of Biology wants all of our students regardless of background to be well served by the biology curriculum including this course. We want to ensure that our students’ needs be addressed both in terms of learning in the classroom and other needs that affect the learning process. To that end, we want to bring to your attention the resources available to help you succeed at CCNY.

Resources available to help you at CCNY

Students with Disabilities

[The AccessAbility Center/Student Disability Services](#) ensures equal access and full participation to all of City College’s programs, services, and activities by coordinating and implementing appropriate accommodations. If you are a student with a disability who requires accommodations and services, please visit the office in NAC 1/218, or contact AAC/SDS using the contact information listed below. Please contact the AccessAbility Center prior to communicating with the lecture and lab instructors about your disability or required accommodations. Students must provide a letter from the AccessAbility Center to the instructor notifying the instructor of the required accommodations. At least 1 week before an exam, the students must provide a signed exam accommodation form to the instructor.

Contact Information:

E-mail: disabilityservices@ccny.cuny.edu

Phone: 212-650-5913, TTY\TTD: 212-650-8441

Fax: 212-650-5772

Mailing Address:

The City College of New York
The AccessAbility Center/Student Disability Services
North Academic Center (NAC) Room 1/218
160 Convent Avenue
New York, NY 10031

Benny's Food Pantry

[The food pantry](#) is available to all members of the CCNY community regardless of their level of need.

Hours of operation:
Monday to Friday 10 am – 4 pm.

Contact Information:
Location: Hoffman Student Center
Charles Ramirez: cramirez1@ccny.cuny.edu
Alyssa Clark: aclark@nypirg.org

Gender Resources

“The mission of [Gender Resources](#) is to provide education, outreach and resources to City College students on gender and sexuality. Core to this mission is the building of strong campus and community partnerships with the goal of strengthening services for the LGBTQIA community, survivors of sexual assault, intimate partner violence, stalking, dating and interpersonal violence. Gender Resources provides direct confidential clinical services and resources to all City College students while promoting gender equity.”

Contact Information:
Marshak Science Building
Room J-15
160 Convent Avenue
New York, NY 10031
Phone: 212-650-8222
Fax: 212-650-8227
E-mail: genderresources@ccny.cuny.edu

Study Help

- [The Counseling Center](#)

“In line with City College's vision of access to excellence, it is the mission of the Counseling Center to provide high quality counseling services that are accessible to all City College students.”

Contact Information:
Marshak Science Building
Room J-15
160 Convent Avenue

New York, NY 10031
Phone: 212-650-8222
Fax: 212-650-8227
E-mail: counseling@ccny.cuny.edu

- [Science Tutoring and CCAPP](#)

“CCAPP is the Collegiate Science And Technology Entry Program (CSTEP) at City College. Sponsored by the New York State Department of Education, the mission of CSTEP is to increase the number of historically underrepresented groups who are pursuing professional licensure and careers in mathematics, science, technology and health-related fields. The CCAPP program provides participants with a supportive community of fellow students, faculty and staff that enriches their lives, promotes their academic success and prepares them for entry into professional careers and/or graduate programs. CCAPP serves students throughout their college careers.”

Free Tutoring is available through the CCAPP office. Use [this link](#) to schedule a tutoring session.

Contact Information:
Dr. Millicent Roth
Director
Marshak Science Building
160 Convent Avenue
New York, NY 10031
Phone: 212-650-5780
Fax: 212-650-5773
E-mail: ccappsci@ccny.cuny.edu

- [The Writing Center](#)

“The City College Writing Center offers one-on-one assistance for students working on writing assignments and projects from any discipline. Visit us whenever you need someone to listen to your ideas, discuss your topics or assignments, and read your drafts. Writing consultants will work with you on planning, drafting, and revising — all of the important steps in your writing process.”

Contact Information:
North Academic Center
Amsterdam Avenue Plaza
160 Convent Avenue
New York, NY 10031
Phone: 212-650-8104
E-mail: writingcenter@ccny.cuny.edu

- [Program in Pre-Medical Studies](#)

If you are interested in the health professions, check out the program in pre-medical studies. There is a lot of information available on the program web site, and the program offers plenty of resources to help you prepare for your future in the health professions.

Contact Information:

Belinda Smith

Director

Annieta Brown

Coordinator

Marshak Science Building

Room 106

160 Convent Avenue

New York, NY 10031

Phone: 212-650-6622

Fax: 212-650-7816

E-mail: premedical@ccny.cuny.edu

Weekly lecture topics, readings, and assignments

The readings are Chapters in the textbook and additional readings as listed below.

Week	Lecture Topics	Readings
The whole semester		Use as references throughout the semester <ul style="list-style-type: none"> • Citation guidelines (also available on BB) • A collection of grammatical points
8/26 Labs begin on 8/26 Take Self Quiz	<ul style="list-style-type: none"> • Intro to course • Cell theory • The scientific process 	<ul style="list-style-type: none"> • Skim Chapter 1
8/31 9/2 9/1 Last day to drop without WD	<ul style="list-style-type: none"> • Introduction to Darwinian evolution • Molecules of life 	<ul style="list-style-type: none"> • Read Chapter 18 (section 18.1) • Skim Chapters 2-3 • This is a truly lousy experiment about evolution
9/7 no class 9/9	<ul style="list-style-type: none"> • Introduction to the cell 	<ul style="list-style-type: none"> • Read Chapter 4 • Chemicals released by bacteria may help gut control the brain, mouse study suggests • ‘Bubble wrap’ cushions a cell’s nucleus on the move
9/14 9/16 9/15 WD period ends W period begins on 9/16	<ul style="list-style-type: none"> • Evolution of eukaryotes 	<ul style="list-style-type: none"> • For class discussion on 9/14: <ul style="list-style-type: none"> ▪ An ode to SET ▪ Lynn Margulis & the question of how cells evolved also available at doinbiology.net • For class discussion on 9/16: <ul style="list-style-type: none"> ▪ On the origin of eukaryotes ▪ On the cusp of complexity ▪ Microbe breaks the powerhouse rules ▪ A love of insects and their microbial partners helped this biologist reveal secrets of symbiosis
9/21 9/23	<ul style="list-style-type: none"> • Membranes and transport • Enzymes and metabolism 	<ul style="list-style-type: none"> • Read Chapters 5-6 • This strange microbe may mark one of life’s great leaps • Long-awaited cystic fibrosis drug could turn deadly disease into a manageable condition

Week	Lecture Topics	Readings
9/28 no class 9/29 (Monday schedule) 9/30	<ul style="list-style-type: none"> Enzymes and metabolism 	<ul style="list-style-type: none"> Read Chapter 6 The business of burps: scientists smell profit in cow emissions
10/5 10/7	<ul style="list-style-type: none"> Exam 1 on 10/5 Respiration 	<ul style="list-style-type: none"> Read Chapter 7
10/12 no class 10/14 (Monday schedule)	<ul style="list-style-type: none"> Respiration 	<ul style="list-style-type: none"> Aerobic respiration For class discussion (if there is time): <ul style="list-style-type: none"> Hundreds of electricity-generating bacteria found Wired bacteria form nature's power grid: 'We have an electric planet'
10/19 10/21	<ul style="list-style-type: none"> Photosynthesis 	<ul style="list-style-type: none"> Read Chapter 8 The little pigment that could America colonisation 'cooled Earth's climate' The story of the Calvin cycle
10/26 10/28	<ul style="list-style-type: none"> Cell communication 	<ul style="list-style-type: none"> Reach Chapter 9 The chemical that turns locusts from Jekyll into Hyde (minutes 1:06 to 8:46 of podcast, first part of transcript) Bumblebees bite plants to force them to flower (seriously) For class discussion: <ul style="list-style-type: none"> The quest to decipher how the body's cells sense touch
11/2 11/4 11/6 W period ends	<ul style="list-style-type: none"> Mitosis and the cell cycle Meiosis 	<ul style="list-style-type: none"> Read Chapters 10-11 Incest uncovered at the elite prehistoric Newgrange monument in Ireland (Minutes 8:33 to 21:11 of podcast, middle of transcript) Sex clouds queen bees' vision
11/9 11/11	<ul style="list-style-type: none"> Exam 2 on 11/9 Mendelian genetics 	<ul style="list-style-type: none"> Read Chapter 12
11/16 11/18	<ul style="list-style-type: none"> Molecular basis of inheritance 	<ul style="list-style-type: none"> Read Chapter 13 How gut bacteria make broccoli a superfood

Week	Lecture Topics	Readings
11/23 11/25 no lecture (Friday schedule)	<ul style="list-style-type: none"> DNA structure DNA replication 	<ul style="list-style-type: none"> Read Chapter 14 Molecular structure of nucleic acids The wild experiment that showed evolution in real time
11/30 12/2	<ul style="list-style-type: none"> From gene to protein Regulation of gene expression 	<ul style="list-style-type: none"> Read Chapters 15 and 16 (sections 16.1-16.5) Neanderthal gene linked to increased pain sensitivity Chinese scientists insert human brain gene into monkeys, spark ethical debate
12/7 12/9	<ul style="list-style-type: none"> Regulation of gene expression 	<ul style="list-style-type: none"> For class discussion: <ul style="list-style-type: none"> Cruel fusion: What a young man's death means for childhood cancer What it takes to reach 100 Something in the air DNA, the double-stranded
12/16	<ul style="list-style-type: none"> Exam 3 on 12/16 at 6 pm 	

There may be changes in the details of the lecture and lab schedule. Pay attention in class and take note of the changes as they are announced.

Lab Schedule

Lab Exercise (lab instructions on Blackboard)	Tue	Wed	Thu	Fri
1 When Does a <i>Paramecium</i> Do The Twist Instead of The Electric Slide? Experimental design and Elements of the Scientific Method I Introduction to microscopy	9/1	8/26	8/27	8/28
2 Experimental design and Elements of the Scientific Method II Oral presentations	9/8	9/2	9/3	9/4
3 Experimental design and Elements of the Scientific Method III: Introduction to Statistical Analysis Oral presentation grades/comments	9/15	9/9	9/10	9/11
4 Evolution of trichromatic vision in primates Report 1 due	9/22	9/16	9/17	9/25
5 Bean Beetles: An Introduction You are what you eat I Lab 4 assignment due Graded report 1 returned	10/6	9/23	9/24	10/2
6 You are what you eat II Graded lab 4 assignment returned Optional 2nd drafts of report 1 due	10/13	9/30	10/1	10/9
7 A Spoonful of Sugar Makes for a Bubbly Personality: Alcohol Fermentation in Yeast Who's That in Your Leaf? Tony Starch? Graded 2nd drafts of report 1 returned	10/20	10/7	10/8	10/16
8 Respiration Report 2 due	10/27	10/21	10/15	10/23
9 Chill coma in insects Oral presentations Graded report 2 returned	11/3	10/28	10/22	10/30
10 Photosynthesis Oral presentation grades/comments Lab 7 and 9 assignments due	11/10	11/4	10/29	11/6
11 Bacterial identification I Graded lab 7 and 9 assignments returned Oral presentations	11/17	11/11	11/5	11/13
12 Bacterial identification II Optional 2nd drafts of report 2 due	11/24	11/18	11/12	11/20
13 Gene expression in stem cells Graded 2nd drafts of report 2 returned	12/1	12/2	11/19	11/25
14 Graded report 3 returned Labs 11-13 assignments due	12/8	12/9	12/3	12/4