Bio12: Cell Structure and Function
Fall 2017
M, W, F 8:50-9:55AM
X-hour, when used: Th 9:05-9:55AM
Room 200, Life Sciences Center (LSC)
Instructor: Prof. Roger Sloboda
Lab Instructors: Dr. Katie Price
Teaching Science Fellow: Joe Minichiello
Graduate Teaching Assistants: Muhammad Khan, Tom Loreng, Melissa Parks

“A scholar approaches a task for the sake of himself or herself, not for that of someone else, as the schoolgirl or schoolboy does.” -George Herbert Palmer, ~1912, as quoted in The Secret History of Wonder Woman by Jill Lepore (quote updated ever so slightly, yet importantly, by Prof. S.)

Bio 12 Learning Objectives:

1. Learn the vocabulary of cell biology and become conversant with its use.

2. Understand the structure and function of the basic components of eukaryotic cells (i.e. cells with nuclei) including molecules, macromolecules, membranes, organelles, and the soluble components of the cytoplasm.

3. Learn how cells are viewed and studied, including approaches from the fields of microscopy, biochemistry, molecular biology, and genetics (note that prior knowledge of any of these fields is not required to be successful in Bio 12).

4. Understand how the cell is organized (the interplay between cytoskeleton, organelles and membranes), produces energy (glycolysis, mitochondria and chloroplasts) divides (mitosis), moves (cilia, flagella, amoeboid movement, and motility of intracellular particles), and communicates with the outside world (membrane receptors and signal transduction).

5. Be able to apply this information to experimental settings in which one or another of the above (i.e. #4) are altered (either by the environment, mutation, drugs, experimental manipulation, or disease) and predict a logical outcome.

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Office Hours:

Prof. Sloboda will hold office hours on Wednesdays from 3 – 5 PM and Thursdays from 3 – 4 PM in LSC 222. He will also be available most of the day on the Tuesdays prior to exams. In addition, please feel free to contact him if you would like to chat about something alone, or if the times above are not convenient for you. He will do his best to accommodate your needs.

Joe Minichiello, our Teaching Science Fellow, will hold review sessions as follows:

Weeks with no exam: Sunday 8 – 9 PM and Thursday 7 – 8 PM (location TBD)
Weeks with exams: Sunday 8 – 9 PM and Tuesday 7 – 8 PM (location TBD)

Joe’s office is 123 LSC (email: Joseph.Michael.Minichiello@dartmouth.edu). Should you wish to meet with Joe either individually or as a group, please sign up for a time at http://doodle.com/jminichiello.
The lab TAs will announce their office hours and contact information in their respective lab sections.

If Prof. Sloboda’s office hours become crowded, we may move to another room in the LSC. If this happens, he will put a note on his office door redirecting you. If a conflict arises and he is unable to hold office hours, he will reschedule that time and let everyone know via e-mail and/or an announcement in class. Note also that he is generally available before and after class, unless he is running to or arriving from a meeting. The scheduled optional review sessions are also good times to have your questions answered.

→ Even if you have no questions, it is a good idea to attend those sessions for practice, i.e. try answering yourself the questions other people ask as a kind of self-check for how you are doing.

Also, by hearing the other questions that are asked, you will realize others may have the same misunderstanding about the material that you do, i.e. that you are not alone! Finally, it is very, very important that you get your questions answered in a timely fashion. Thus, Prof. S. is happy to meet at other times if he is free, via a pre-arranged appointment, or you can post a question, anonymously if you wish, to him (and the rest of the class, again, anonymously) via Piazza (you can find a link to this site on the left side of the course home page on Canvas). Piazza will be monitored by Joe, the TAs, and Prof. S. We will respond to questions posted on Piazza as quickly as possible. Note, however, that we may not answer a Piazza question if the response needed would be too complex to type, in which case we will figure out another way to get your question(s) answered.

CLASS SCHEDULE

How do we view cells?

1. M 9/11 Course Logistics & Introduction to Cell Architecture Chapter 1
2. W 9/13 Microscopy I Chapter 18
   Th 9/14 Optional Q & A review

There is material on Canvas providing background information on the basic chemistry you all should know in order to be successful in Bio 12. I strongly urge all of you, even if you feel confident with chemistry, to look over this material (a pdf) prior to Th 9/14, and come to the optional review session if you have any questions or concerns. All of the classes in the list that follows below will assume mastery of this basic knowledge.

3. F 9/15 Microscopy II Chapter 18

How do we analyze cells?

4. M 9/18 Protein Structure & Function Chapter 2
5. W 9/20 Experimental Approaches I Chapter 18
   Th 9/21 Optional Review with practice questions
6. F 9/22 Experimental Approaches II Chapter 18

How are cell compartments built?

7. M 9/25 Thermodynamics & Enzymes Chapter 3
8. W 9/27 Membrane Structure and Composition Chapter 4
9. Th 9/28 Transport Across Membranes I Chapter 4
10. F 9/29 Transport Across Membranes II Chapter 4
    M 10/2 Optional Pre-Exam Review/Q & A
How do cells generate and utilize energy?

11. Th 10/5 Glycolysis & Aerobic Respiration
12. F 10/6 Photosynthesis

How do proteins know where to go in the cell?

13. M 10/9 Protein Sorting I
14. W 10/11 Protein Sorting II
15. F 10/13 Protein Sorting III
16. M 10/16 Signal Transduction I

How do cells receive, integrate and process information?

17. W 10/18 Signal Transduction II
18. Th 10/19 Optional Review/Q & A
19. F 10/20 Signal Transduction III
20. Th 10/26 Signal Transduction II

How do cells regulate cell shape and motility and interact with other cells to form tissues?

21. F 10/27 Cytoskeleton – Actin I
22. M 10/30 Cytoskeleton – Actin II
23. W 11/1 Cytoskeleton – Microtubules I
24. F 11/3 Cytoskeleton – Microtubules II, and group discussion of a paper from the literature: the bacterial cytoskeleton

How do cells reproduce?

25. M 11/6 The Cytoskeleton in Action during Cell Division
26. W 11/8 Group discussion of a paper from the literature: cyclin
27. F 11/10 The Cell Cycle

What happens when cell biology fails to operate properly?

28. M 11/13 Cancer

Optional Final Exam Review Session ➔ TBA

FINAL EXAM, SUNDAY, 11/19: 8:00-11:00 AM, Emphasis on Lectures #20-30
Once again, some resources for assistance with class material:

1. Office hours (see page 1).

2. X-hour question answering sessions with Prof. Sloboda: Come to these sessions with a list of questions to ask so that you understand the material as the course progresses. Never wait until just before an exam to obtain answers; if you do, you will likely have become hopelessly overwhelmed and frustrated by then. The best way to do well is to stay current with the material.

2. Ask questions. If you would like to ask a question outside of class/office hours, please use Piazza. You can find a link on the left side of the course page on Canvas; the first time you will be prompted to set up a username and password. You can post questions to the thread anonymously if you wish (anonymous to the class but not to me), and you can also answer student questions yourself, also anonymously (this is a good thing to do if you know the answer; note that one of us will confirm student answers as being correct, etc.). Please check the thread before posting a question, as your question may have already been asked (this is why we will not respond to questions of a general nature posed by regular e-mail, so as not to have to answer the same question many times over). If your question requires a great deal of info in the response, or if it would be difficult to type a coherent answer, we may ask you to come to office hours or see one of us before or after class instead. We may also address such questions during class time.

3. Joe, our teaching science fellow, having taken Bio 12 very recently, is a great source of information about course content, etc. as well.

4. Course Teaching Assistants: Your lab TA is a Ph.D. student in the Molecular and Cellular Biology graduate program and thus is also an excellent resource for information.

5. Review previous class sessions. Each class session, including review sessions, will be recorded, and these will be available via the Echo360 on the course page in Canvas.

6. Join a study group through the Academic Skills Center, or form your own.

7. Come to review sessions, office hours, etc. and ask, hear, respond etc. to the give and take that occurs.

Textbook – Cell and Molecular Biology, by Gerald Karp, 7th or 8th edition

Cell and Molecular Biology: Concepts and Experiments, 8th Edition (7th Edition is OK as well) by Gerald Karp et al. The text is suggested for those who wish one, but it not required.

There are only two options for this textbook in the 8th edition version:

1. Loose-leaf (ring binder) version
   ISBN: 978-1-118-88614-4
   832 pages
   December 2015, copyright 2016
   ~$142.95

2. E-text
   ISBN: 978-1-118-88384-6
   832 pages
   January 2016
   ~$82.50
(Note: there may be limitations as to how long you may be allowed to access the e-text, and how many pages you may print from it.)

An important note about the textbook:

It is not required.

Everything you need to know will be covered in class. Prof. S. does not look through the text for obscure bits of information and then ask you questions about these on exams. Use the text, if you purchase one, as a reference to enhance and clarify your understanding of the material we discuss in class. Also, please note the following: If you intend to apply to med school, vet school or graduate school, then you may find having the text will be useful as a familiar source of information when you begin to review what you have learned in preparation for the MCAT or GRE exams.

Additional Textbooks on Reserve

For those wishing to supplement the lectures and the assigned readings in Karp, a number of other cell biology textbooks are on reserve in Dana Biomedical Library, 37 Dewy Field Road. The list can be found here: <http://libcat.dartmouth.edu/search/p?SEARCH=grotz>.

Grading

Exam 1 100 pts
Exam 2 100 pts
Final Exam 100 pts
Lab grade 100 pts
Writing Assignments 50 pts
Class participation 50 pts

Exams will include a mixture of testing your mastery of the information and applying your knowledge to new situations and asking you to predict an outcome. Before each exam Prof. S. will post questions and answers from previous exams on Canvas to give you an idea what to expect.

Barring documented illness, failure to take an exam (or attend a lab section, see more below) at the scheduled time will result in a grade of zero.

➔ Important information about grades in Bio 12:

You are not competing against each other for grades in Bio 12. Let me be very clear about that and reiterate this point: You are not competing for grades in this class with anyone but yourself. All grades, up until the final letter grades are decided, are recorded as numerical grades, from 0% to 100%. We do not assign letter grades to individual exams.

Here are three important points to note about grades in Bio 12:

[i] A grade of 90% or above will always be at least an A-. No one is ever penalized for learning the material. Thus, it is entirely possible for everyone in the class to receive a grade of A' or A, if everyone in the class scores a grade of 90% or greater on an exam. However, my experience suggests to me that this will not happen (see page 9 of this syllabus).

[ii] In order to receive a D, you have to achieve a final grade of at least 50%. In other words, a final grade less than 50% is an E, as is a grade of less than 50% on an exam. But…

[iii] This next point is really important, and note that it has two parts: The median grade [for both
sections of Bio 12, although the exams for each section of Bio 12 are different and are graded independently of the other] will be a B.

   a. That means that if the median of an exam is 62%, then a grade of 62% for that exam would be equivalent to a B. If the median is 29%, then a grade of 29% for that exam is a B. Note, therefore, that this portion of rule [iii] negates rule [ii] above.

   b. If the median grade is 94% then a grade of 94% for that exam is an A/A-. Note, therefore, that this portion of rule [iii] negates rule [iii] itself.

A word about the word ‘median’ in this context. The median grade in a grade distribution is that grade above which half the class scored and below which half the class scored. Thus, the median of this grade distribution, 47, 55, 59, 76, 82, 90, 94, is 76. The mean (i.e. the average), however, is 71.9. The median of 27, 55, 59, 76, 76, 94, is also 76; the mean for this distribution is 66.1. Sorry, but every term, some students have a tough time interpreting what is meant by the term “median grade.”

   Here is a list of the grades distribution last fall in Bio 12 (50 total):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>17</td>
</tr>
<tr>
<td>A-</td>
<td>3</td>
</tr>
<tr>
<td>B+</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
</tr>
<tr>
<td>B-</td>
<td>4</td>
</tr>
<tr>
<td>C+</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>C-</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
</tr>
</tbody>
</table>

In this distribution, the median is 3.0 (B), and the mean is 3.3 (B+).

Finally, audio and video recordings of each class will be available, accessed via the Echo360 link on the Bio 12 Canvas page. This means the slides and associated clicker questions, accompanied by the audio portion of class, will be posted on Canvas for you to re-review when you are studying.

Class Participation:

Class participation will be assessed as follows. For in class questions related to the material being covered, you will need to have a computer, a tablet, or a cell phone. Your devise must be rigged to interact with a program called Poll Everywhere. Once set up, you can use your laptop, tablet, or phone to answer questions during class. Your responses to questions posed in class will be used to assess class participation, as well as provide you with practice thinking about and answering questions. Note that I will not be tracking whether you answer a question right or wrong, only whether or not you provide an answer. With respect to the Honor Principle, it is a clear violation to bring someone else’s computer, tablet, or phone to class for them, and use it to provide answers as if the person were present. It is also a violation to provide, remotely, answers for yourself or anyone else from some position in the known universe other than the Bio 12 classroom.

   To use Poll Everywhere, the first step is to set up a Poll Everywhere account prior class on Wednesday. To do this log into https://www.polleverywhere.com/login with your official Dartmouth email address and follow the prompts.

   Next, if you have a smartphone, this will be the easiest and most convenient device to use. Download the Poll Everywhere app and use the app each day:

   a. iOS: https://itunes.apple.com/us/app/poll-everywhere/id893375312
If you are not able to use a smartphone to respond, you may use another internet-enabled device such as a tablet or a laptop instead. For these, the URL is: https://www.polleverywhere.com/biol12. You will need to log into the site at the beginning of class each day.

Class will meet 28 times, not counting the first class, exams, and the optional review sessions. You can miss 10% (three classes) of the classes without losing any class participation points. Therefore, if you come to class every day, you earn 50 class participation points. If you come to 25 of 28 classes, you earn 50 points. If you miss seven classes, you will receive 42 pts; if you miss 13 classes, you will receive 30 pts, etc.

Writing Assignments:

There will be two, very short (one page each) writing assignments this term. The first will be two paragraphs long, and the second will be one page long (but no more). You will prepare a draft of each assignment by the first due date, it will be peer reviewed anonymously by two of your fellow students by a second due date, you will revise your assignment as necessary and submit it by the final due date. All of this (submission, peer review, resubmission) will occur on line at a site called MyReviewers.org. More details about these assignments will be provided in class.

Grading Policy for Exams:

The following points summarize the grading procedures with respect to exams:

[1] After an exam has been graded and returned, a copy of the answer key will be posted on Canvas. Review this answer key and be sure you understand the errors in your exam and why you made them. If you do not understand what you did wrong, you are very likely going to make the same mistake again on the next exam.

[2] The number of points given for each answer is final. If, after reviewing your answers and comparing them to the posted answer key, you find an arithmetic error or detect an omission by the grader for one of the questions, you must observe the following procedures to correct the error:

a) Do not write on the exam. Exams that have been written on will not be corrected. Any alteration of the answers between the time when the graded exams were returned to students and the time when the exam was submitted for error correction constitutes a breach of the Academic Honor Principle and will not be tolerated. To deter this practice, we scan exams before grading them.

b) Prepare a typed cover page with your name and HB number.

c) If you find an addition error, indicate on the cover page that an addition error has occurred. Specify the page and question number(s.)

d) If you determine that your answer contains all of the information indicated in the key, but you did not receive full credit, simply indicate the number of the question on your cover page and state in one or two short, descriptive typed sentences the facts that make your answer correct. The citation of a text page, diagram, or reference to a lecture date/number would also be helpful.

e) Attach the typed cover sheet to your complete exam and return it to the Bio12 drop box in the short corridor between Room 200 and 201 in LSC before the deadline noted below. The error correction process will take a few days. You will be notified of the place and time to pick up your exam after the correction is completed.
We will not accept questions regarding errors in grading after the deadlines noted below. Nor will we accept requests that are not typed. Sorry for these rules, but if we do not impose them, things get a bit out of hand, especially toward the end of the term.

These are the deadlines:

First Exam: 12:00PM (Noon) 16 October
Second Exam: 12:00PM (Noon) 6 November

We will not accept questions regarding errors in grading after these deadlines. There will be no such process for the final exam, as the final exam is, after all, final.

Academic Honor Principle:

The Dartmouth College Student Handbook states "Fundamental to the principle of independent learning are the requirements of honesty and integrity in the performance of academic assignments, both in the classroom and outside. Dartmouth operates on the principle of academic honor, without proctoring of examinations. Students who submit work which is not their own or who commit other acts of academic dishonesty forfeit the opportunity to continue at Dartmouth."

There are a number of situations in which a student in Biology 12 might be tempted to violate the Academic Honor Principle. These situations include (but are not limited to) the following:

a) Examinations must be completed without reference to written materials other than those provided with the exam pages and must be completed without communication with anyone else (the only permissible exception is that students may request clarification of any exam question from Prof. S., which is why he makes himself available during the exams). The answers that you provide must be entirely your own work. This means you talk to no one, you do not write notes that you leave on the floor at your seat, you do not write notes on the palm of your hand (or elsewhere on your body or clothing), you never leave notes or texts in the rest room to consult during an exam, and you never, ever use any sort of electronic device to obtain information during the course of an exam. And yes, all these things have occurred in past offerings of Bio 12 (I have been here a while…).

b) Our policy permits the re-submission of exams for correction of errors made during the grading process. Any alteration of the answers on an exam made between the time the graded papers were returned to the student and the time when the paper was submitted for correction constitutes a clear, premeditated, and egregious breach of the Academic Honor Principle. To deter this practice, we photocopy exams before grading them.

c) Laboratory experiments are performed in pairs or groups, and we strongly encourage student collaboration. This includes data collection, analysis, and visual presentation of the data (graphs/tables). However, the writing of the text of the lab reports and the preparation of the data obtained in the form of figures, tables, etc. submitted for grading must represent the original work of the student submitting that report. While we encourage collaborative discussion of your data, all writing must be done independently and individually. Do not share computer files of work (including graphs and tables) to be submitted for grading! Although you are encouraged to discuss lab data with your lab partner(s) and with other students in the class, you must prepare the text and graphical content of each lab report you submit for grading yourself. A student misrepresenting the work of another as his or her own would be in violation of the Academic Honor Principle, as is likely the student who provided that information. Thus, it is possible that the Committee on Standards will find the student providing the original file also to be in violation of the Honor Principle.

Honesty is the foundation of the academic pursuit of knowledge. In recognition of this, the staff of Bio 12 will not overlook any violations of the Academic Honor Principle. Indeed, the Faculty
Handbook of Dartmouth College states explicitly that College faculty members are obligated to report potential violations of the Academic Honor Principle to the Committee on Standards.

**Note to Students with Physical or Learning Disabilities:**

I encourage students with disabilities, including invisible disabilities such as chronic illnesses and learning disabilities, to arrange for accommodations that might be helpful. Please meet with me soon, preferably during the first week of class, to discuss possible accommodations that have been approved by the folks at Student Accessibility Services. All discussions will be confidential, although the Academic Skills Center may be consulted to discuss the details of the accommodation recommended.

**Religious Observances:**

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in this course, please speak with me as soon as possible to discuss appropriate accommodations.

**How to be Successful in Bio 12 (see more at the ‘tips’ link on the Canvas home page):**

1) Preview the topic to be discussed the night before class. If using the textbook, look at the figures, read the figure legends, and get a general feel for the vocabulary to be introduced and the topics to be covered in the upcoming class. If not, review the data to be discussed (slides on Canvas). In either case, jot down any questions you have to focus your attention in lecture.

2) Attend lectures on time (class will start promptly at 8:50 AM), take notes on the material discussed in class, and ask questions about the things you do not understand. Make sure you have answers to the questions you wrote down the previous night.

3) That very same afternoon or evening, familiarize yourself with the topics discussed and review your notes, while things are still fresh in your mind. Correct or add points to your notes as you go along. And please note the following. The study of how effective learners learn things indicates that certain activities promote learning and retention much better than simply re-reading your notes and/or the textbook and convincing yourself that the material is familiar to you. And note that on an exam, I am not going to show you your notes and ask you if they look familiar…

   If you would like to learn more about the most effective strategies for studying and learning (and the research underlying these recommendations), have a look at the book entitled *Making it Stick: The Science of Successful Learning* by Brown, Roediger III, and McDaniel. One effective study strategy is called retrieval practice. The actual act of retrieving information (like working on practice exam questions, responding to a clicker question, or to a verbal question posed in class or at a study group or a review session, etc.) helps you to solidify your knowledge/memory and enhances your ability to retrieve that information in the future. Thus, I encourage you to build the study habit of retrieval practice into your own personal study routine.

4) Review the notes and reading assignments from the previous week’s classes sometime during the weekend.

5) Be curious and ask questions in class, in office hours, in lab, and with fellow students, etc. Also ask yourself questions and challenge yourself to understand the material.

6) Test your own knowledge by putting away your notes and drawing out structures and pathways from memory. Your goal is to be able to accurately re-create the details and mechanisms we discuss in class, and understand them. Do not just try to do this as a mental exercise (i.e. in your head). Do it on paper, as you would be doing it in an exam, and then compare your attempt with your notes and the textbook.

7) Attend all classes and review sessions and come to office hours, even if you have nothing to a
Laboratory Section Information:

Below is a calendar outlining each laboratory session for the term and relevant assignment due dates. This calendar will also be available electronically through Canvas and can be integrated with your other courses for the term. Be sure to check the Canvas calendar regularly throughout the term for any changes to this calendar.

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 1 – Microscopy</td>
<td>September 18-20</td>
<td>Laboratory Quiz In-lab microscopy assignment</td>
</tr>
<tr>
<td>Lab 2 – Ion Chromatography</td>
<td>September 25-27</td>
<td>Laboratory Quiz Ion Chromatography Summary Assignment</td>
</tr>
</tbody>
</table>

No Lab October 2-4

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 3 – Gel Electrophoresis</td>
<td>October 9-11</td>
<td>Laboratory Quiz Protein Gel Summary Assignment</td>
</tr>
<tr>
<td>Lab 4 – Hill Reaction</td>
<td>October 16-18</td>
<td>Laboratory Quiz Lab Report</td>
</tr>
</tbody>
</table>

No Lab October 23-25

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 5 – Cell Motility</td>
<td>October 30-November 1</td>
<td>Laboratory Quiz Lab Abstract</td>
</tr>
<tr>
<td>Lab 6 – Experimental Design</td>
<td>November 6-8</td>
<td>Methods Assignment Lab Report</td>
</tr>
</tbody>
</table>

How to determine your laboratory section:

On the first day of class you will be directed to fill out an online survey to determine your lab section based on your academic schedule. Conflicts of an academic nature will take priority, followed by work and extracurricular activities.

It should go without saying, but we need to say it anyway. You must represent to us your schedule accurately and truthfully, otherwise you are in violation of the Honor Principle. Your lab section assignment will be the same for the entire term and it is your responsibility to ensure that you will be in attendance for all sessions. Be sure to check all exams and X-hours for your other classes throughout the term. This term there will be six lab sections; the students in these sections will be derived from both sections of Bio 12:

Section 1: Monday 1:30-5:30pm
Section 2: Monday 6:00-10:00pm
Section 3: Tuesday 1:30-5:30pm
Section 4: Tuesday 6:00-10:00pm
Section 5: Wednesday 1:30-5:30pm
Section 6: Wednesday 6:00-10:00pm
LABORATORY GRADES

Your work in the laboratory will contribute to 25% of your overall grade in Bio12. The lab grade will be composed as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Quizzes</td>
<td>25%</td>
</tr>
<tr>
<td>In-Lab Microscopy Assignment (Lab 1)</td>
<td>5%</td>
</tr>
<tr>
<td>Chromatography Assignment (Lab 2)</td>
<td>15%</td>
</tr>
<tr>
<td>Protein Gel Assignment (Lab 3)</td>
<td>10%</td>
</tr>
<tr>
<td>Chloroplast Report (Lab 4)</td>
<td>15%</td>
</tr>
<tr>
<td>Cell Motility Abstract (Lab 5)</td>
<td>5%</td>
</tr>
<tr>
<td>Experimental Design (Lab 6)</td>
<td>5%</td>
</tr>
<tr>
<td>Experimental Design Report (Lab 6)</td>
<td>20%</td>
</tr>
</tbody>
</table>

ASSIGNMENTS

You are required to prepare your assignments electronically and submit a hard copy of the assignment at the beginning of your laboratory session. Printing problems are not an acceptable excuse for lateness so plan your assignment printing in advance.

Please note that more extensive details pertaining to the lab section of Bio 12 can be found in the syllabus for Bio 12 lab and at the Bio 12 Lab Canvas page.
BIO12 CELL STRUCTURE AND FUNCTION LABORATORY SYLLABUS

FALL 2017

Welcome to the laboratory of Bio12! This portion of the course will complement the lecture by offering you the opportunity to engage in the scientific process within the field of cell biology. The specific laboratory objectives for Bio12 are:

1. Using an array of microscopy techniques, students will critically observe both live and fixed cells to analyze cell structure and function.

2. Students will integrate data from multiple biochemical assays to draw conclusions regarding the interplay of cellular components.

3. Students will engage in the process of scientific inquiry by generating hypotheses, developing study designs, collecting data, and interpreting results. Written laboratory reports will be culminating assignments to display proficiency in communicating scientific ideas and findings.

This syllabus outlines the material that will be covered this term, important dates, and laboratory policies. We will review this syllabus during your first laboratory session. However, it is your responsibility to be familiar with all parts of this syllabus and to follow them closely. Please refer back to this document throughout the term.

LABORATORY LOCATION
LSC 202

LABORATORY PERSONNEL

Laboratory Directors
Dr. Katie Price Katherine.E.Price@dartmouth.edu LSC 230
Dr. Nick Sylvain Nicholas.R.Sylvain@dartmouth.edu LSC 236

Graduate Teaching Assistants
Ko-wei Liu Ko-wei.Liu.GR@dartmouth.edu
Harini Natarajan Harini.Natarajan.GR@dartmouth.edu
Melissa K. Parks Melissa.K.Parks.GR@dartmouth.edu
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LABORATORY CALENDAR

The Lab calendar outlines each laboratory session for the term and relevant assignment due dates. This calendar is available on Canvas and is subject to change with notice.

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Assignments</th>
<th>Assignment Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab 1 – Microscopy</td>
<td>Sept. 18-20</td>
<td>Pre-Lab Quiz</td>
<td>Sept. 18-20 on Canvas before Lab 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In-lab microscopy assignment</td>
<td>Sept. 18-20 at the end of Lab 1</td>
</tr>
<tr>
<td>Lab 2 – Ion Chromatography</td>
<td>Sept. 25-27</td>
<td>Pre-Lab Quiz</td>
<td>Sept. 25-27 on Canvas before Lab 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ion Chromatography Assignment</td>
<td>Oct. 9-11 on Canvas before Lab 3</td>
</tr>
<tr>
<td><strong>No Lab Oct. 2-4</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab 3 – Gel Electrophoresis</td>
<td>Oct. 9-11</td>
<td>Pre-Lab Quiz</td>
<td>Oct. 9-11 on Canvas before Lab 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Protein Gel Assignment</td>
<td>Oct. 16-18 on Canvas before Lab 4</td>
</tr>
<tr>
<td>Lab 4 – Hill Reaction</td>
<td>Oct. 16-18</td>
<td>Pre-Lab Quiz</td>
<td>Oct. 16-18 on Canvas before Lab 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab Report</td>
<td>Oct. 30-Nov. 1 on Canvas before Lab 5</td>
</tr>
<tr>
<td><strong>No Lab Oct. 23-25</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab 5 – Cell Motility</td>
<td>Oct. 30-Nov. 1</td>
<td>Pre-Lab Quiz</td>
<td>Oct. 30-Nov. 1 on Canvas before Lab 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab Abstract</td>
<td>Nov. 6-8 on Canvas before Lab 6</td>
</tr>
<tr>
<td>Lab 6 – Experimental Design</td>
<td>Nov. 6-8</td>
<td>Methods Outline</td>
<td>Nov.1-3 on Canvas (48 hrs. after the start of your lab section)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab Report</td>
<td>Nov. 12-14 at noon (six days after your lab section)</td>
</tr>
</tbody>
</table>
LABORATORY SECTION ASSIGNMENT

On the first day of class you will be directed to fill out an online survey to determine your lab section based on your academic schedule. Your lab section assignment will be the same for the entire term and it is your responsibility to ensure that you will be in attendance for all sessions. Be sure to check all exams and X-hours for your other classes throughout the term. Conflicts of an academic nature will take priority, followed by work and extracurricular activities. This term we will be offering six lab section times:

- Section 1: Monday 1:30-5:30pm
- Section 2: Monday 6:00-10:00pm
- Section 3: Tuesday 1:30-5:30pm
- Section 4: Tuesday 6:00-10:00pm
- Section 5: Wednesday 1:30-5:30pm
- Section 6: Wednesday 6:00-10:00pm

LABORATORY GRADES

Your work in the laboratory will contribute to 20% (Prof. Sloboda’s Section) or 25% (Prof. Grotz’s Section) of your overall grade in Bio12. The lab grade will be composed as follows:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Lab Quizzes (5 quizzes, Labs 1-5)</td>
<td>10%</td>
</tr>
<tr>
<td>In-Lab Microscopy Assignment (Lab 1)</td>
<td>10%</td>
</tr>
<tr>
<td>Chromatography Assignment (Lab 2)</td>
<td>15%</td>
</tr>
<tr>
<td>Protein Gel Assignment (Lab 3)</td>
<td>15%</td>
</tr>
<tr>
<td>Chloroplast Report (Lab 4)</td>
<td>15%</td>
</tr>
<tr>
<td>Cell Motility Abstract (Lab 5)</td>
<td>10%</td>
</tr>
<tr>
<td>Experimental Design (Lab 6)</td>
<td>5%</td>
</tr>
<tr>
<td>Experimental Design Report (Lab 6)</td>
<td>20%</td>
</tr>
</tbody>
</table>

ASSIGNMENTS

You are required to **prepare your assignments electronically and submit an electronic copy via the Bio12 Laboratory Canvas Page** before the start of your laboratory session unless otherwise indicated. Uploading problems are not an acceptable excuse for lateness; plan in advance.

Lab Assignment Grading Error Correction Requests

All of your laboratory assignments are graded carefully and conscientiously. If you identify arithmetic or omission errors by the grader after reviewing your graded assignment, you must observe the following procedure to correct the error.

1. Do not write on the assignment. Assignments that have been written on will not be reviewed. Any alteration to the assignment following the original submission will be considered a violation of the Academic Honor Principle.
2. Prepare a typed page with your name and HB number and outline the grading error(s) you have identified.

3. If you find an addition error, indicate which page of the assignment has the error.

4. If you determine that your assignment contains the requisite information to satisfy a grading comment but did not receive full credit, indicate which grading comment you are referring to and which section of your assignment satisfies the comment.

5. Submit your grading error correction request, comprised of the cover page, grading error description, and original hard copy assignment, in the Bio Drop Box outside of LSC 202 (physical, wooden drop box, not the electronic file sharing program DropBox) by the designated deadline. Grading error correction requests submitted after this time will not be accepted.
   - Lab 2 Chromatography Assignment: due by noon on Monday, Oct. 23rd
   - Lab 3 Protein Gel Assignment: due by noon on Monday, Nov. 6th
   - Lab 4 Chloroplast Report: due by noon on Monday, Nov. 13th

**Academic Honor Principle**

As stated in the Dartmouth College Student Handbook, “Fundamental to the principle of independent learning are the requirements of honesty and integrity in the performance of academic assignments, both in the classroom and outside. Dartmouth operates on the principle of academic honor, without proctoring of examinations. Students who submit work which is not their own or who commit other acts of academic dishonesty forfeit the opportunity to continue at Dartmouth.”

Part 2 of the Academic Honor Principle indicates that it is the responsibility of the faculty to “(a) provide continuing guidance as to what constitutes academic honesty, (b) to promote procedures and circumstances which will reinforce the principle of academic honor; and (c) to review constantly the effective operation of this principle.”

In line with these obligations, we have outlined below how the Academic Honor Principle is applied to the laboratory portion of your Bio12 course work.

- Science is a collaborative field and we encourage collaboration for many aspects of the course while still requiring demonstration that each individual has an understanding of key concepts. You will work with a partner during the laboratory sessions to perform all in-lab activities including microscopy, data collection, and hypothesis generation. We encourage you to collaborate with your partner and peers in the analysis of your data, including discussion of data presentation and interpretations. While the ideas and overall interpretations may result from collaboration, we require that the textual and graphical content of any assignment or lab report submitted for grading is prepared by you individually without the assistance of anyone else. **Do not copy directly from lab manual, do not share electronic data, textual or graphical files.**
• Frequently you will search the scientific literature in order to find support for your hypotheses or data interpretations. It is critical to cite all references used. We require that you use the citation style of Cell, available at http://www.cell.com/cell/authors. For extensive lab reports, it is recommended that you use a reference manager program (ie. RefWorks, Papers, Endnote). Help with these is freely available to you through the Dana Biomedical Library.

• Any attempt to mislead the laboratory instructor, TA, or other course personnel regarding late submission of assignments, absences from lab, or alterations in graded assignments will be considered academic dishonesty and will be considered a violation of the Academic Honor Principle.

LABORATORY POLICIES

Attendance

Attendance is required at ALL of your assigned lab dates. It is your responsibility to ensure that you are in attendance for all of your assigned laboratory sessions for the entirety of the laboratory period.

If you are unable to attend your assigned lab section due to unforeseen circumstances, you must notify the laboratory directors as early as possible, before your assigned lab section time. The earlier you bring this to the attention of laboratory directors the greater the possibility that arrangements can be made for you to still complete all or portions of the laboratory activities. Due to time constraints, however, there are no arrangements for make-up labs and there is no guarantee you will be able to participate in or receive full credit for the lab.

Attire

We will routinely be working with hazardous chemicals and laboratory equipment. Therefore it is critical that you come to the laboratory with appropriate attire to perform all laboratory procedures safely. You are required to wear closed-toe shoes and long pants or ankle-length skirts at all laboratory sessions. Shorts, capris, skirts above the ankle and sandals are not allowed. During the winter months, it is recommended to bring dry shoes to avoid slipping in wet boots. Arrival at the laboratory with inappropriate attire will result in you being sent home to acquire the appropriate lab attire.

We will provide lab coats, gloves, and goggles when necessary. The purpose of this personal protective equipment is to prevent the contamination of you and your belongings, therefore please remove all lab coats, goggles, and gloves if you leave the laboratory, (including going into the lab vestibule) for any reason during the laboratory session.

Electronic Devices

Due to the nature of the reagents and equipment used in the laboratory, it is critical that electronic devices are not used during the laboratory sessions. Cell phones are not permitted in the laboratory at any time and must be kept in the vestibule during the entire laboratory session. Laptop computers are permitted only during designated times (as indicated by your TA) and can only be used in designated areas to avoid contamination with hazardous reagents.