Life Sciences 1a. An Integrated Introduction to the Life Sciences: Chemistry, Molecular Biology, and Cell Biology

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Half course (fall term). Tu., Th., 10-11:30 and three hours of laboratory/discussion weekly.

What are the fundamental features of living systems? What are the molecules that impart these features, and how do their chemical properties explain their biological roles? The answers to these questions form the basis for an understanding of the molecules of life, the cell, diseases, and medicines. In contrast with a traditional presentation of relevant scientific disciplines in separate courses, the above concepts are examined through an integrated presentation of chemistry, molecular biology, biochemistry, and cell biology framed within two central problems such as the biology of HIV and cancer.

Course requirements

Prerequisites
none

Lectures
Lectures are held Tuesday and Thursday from 10:00-11:30 in Sanders Theater. Note that food and drink is strictly prohibited in Sanders Theater. Please arrive no later than 10:07, as lectures and lecture break-outs (see below) will begin promptly at 10:07. Attending lecture is a crucial component of learning the material presented in this course. No single textbook currently exists that presents all of the concepts in LS1a, and the question & answer exchanges in lecture are valuable learning opportunities. Lecture videos and lecture notes will be made available on the Life Science 1a website.

After every lecture beginning with the lecture on September 26, students are required to submit brief answers to the following two questions by e-mail to their TF by midnight. There is no right or wrong answer to the questions, however submission is mandatory and will be considered in assigning section grades.

Question 1: What concept(s) in today’s lecture did you find most interesting?
Question 2: What concept(s) in today’s lecture did you find unclear?
Required Textbooks
There are two required texts for Life Sciences 1a that will be made available at The Coop.

Alberts et. al., *Essential Cell Biology* 2nd edition
McMurry et. al., *General, Organic, and Biological Chemistry* 5th edition

Some of you may have access to other textbooks relevant to this course (such as the organic chemistry text by Claydon et al., used in Chemistry 17). While these other texts may be useful supplementary references for concepts presented in this course, different texts present concepts in different ways and in a different order; you are responsible for ensuring that you are familiar with the material in the assigned reading from the required texts.

Additional readings, including lecture notes, will be posted on the web site. You are responsible for the material provided from these sources. It is recommended that you purchase a molecular model set for general or organic chemistry. Model sets will be useful for visualizing chemical molecules in this course as well as in future chemistry courses.

Lecture Break-Outs

A Break-Out is a discussion among students and faculty during lecture that culminates in a multiple choice question based on concepts taught in lecture. Students will write their answer on a 3” x 5” index card, which is turned in at the end of the Break-Out session. *Cards will not be provided in lecture and no other forms of answer sheets (i.e. 4” x 6” card, notebook paper) will be accepted. Students are therefore required to bring an index card to each lecture.* Break-Outs will occur at unannounced times during lecture throughout the semester. There will be a total of 8 Break-Outs, each worth 1% extra credit to be added to the final exam grade.

**Note:** Break-Outs are only administered in lecture and since they are worth extra extra credit points, there will be no make-ups.

Sections
Weekly section meetings combine both laboratory and discussion components. Sections are designed to complement the course and reinforce materials presented in the lecture and readings. Attendance is mandatory and participation, together with graded assignments and problem sets, account for a substantial portion of the section grade. No student may obtain a passing grade in the course without attending section.
Laboratory
This semester a series of interconnected labs will be conducted to emphasize the links between chemistry and biology. Lab activities include: (1) a computer module to better visualize and understand the molecules introduced in lecture, (2) an organic chemistry module in which you will synthesize a biologically active small molecule called Fluvastatin, and (3) a biology module in which you will assay the biological properties of Fluvastatin and several related molecules. The background information and protocols for the lab will be made available on the course website or in a lab manual.

Discussion
Sections include a 1-hour discussion session every week. Discussion sessions will cover practice problems, problem sets, lectures, readings, and additional materials relevant to the course. The section will be most beneficial if you come prepared for discussion – we expect you to complete the readings prior to section and to attend the lectures. Discussion sections are a weekly opportunity for you to ask your TF any questions you may have about the course material.

Students must attend the same three-hour section each week. Sections are offered at these times:
- Tuesdays 2:00 pm – 5:00pm and 6:00 pm – 9:00pm
- Wednesdays 12:00 pm – 3:00 pm, 2:00 pm – 5:00 pm and 6:00 pm – 9:00 pm
- Thursdays 12:00 pm – 3:00 pm, 2:00 pm – 5:00 pm and 7:00 pm – 10:00 pm

Electronic sectioning will be open from Monday, September 18 through Thursday, September 21. During this time, students must go to

http://www.section.fas.harvard.edu

and give their preferences for section times. Students will receive their section assignments by email on or before Wednesday, February 8. Requests to change section must be addressed to Preceptors Dr. Ernie Chang and Dr. Elizabeth Heller (lsci1a@fas.harvard.edu), and will only be considered for academic reasons. Once sections start the week of September 25, all section assignments are final.

Section orientation:
All students must attend one of the following section orientations:
- Tues, Sep 19 from 2-3 pm in Science Center Hall B
- Thu, Sep 21 from 9-10 am in Sanders Theater
- Thu, Sep 21 from 4-5 pm in Science Center Hall C
Problem Sets
Problem sets will be posted on the website. They will be due at 12 pm on the Fridays listed on the course syllabus and also posted on the website. They are to be turned in to the appropriate box on the 2nd floor of the Science Center no later than 12 noon. Problem sets can be turned in earlier than the due date, however no problem sets will be accepted after the noon deadline. Students are encouraged to work in groups on their problem sets, however each person must write and submit their own answers to receive credit.

Weekly Review
At the end of every week, the most recent lectures as well as some special topics will be reviewed by one of the course preceptors (Fridays 1-3 pm in SC Hall A). This is another opportunity for you to obtain clarification on any aspect of the week’s lecture material. Attendance is voluntary, but encouraged.

Student Study Networks
To further promote Life Sciences 1a as a community of learning, the course facilitates the formation of study networks where students can discuss problem sets and assignments, and prepare for exams in groups. LS1a study network facilitators will host problem-solving sessions throughout the semester in the Science Center Rooms 309 and 309a on Sunday nights from 7-9 pm, Wednesday nights from 8-10 pm and Thursday nights from 8-10 pm. On Sundays the facilitators will help students work through practice problems.

Examinations
There will be two mid-term examinations held on Monday, October 16 and Monday, November 13 from 7:00-8:30 pm, and a final examination held during the Final examination period. You are responsible for ensuring your attendance at these examinations.

NO MAKE-UP MID-TERM EXAMS WILL BE GIVEN. If you miss an exam, you must have a documented medical excuse, and your remaining mid-term exam and the final exam will each account for 35% of the course grade.
Grading
Your performance on examinations and section contribute to your overall course grade. Note that your section grade includes your performance on laboratory exercises and assignments, discussion, quizzes, and problem sets. Your overall course grade will be calculated using one of the two formulae listed below (whichever is higher):

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<tr>
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<th>Grade Formula 1</th>
<th>Grade Formula 2</th>
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<tbody>
<tr>
<td>Two mid-term examinations</td>
<td>40%</td>
<td>30%</td>
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<tr>
<td></td>
<td>(20% each)</td>
<td>(10% low, 20% high)</td>
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<tr>
<td>Final examination</td>
<td>30%</td>
<td>40%</td>
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<tr>
<td>Section</td>
<td>30%</td>
<td>30%</td>
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Formula 2 allows you to compensate for a disappointing midterm by doing better on the final exam. Since the final exam is comprehensive, either formula will result in your course grade accurately reflecting your overall grasp of the material.

Web Page
The course webpage is a rich source of essential information about all aspects of the course and contains all course handouts as well as lecture videos. You can visit the course webpage at

http://www.courses.fas.harvard.edu/~lsci1a/