Preliminary Syllabus for Chemical Biology 101a – Fall, 2014

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Office Hours: MWFTh, 1:00-2:00

Lectures: MWFTh 12:00-12:50 p.m., Location TBA
Textbook: There is no required text for this course. However, students may be interested in the following monographs that provide general introductions to the topics we will be discussing:

- Introduction to Bioorganic Chemistry and Chemical Biology, by David Van Vranken
- Chemical Biology by Herbert Waldmann

It will also be useful to have your old organic chemistry and biology textbooks around.

Course Description: The revolution in the techniques of genomics (high-throughput sequencing, polymerase chain reaction (PCR)-based cloning and site directed and random mutagenesis, overexpression and regulation of protein expression, among others), proteomics and glycomics has opened up a new and exciting scientific endeavor at the interface between chemistry and biology. While “biochemistry” is the traditional study of the chemical behavior of natural biological systems, the term chemical biology is often used to describe the employment of the products of chemical synthesis to probe and/or manipulate biological systems. On the other extreme, synthetic biology is more concerned with the manipulation of biological processes for synthetic ends: How can I make a biological system do what I want, rather than what it wants/needs?

Because this is a rapidly evolving field, we will be using the primary literature as our sources. Any textbook would be quickly out of date. Some of the more important journals in this area include Nature Chemical Biology and Nature Methods, ACS Chemical Biology and Cell Press Chemistry & Biology. This course will project-based: While I will present lectures to introduce a particular topic, students will be assigned a current topic in chemical biology that they will present to the class as concrete examples of the state of the art.

Attendance and Partners: Because this is a no-textbook course, attendance at lectures and presentations is particularly important. Exams will be based exclusively on the material presented in these forums and on any assigned readings. I will try to arrange the class so that each person is given an individual project. However, depending upon enrollment, there may need to be some partnering.

Homework and exams: Homework assignments will be primarily for review of material prerequisite for the course, and will be due at the beginning of class on the Monday after assignment.

Presentations: All students in the course will be assigned scientific literature on which to
prepare a 40-50 minute PowerPoint presentation. Presentations must include background information, results and discussion, and conclusions and future directions. Additional references may be needed to fully understand background information. Results and discussion should include organic reactions and mechanisms as well as biological assays and techniques used for evaluation. Note that it may not be possible to discuss ALL content of the assigned publications during your presentation; it will be important to provide sufficient information to understand the overview and broader applications of the research.

Projects: Students will select a reference published within the past five years from a journal containing chemical biology research (for example, ACS Chemical Biology, Nature Chemical Biology, Chemistry & Biology, Science, PNAS, etc.), and prepare a report. Project details will be given later in the course.

Prerequisites and Grading: A satisfactory grade (C- or better) in CHEM 25a/b and Biol 22a/b or the equivalent. OC Requirement: This course satisfied university requirements for an Oral Communication Course.

Grades will be distributed as follows:

- Homework 10%
- Presentation 15%
- Project 15%
- Examinations 30%
- Final Exam 30%

Course grades are determined based on the class average and student distributions around the average.

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<thead>
<tr>
<th>Date</th>
<th>Notes and Literature Refs.</th>
<th>8/28</th>
<th>9/3</th>
<th>9/4</th>
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<tbody>
<tr>
<td>8/28</td>
<td>Introduction to methods (Morrison and Weiss 2006)</td>
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<tr>
<td>9/1-9/5</td>
<td>Databases and searching (GenBank, SwissProt Human microbiome)</td>
<td>LD, no classes</td>
<td>9/8</td>
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<tr>
<td>Date Range</td>
<td>Notes</td>
<td>9/29</td>
<td>10/1, P7</td>
<td>10/2, P8</td>
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<td>9/29-10/3</td>
<td>(Kipnis and Baker 2012; Kiss, Celebi-Olcum et al. 2013)</td>
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<td>10/6-10/10</td>
<td>(Giger, Caner et al. 2013; Tinberg, Khare et al. 2013; Correia, Bates et al. 2014)</td>
<td>10/6, P10</td>
<td>10/8, P11</td>
<td>10/9 Sukkot</td>
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<td>10/13-10/17</td>
<td>10/14 last “no W” drop Glycobiology (Bertozzi 2005; Dube and Bertozzi 2005; Chang, Chen et al. 2009)</td>
<td>10/13 Brandeis Thursday, P12</td>
<td>10/15, P13</td>
<td>10/16 Shmini Atzeret</td>
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<td>10/27-10/31</td>
<td>Metabolic engineering (Baltz 2009; Medema, Breitling et al. 2011)</td>
<td>10/27, P17</td>
<td>10/29, P18</td>
<td>10/30 exam I</td>
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<td>11/3-11/7</td>
<td>(Aigle and Corre 2012; Gomez-Escribano and Bibb 2014; Jaitzig, Li et al. 2014)</td>
<td>11/3, P19</td>
<td>11/5, P20</td>
<td>11/6, P21</td>
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<td>11/24-11/28</td>
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<td>11/24</td>
<td>Thanksgiving holiday</td>
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<td>12/1-12/5</td>
<td>(Kasap, Elemento et al. 2014)</td>
<td>12/1, P28</td>
<td>12/3, P29</td>
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<td>12/8-12/12</td>
<td>Exams 2, 12/8 last day of classes</td>
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**Academic Integrity:** Consult the appropriate sections concerning academic integrity in the Brandeis University Catalog and Student Handbook. Rules and regulations contained in these publications will be strictly applied.

**Disability Statement:** If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately. Keep in mind that accommodations are not provided retroactively.
Leading references


