# Department of Biology Course Outline

## SC/Biol2020A 3.00, Biochemistry
### Summer, 2017

## Course Description
A study of the cell biology and biochemistry of biomolecules. Topics include intermediary metabolism related to bioenergetics, including the biology of mitochondria and chloroplasts, protein structure and function, nucleic acid replication, gene expression, chromosome organization and recombinant DNA technology. Three lecture hours.

## Prerequisites
Both SC/BIOL 1000 3.00 and SC/BIOL 1001 3.00 or SC/BIOL 1010 6.00; both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00, or SC/CHEM 1000 6.00. Course credit exclusions: SC/BIOL 2020 4.00, SC/BCHM 2020 4.00, SC/CHEM 2050 4.00.

## Course Instructors and Contact Information
Course Director: Dr. Mark Bayfield, LSB327E
Emails: Questions about course content should be sent to: BIO2020A@yorku.ca
Questions about course administration issues should be sent to bayfield@yorku.ca

## Schedule
Lectures: Mondays and Wednesdays, 8:30 – 11:00 am, Lassonde A
Office Hours: Wednesdays 11:30 am– 12:30 pm, LSB 1st floor common study area and various online Q&A sessions at times to be determined.

## Evaluation

### Grading:
- Midterm 1: 25%
- Midterm 2: 25%
- Final Exam: 45% or 50%
- Optional participation component: 5% or 0% (see “Optional Polling Participation Component”)

Section 1 will be tested on Midterm 1 and Section 2 will be tested on Midterm 2. The final exam is cumulative but weighted; it will have a higher proportion of material from section 3 than sections 1 or 2.
### Important Dates

**DROP DEADLINE FOR THIS COURSE IS June 2\textsuperscript{nd}, 2017.**

- **Midterm 1:** May 15\textsuperscript{th}, 2017 at 10:00 am (in class, after the first half lecture)
- **Midterm 2:** June 5\textsuperscript{th}, 2017 at 10:00 am (in class, after the first half lecture)

**NOTE:** for additional important dates such as holidays, refer to the “Important Dates” section of the Registrar’s Website at [http://www.yorku.ca/yorkweb/cs.htm](http://www.yorku.ca/yorkweb/cs.htm)

### Resources

- **Text:** “Lehninger Principles of Biochemistry” by Nelson and Cox, 6\textsuperscript{th} edition
- Lecture slides available via course website accessible via Moodle @ York

### Learning Outcomes

Upon successful completion of this course, students should understand the major classes of biomolecules and the mechanisms by which cells express genetic information and utilize and store energy. The students should also apply concepts covered in the course to problem sets related to current biochemical methods and research.

### Other Information

This second year course will focus on a wide range of topics within Biochemistry. In order to fully understand the material presented during lecture, a basic understanding of chemical principles and cellular molecular biology (i.e. BIOL 1000 & 1001, CHEM 1000 & 1001) will be expected of candidate students. Although most of the curriculum can be found in the course recommended text, certain topics, such as the practical application of several biochemical techniques, will NOT be found in the text. Thus, in order to be as successful as possible, each student should attempt to be present for all lectures.

Chapters correspond to Lehninger, 6\textsuperscript{th} edition. Coverage of chapters will not be complete, and where indicated the lectures will cover only selected topics from the chapter. Students are advised to attend all lectures and study those sections of the text relevant to the lecture topics. Exam questions will relate to the lecture topics and any related information presented in the lectures that may not be covered in the textbook.

This course emphasizes the ability to apply knowledge gained in BIOL2020. As a consequence, testing will focus on situations and the ability of the student to analyze data and anticipate outcomes. Again, the critical thinking required by the student would be strengthened by attending all lectures. In order to **EARN** an “A” in this course, students must demonstrate the ability to apply their knowledge.

## Course Content

<table>
<thead>
<tr>
<th>Section</th>
<th>DATE</th>
<th>TOPIC</th>
<th>READING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Lehninger)</td>
</tr>
<tr>
<td>Section 1: Buffers, amino acids and protein structure</td>
<td>May 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Introduction, chemical bonds</td>
<td>Chapter 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water, acids &amp; bases, buffers</td>
<td>Chapter 2</td>
</tr>
<tr>
<td></td>
<td>May 3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Amino acids</td>
<td>Chapter 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Protein structure (secondary)</td>
<td>Chapter 4</td>
</tr>
<tr>
<td></td>
<td>May 8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Protein structure (tertiary), protein purification</td>
<td>Chapter 3, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemoglobin, enzymes kinetics</td>
<td>Chapter 5, 6</td>
</tr>
<tr>
<td></td>
<td>May 10&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Enzyme kinetics &amp; inhibition</td>
<td>Chapter 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbohydrates</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>Section 2: DNA &amp; RNA structure and techniques</td>
<td>May 15&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Nucleotides and Nucleic Acids</td>
<td>Chapter 8</td>
</tr>
<tr>
<td></td>
<td>May 17&lt;sup&gt;th&lt;/sup&gt;</td>
<td>DNA Replication and Repair</td>
<td>Chapter 25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RNA transcription and Processing</td>
<td>Chapter 26</td>
</tr>
<tr>
<td></td>
<td>May 24&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Translation &amp; Protein Targeting and degradation</td>
<td>Chapter 27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regulation of gene expression</td>
<td>Chapter 28</td>
</tr>
<tr>
<td></td>
<td>May 29&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Recombinant DNA technology</td>
<td>Chapter 8, 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metabolism and energy transfer</td>
<td>Chapter 13, 15</td>
</tr>
<tr>
<td>Section 3: Metabolism</td>
<td>May 31&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Glycolysis &amp; gluconeogenesis</td>
<td>Chapter 14</td>
</tr>
<tr>
<td></td>
<td>June 5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Oxidation of pyruvate, citric acid cycle</td>
<td>Chapter 16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxidative phosphorylation and electron transport</td>
<td>Chapter 19</td>
</tr>
<tr>
<td></td>
<td>June 7&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Metabolism of fatty acids</td>
<td>Chapter 17, 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metabolism of amino acids</td>
<td>Chapter 18, 22</td>
</tr>
<tr>
<td></td>
<td>June 12&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Coordination of metabolism</td>
<td>Chapter 23</td>
</tr>
</tbody>
</table>

Midterms are held in class. The final exam is cumulative and weighted. That means the majority of material on the final exam will cover section #3 (blue), but there will still be questions from the red and green sections.

## Course Policies

1. If you miss an exam (midterm or final) with a legitimate documented reason (unplanned medical or family emergency), documentation must be submitted to me (Dr. Bayfield) in order to avoid receiving a grade of zero on the exam. You should submit your information and a scan of your medical note at [http://science.apps01.yorku.ca/machform/view.php?id=84113](http://science.apps01.yorku.ca/machform/view.php?id=84113). I must receive all documentation supporting your excuse for missing an exam within 1 week of the missed exam.

2. In the event of one missed midterm with a valid documented reason, the weight of this midterm will be moved to the final exam. No makeup exam will be available for midterms. In the event of a missed final exam with a valid, documented reason (where both midterms have been written), a deferred final exam will be offered. In the event that a student misses the final exam in addition to one or both midterms, the student will be required to petition in order to take the deferred final exam.

3. All exams will be multiple-choice.

4. In order to be fair and consistent with regards to the entire class, individual grades are not negotiable.
Contact me about marks ONLY if there is a clear error in your mark (calculation, clerical, etc.) as soon as possible at bayfield@yorku.ca. It is highly unlikely that you will receive a response regarding any other mark-related queries.

5. Students who do not write the final exam, but have completed both midterms must contact me for permission to write a deferred exam (i.e. sign the Deferred Standing Agreement form). It is Senate Policy that "Normal requests for deferred standing must be communicated within one week following a missed examination, or on the last day to submit course work". Please check out the Registrar’s Office Deferred Standing FAQs (http://www.registrar.yorku.ca/exams/deferred) for more details. Students who have missed a midterm will be required to petition to write a deferred final exam.

6. **Optional Polling Participation Component.** Students will be given the option to have 5% of their grade made up of an in class participation component in which questions will be posed and students can answer using their laptop or mobile device (similar to a “clicker” question). Each question is scored out of 2; students will be given 1 point for answering a question, and a further point for answering a question correctly. Questions that are not answered are scored as a zero for that question. The participation grade will be included in the students’ score if this has a positive effect on their final mark at the expense of 5% on the final exam (i.e. the final exam will be worth 45% instead of 50%). If the participation score does not have a positive effect on the students’ grade then the grade will be calculated only from the exams. **Thus, the participation component is only scored if it helps the students' final grade.** The one exception to this rule is if a student is caught cheating with the participation component, for example by trying to answer without coming to class (i.e. giving their device to another student). In this case the participation component will be included in the mark, the entire participation component will be scored as “0”, and the student will be taken up with academic dishonesty for further disciplinary action.

**There will not be any accommodations made for missing class or questions that make up the participation marks; to get the optional participation mark, you must be in class, participating.** It is the responsibility of the student, and only the student, to have registered their mobile device or laptop to participate. Questions that are missed for any reason are scored as “0”. We will try some sample questions starting in Lecture 2, and questions that count to the participation grade will start in Lecture 3.

---

**University Policies**

**Academic Honesty and Integrity**
York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students’ research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - http://www.yorku.ca/spark/academic_integrity/index.html

**Access/Disability**
York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Student's in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

**Additional information is available at the following websites:**
  - Counselling & Disability Services - http://cds.info.yorku.ca/
  - Counselling & Disability Services at Glendon –
Ethics Review Process
York students are subject to the York University Policy for the Ethics Review Process for Research Involving Human Participants. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an Application for Ethical Approval of Research Involving Human Participants at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

Religious Observance Accommodation
York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf

Student Conduct in Academic Situations
Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/