# Department of Biology Course Outline

**SC/BIOL2020A 3.00, Biochemistry**  
**Summer, 2019**

## 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 per class.

## 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 administration issues should be sent to bayfield@yorku.ca  
Emails about course material are to be sent to bio2020A@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% or 0% (optional)
- Midterm 2: 25% or 0% (optional)
- Final Exam: 50%, 75% or 100%

Midterms are optional. Missed midterms (for any reason) will have their weight transferred to the final exam, up to a 100% final exam. There are no makeup midterms. See Course Policies for other information. Section 1 will be tested on Midterm 1 and Section 2 will be tested on Midterm 2. The final exam is cumulative.
Important Dates

DROP DEADLINE FOR THIS COURSE IS MAY 27th, 2019

Midterm 1: May 13th, 2019
Midterm 2: June 3rd, 2019

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

Resources

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, 7th 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>
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<tbody>
<tr>
<td>Section 1: Buffers, amino acids and protein</td>
<td>April 29th</td>
<td>Introduction, chemical bonds</td>
<td>Chapter 1</td>
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<tr>
<td>structure</td>
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<td>Water, acids &amp; bases, buffers</td>
<td>Chapter 2</td>
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<td></td>
<td>May 1st</td>
<td>Amino acids</td>
<td>Chapter 3</td>
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<td>May 6th</td>
<td>Protein structure (secondary)</td>
<td>Chapter 4</td>
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<td></td>
<td>May 8th</td>
<td>Protein structure (tertiary), protein purification</td>
<td>Chapter 3, 4</td>
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<td>Hemoglobin, enzymes kinetics</td>
<td>Chapter 5, 6</td>
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<td></td>
<td>Enzyme kinetics &amp; inhibition</td>
<td>Chapter 6</td>
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<td>Carbohydrates</td>
<td>Chapter 7</td>
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<td>Section 2: DNA &amp; RNA structure and techniques</td>
<td>May 13th</td>
<td>Nucleotides and Nucleic Acids</td>
<td>Chapter 8</td>
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<td></td>
<td>May 15th</td>
<td>DNA replication and repair</td>
<td>Chapter 25</td>
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<td>May 22nd</td>
<td>RNA transcription and Processing</td>
<td>Chapter 26</td>
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<td>May 27th</td>
<td>Translation &amp; Protein Targeting and degradation</td>
<td>Chapter 27</td>
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<td>Regulation of gene expression</td>
<td>Chapter 28</td>
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<td>Recombinant DNA technology</td>
<td>Chapter 8, 9</td>
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<td>Metabolism and energy transfer</td>
<td>Chapter 13, 15</td>
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<tr>
<td>Section 3: Metabolism</td>
<td>May 29th</td>
<td>Glycolysis &amp; gluconeogenesis</td>
<td>Chapter 14</td>
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<td>June 3rd</td>
<td>Oxidation of pyruvate, citric acid cycle</td>
<td>Chapter 16</td>
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<td>June 5th</td>
<td>Oxidative phosphorylation and electron transport</td>
<td>Chapter 19</td>
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<td>June 10th</td>
<td>Coordination of metabolism</td>
<td>Chapter 23</td>
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Midterms are held in class. Midterm 1 will test section 1 (red) and Midterm 2 will test section 2 (green). The final exam is cumulative.

## Course Policies

1. If you miss a midterm exam for any reason the weight of the midterm will be transferred to the final exam. Midterms are optional; grades will be calculated based on the highest possible score incorporating or dropping the midterm scores. Under this scheme, only midterms whose scores are higher than the final exam score are counted toward the final grade. Thus, the final exam is worth either 50%, 75%, or 100% of your final grade, but the minimum that the final exam will count for your grade is 50%. The final exam must be worth at least 50%, and the midterms are counted as being worth 25% or 0%. The final exam is cumulative.
Some examples of how grades would be calculated based on following situations:

**Student A:** Midterm 1 score: 80%; Midterm 2 score: 50%; Final exam score: 75%.

*Student A did better on Midterm 1 than on the final exam, but worse on Midterm 2 than the final exam. Their grade is calculated as 25% Midterm 1, 0% Midterm 2, 75% Final exam. The midterms count as 25% or 0%. Midterm 1 will not be counted as worth more than 25% just because the student did better on it than Midterm 2. If you do badly on a midterm that weight is only transferred to the final exam.*

**Student B:** Midterm 1 score: 0% (didn’t write); Midterm 2: 65%, Final exam: 70%.

*Student B did better on the final exam than both Midterms 1 & 2. Their grade is calculated as a 100% final exam.*

**Student C:** Midterm 1: 80%; Midterm 2: 80%, Final exam: 60%.

*Student C did better on both Midterms 1 & 2 than the final. Their grade is calculated as Midterm 1: 25%, Midterm 2: 25%, Final exam: 50%. The final exam must count for at least 50%, and the midterms cannot count for more than 25.*

**Student D:** Midterm 1: 0% (didn’t write), Midterm 2: 0% (didn’t write), Final exam: 45%.

*Student D wrote neither midterm and thought they would be fine with a 100% final exam. Their final grade is 45%.*

2. All exams will be multiple-choice.

3. 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.

4. Students who do not write the final exam with a legitimate documented reason (unplanned medical or family emergency) must acquire documentation that must be submitted to me (Dr. Bayfield) in order to avoid receiving a grade of zero on the exam. Only a "York Attending Physician's Statement Form" (can be downloaded as part of the Petitions Package) OR a similarly detailed doctor’s note (i.e. not simply a form stating that the student visited a clinic) will be accepted for medical excuses. Students must contact me for permission to write a deferred exam (i.e. fill and 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**". Please check out the Registrar’s Office Deferred Standing FAQs (http://www.registrar.yorku.ca/exams/deferred) for more details.

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**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.

Students 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 – http://www.glendon.yorku.ca/counselling/personal-counselling/what-is-counselling/
- York Accessibility Hub - http://accessibilityhub.info.yorku.ca/

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/