

## Department of Biology Course Outline

### SC/BIOL 2020 3.00 Biochemistry Winter 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.

#### 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

Dr. Emanuel Rosonina  
Life Sciences Building (LSB) 329D (Note that this floor is not accessible without security card)  
rosonina@yorku.ca  
Phone: 416-736-2100 x44702

Office hours: Tentatively Thursdays 3:30 – 4:30 PM in Room LSB 213

Questions regarding the course and about course material should primarily be made during/after class, during office hours, or using the Course Discussion Forum on the course website. Generally, emails will be answered within a day. However, emails will not be answered for the 24 hours prior to the start of midterm and final exams. Please indicate *BIOL2020* or *BCHM2020* in the subject of emails.

#### Schedule

Tuesdays and Thursdays in Lassonde Hall C (LAS-C), 10:00 – 11:30 AM

#### Important Dates

**February 1, 2019** Deadline for submission of Assignment 1  
**February 7, 2019** Midterm 1 (Based on Part 1: Lectures 1 – 8)  
**March 8, 2019** Final day to drop the course without receiving a grade  
**March 8, 2019** Deadline for submission of Assignment 2  
**March 12, 2019** Midterm 2 (Based on Part 2: Lectures 9 – 15)  
**April 3, 2019** Deadline for submission of Assignment 3

NOTE: For additional important dates such as holidays, refer to the “Important Dates” section of the Current Students Website at <http://currentstudents.yorku.ca/>

## Evaluation

- |                                |                    |                           |
|--------------------------------|--------------------|---------------------------|
| 1. Midterm 1 (Based on Part 1) | February 7, 2019   | worth 25% or 0%           |
| 2. Midterm 2 (Based on Part 2) | March 12, 2019     | worth 25% or 0%           |
| 3. Three Assignments           | (See below)        | worth 5% (2%, 2%, and 1%) |
| 4. Final Exam (Cumulative)     | April 5 - 20, 2019 | worth 45%, 70%, or 95%    |

### Final Grade Calculation

- For each student, four grades will be calculated, based on the Schemes described below.
- **The highest of the four grades will be submitted as the final course grade.**

	Midterm 1	Midterm 2	Assignments	Final Exam
<b>Scheme A</b>	25%	25%	5%	45%
<b>Scheme B</b>	-	25%	5%	70%
<b>Scheme C</b>	25%	-	5%	70%
<b>Scheme D</b>	-	-	5%	95%

- By this system, if you do poorly on one or both midterms, you can still do well on the course by doing well on the final exam.
- Essentially, the midterms are optional. However, it is to your benefit to write both midterm exams since your midterm grades will be excluded if they lower your final grade.
- If you do not write one or both midterm exams (due to illness, family emergency, by choice, or for any other reason), your grade will be zero but that grade will be automatically excluded from your final grade calculation.
  - For example, if you miss Midterm 2, only Schemes C or D will be used to determine your final grade.
- By this system, **no documentation, explanation, or notification is needed for missing a midterm exam.** If you miss one or both midterm exams, they will automatically be excluded from your final grade.

Tentatively, exams will be multiple-choice, with approximately 30 questions for each midterm exam and 75 questions on the final exam. It is possible that there will be some fill-in-the-blank and short answer questions, as well. Notice that if you are permitted or required, for any reason, to write any course exam on a date that is not the usual date for that exam, then the exam can be in a format that is different than the format of the usually-scheduled exam.

This course emphasizes the ability to apply knowledge gained in the class. As a consequence, testing will focus on the ability of students to analyze data, anticipate outcomes, and apply knowledge to new situations. Critical thinking skills that are required to do well in the course will be strengthened by attending all lectures. In order to earn an "A" in this course, students must demonstrate the ability to apply their knowledge.

### Assignments (5%)

Create a total of five multiple choice questions based on course material. See full instructions on the course Moodle website.

**Assignment 1:** Submit two questions from Part 1 of the course (Lectures 1 - 8) for 2%.  
Due: **February 1, 2019 by 9:00 PM**

**Assignment 2:** Submit two questions from Part 2 of the course (Lectures 9 - 15) for 2%.  
Due: **March 8, 2019 by 9:00 PM**

**Assignment 3:** Submit one question from Part 3 of the course (Lectures 16 - 22) for 1%.  
Due: **April 3, 2019 by 9:00 PM**

Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

## Course Content

The following is a preliminary schedule of topics to be covered in the course. Changes and corrections can be expected.

PART	DATE	LECTURE	TOPICS
<b>Part 1: Buffers, Amino Acids, Proteins</b> (Lectures 1 – 8)	Jan. 3	1	Introduction, Chemical Bonds, Water
	Jan. 8	2	Water, Acids, Bases, Buffers
	Jan. 10	3	Amino Acids
	Jan. 15	4	Protein Structure
	Jan. 17	5	Protein Folding, Hemoglobin
	Jan. 22	6	Protein Isolation and Purification
	Jan. 24	7	Enzymes, Enzyme Kinetics
	Jan. 29	8	Enzyme Inhibition and Regulation
<b>Part 2: Carbohydrates, DNA &amp; RNA, Translation</b> (Lectures 9 – 15)	Jan. 31	9	Carbohydrates
	Feb. 5	10	Carbohydrates, Nucleic Acids
	Feb. 7	<b>Midterm Exam 1 (Lectures 1 – 8)</b>	
	Feb. 12	11	Nucleases, DNA Replication
	Feb. 14	12	DNA Damage and Repair, Transcription
	Feb. 26	13	Pre-mRNA Processing, Gene Regulation
	Feb. 28	14	Protein Synthesis (Translation)
	Mar. 5	15	Protein Regulation, Molecular Biology Techniques
<b>Part 3: Metabolism</b> (Lectures 16 – 22)	Mar. 7	16	Metabolism and Energy Transfer
	Mar. 12	<b>Midterm Exam 2 (Lectures 9 – 15)</b>	
	Mar. 14	17	Glycolysis and Gluconeogenesis
	Mar. 19	18	Pyruvate Oxidation, Citric Acid Cycle
	Mar. 21	19	Electron Transport, Oxidative Phosphor.
	Mar. 26	20	Fatty Acid and Lipid Metabolism
	Mar. 28	21	Amino Acid and Nitrogen Metabolism
	Apr. 2	22	Coordination of Metabolism

Coverage of text book chapters will not be complete, and not all topics presented in class are covered in the text book. Students are advised to attend all lectures and study the sections of the textbook that are relevant to the lecture topics. Exam questions will relate to material presented in lectures. However, students are responsible for all material covered in the course, and are encouraged to search for other reference material that complements the lectures.

### Participation (iClicker)

The iClicker student response system will be used during class to answer review questions on material taught in the previous or current class. Usually, three to six questions will be posed per class. Participation is encouraged, but not worth marks. You can find more information, including how to obtain the necessary iClicker software, on the course Moodle site.

### Practice Problems

A list of practice problems found at the end of textbook chapters will be provided on the course Moodle website after each class. Students are encouraged to attempt these problems for their own practice.

### Lecture Recordings

Lectures will be video recorded for student use. Links to the recording will appear on the course Moodle site within a day of the lecture.

Please note the following:

- Recordings should be considered as a supplement to attending classes, not as a replacement.
- Only slides as they appear on the screen, movements of the computer mouse pointer, and the instructor's voice will be recorded.
- The instructor will sometimes use a laser pointer during class. This will not be recorded.
- The instructor will sometimes use the blackboard or document camera. This will not be recorded.
- Students are responsible for all material presented during class, even material that is not in the lecture recording.

## Resources

- COURSE WEBSITE:** Moodle (moodle.yorku.ca)  
A basic version of the slides presented in class will be posted as a static PDF file prior to each class. Full (and updated) slides will be shown only in class.
- REQUIRED TEXT:** Nelson and Cox, **Lehninger: Principles of Biochemistry, Seventh Edition (2017)** Freeman.
- ADDITIONAL TEXTS:** Although not required, you might find current or previous editions of these additional texts useful.
1. Berg, Tymoczko, and Stryer, **Biochemistry**, Freeman.
  2. McKee and McKee, **Biochemistry: The Molecular Basis of Life**, Oxford University Press.
  3. Tymoczko, Berg, Stryer, **Biochemistry: A Short Course**, Freeman.

## Learning Outcomes

Upon successful completion of this course, students should be able to:

- Identify major biological molecules and their polymers by their chemical structure,
- Understand the chemical properties of proteins, nucleic acids, carbohydrates and fatty acids, and details of their biosynthesis and/or metabolism,
- Describe methods by which biological molecules and systems are regulated and coordinated,
- Understand the relationship between energy and biological processes.

## Course Policies

### 1. Missed Midterm Exams.

No documentation, explanation, or notification is required for missed midterm exams due to illness, family emergency, or other reasons. If you miss a midterm exam, your grade will be zero but that midterm will automatically be excluded from your final grade calculation, as described above.

### 2. Missed Final Exam.

Students who write both midterm exams but miss the final exam for valid, documented reasons may request to write a deferred exam, at the discretion of the course director. A Deferred Standing Agreement form and any additional documentation (e.g. Attending Physician's Statement) must be completed and provided to the course director. Student's whose requests are declined may then petition to their home faculty. Check the course Moodle website for more information.

Students who missed one or both midterm exams and miss the final exam will automatically be given a grade of zero on the final exam. These students must then submit a petition to their home faculty. If approved by their Petitions Committee, students will then be permitted to write a deferred exam at a future date (often months after the regular exam).

Please note that, in all cases, the format of the deferred exam might be different from the regular exam (e.g. short answers, oral exam, one or more essay questions, etc. instead of multiple choice format).

**Continued. . .**

**3. Important Information for Students. There is a no-tolerance policy for breaches of academic honesty (e.g. cheating) in this course.** Students who are caught cheating in any way, no matter how minor, will be reported to the Associate Dean for Students. Note that students convicted of breaches of academic honesty will have a permanent record of the incident and may have a notation indicated on their transcript, in addition to penalties such as an assigned failure in the course, suspension, or expulsion.

Examples of breaches of academic honesty in BIOL/BCHM 2020 may include:

- Submitting an assignment that is not your own original work (copying or plagiarising);
- Viewing another student's answer sheet during an exam;
- Allowing another student to view your answer sheet during an exam;
- Communicating with anyone other than the instructor/invigilators during exams;
- Possessing or accessing an unauthorized aid during an exam, for example, paper notes, notes written on your body or clothing, or notes stored electronically on calculators or other devices (e.g. smart watch);
- Possessing or using a programmable calculator during exams. This includes calculators that allow you to save formulas or other entered information. Only basic scientific calculators are permitted when indicated, with memories cleared;
- Recording final exam questions in any way with the intention of sharing this with other students.
- Accessing exam questions prior to exams.

## University Policies

### Ownership of Course Materials

Course materials (lecture notes, slides, tests, exams, etc.) are designed for use as part of this course at York University and are the property of the instructor, unless otherwise stated. Third party copyrighted materials (such as book chapters and articles) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this material for distribution (e.g. uploading material to a commercial third-party website) can lead to a violation of copyright law.

### 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/academicintegrity/>

### 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 - <http://www.glendon.yorku.ca/counselling/personal.html>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

### **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 and submit an Examination Accommodation Form at least 3 weeks before the exam period begins. The form can be obtained from Student Client Services, Student Services Centre or online at [http://www.registrar.yorku.ca/pdf/exam\\_accommodation.pdf](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf) (PDF).

**Note that, if, for whatever reason, you are permitted to write an exam on a date or time that is different than the normally scheduled exam, then the alternately scheduled exam may be of a different format than the original exam. For example, the exam held on the alternate date or time might be an oral, essay, or short answer type exam instead of multiple choice.**

### **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/>