

## Department of Biology Course Outline

### SC/BIOL 2020 3.00 Biochemistry Winter 2016

#### 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 access card)  
rosonina@yorku.ca  
Phone: 416-736-2100 x44702

Office hours: 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 or during office hours. Generally, emails will be answered within a day. However, emails will not be answered for the 24 hours prior to the start of mid-term and final exams. Please indicate *BIOL2020* or *BCHM2020* in the subject of emails.

#### Schedule

Tuesdays and Thursdays in Lassonde C, 10:00 – 11:30 AM

#### Evaluation

- 25%** Mid-term Exam 1 (Based on Section 1)      **February 2, 2016**
- 25%** Mid-term Exam 2 (Based on Section 2)      **March 8, 2016**
- 5%** Participation (In-class “clicker questions”)
- 45%** Final Exam (Cumulative, with a focus on Section 3)

Tentatively, exams will be multiple-choice, with approximately 30 questions for each mid-term 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.

This course emphasizes the ability to apply knowledge gained in BIOL 2020. As a consequence, testing will focus on situations and the ability of the student to analyze data and anticipate outcomes. Again, critical thinking required by the student 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.

### Participation/Clickers

Audience response systems (“clickers”) 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 mandatory and worth 5% of the final grade. Grades for participation will be given according to the following table. **Because answering only three-quarters of all clicker questions is needed for full participation marks, questions missed due to absences (including for valid reasons) and technical issues will be considered as missed questions.**

Percentage of questions answered	Grade (/5%)
75 – 100%	5
50 – 75%	3
Fewer than half	Zero

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

### Important Dates

**February 2, 2016** Mid-term 1 (Based on Section 1: Lectures 1 – 8)  
**March 4, 2016** Final date to drop the course without receiving a grade  
**March 8, 2016** Mid-term 2 (Based on Section 2: Lectures 9 – 15)

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

**COURSE WEBSITE:** Moodle ([moodle.yorku.ca](http://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, Sixth Edition (2013)** 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 Content

The following topics will be covered in lecture, although there may be some alterations at the discretion of the course director.

SECTION	DATE	LECTURE #	TOPICS	CHAPTER (Lehninger)
<b>Section 1: Buffers, Amino Acids, Proteins (Lectures 1 – 8)</b>	Jan. 5	1	Introduction, Chemical Bonds, Water	1, 2
	Jan. 7	2	Water, Acids, Bases, Buffers	2
	Jan. 12	3	Amino Acids	3
	Jan. 14	4	Protein Structure	4
	Jan. 19	5	Protein Folding, Hemoglobin	4, 5
	Jan. 21	6	Protein Isolation and Purification	3
	Jan. 26	7	Enzymes, Enzyme Kinetics	6
	Jan. 28	8	Enzyme Inhibition and Regulation	6
	Feb. 2	<b>Mid-term Exam 1 (Lectures 1 – 8)</b>		
<b>Section 2: Carbohydrates, DNA &amp; RNA, Translation (Lectures 9 – 15)</b>	Feb. 4	9	Carbohydrates	7
	Feb. 9	10	Carbohydrates, Nucleic Acids	8, 24
	Feb. 11	11	Nucleases, DNA Replication	8, 25
	Feb. 23	12	DNA Damage and Repair, Transcription	25, 26
	Feb. 25	13	Pre-mRNA Processing, Gene Regulation	26, 28
	Mar. 1	14	Protein Synthesis (Translation)	27
	Mar. 3	15	Protein Regulation, Molecular Biology Techniques	27, 9
	Mar. 8	<b>Mid-term Exam 2 (Lectures 9 – 15)</b>		
<b>Section 3: Metabolism (Lectures 16 – 22)</b>	Mar. 10	16	Metabolism and Energy Transfer	13
	Mar. 15	17	Glycolysis and Gluconeogenesis	14
	Mar. 17	18	Pyruvate Oxidation, Citric Acid Cycle	15, 16
	Mar. 22	19	Electron Transport, Oxidative Phosphor.	19
	Mar. 24	20	Fatty Acid and Lipid Metabolism	10, 17, 21
	Mar. 29	21	Amino Acid and Nitrogen Metabolism	18, 22
	Mar. 31	22	Coordination of Metabolism	23

Chapters correspond to Nelson and Cox, *Lehninger: Principles of Biochemistry*. Coverage of 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 those sections of the text 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.

## Course Policies

- Missed Mid-term Exams.** For students who miss a mid-term exam with a valid, documented reason (unplanned medical or family emergency), the weight of the mid-term will be transferred to the final exam. No make-up exam will be available for mid-terms. If both mid-term exams are missed with valid, documented reasons, the final exam will be worth 95% of the final grade (plus 5% for participation).

In the event of a missed mid-term exam, please contact the course director within one week of the exam with legitimate documentation (e.g. Attending Physician's Statement) explaining the absence. Failure to provide acceptable documentation will result in a grade of zero on the exam.

- Missed Final Exam.** Students who write both mid-term 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 must be completed and provided to the course director. Please see the registrar's website for more information (<http://www.registrar.yorku.ca/exams/deferred/index.htm>). Student's whose requests are

declined may then petition to their home faculty.

Students who missed one or both mid-term 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).

- 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:

- 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;
- Using a clicker other than your own during class;
- 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/>

### **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](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf) (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-and-or-harassing-behaviour-in-academic-situations-senate-policy/>