

University of Toronto Scarborough – Department of Biological Sciences

## **BIOC13 – Biochemistry II: Bioenergetics and Metabolism – Summer 2021**

**Course Instructor:**

**Dr. Jason Brown**

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Office Hours:

By appointment only:

<https://outlook.office365.com/owa/calendar/UniversityofTorontoScarborough2@utoronto.onmicrosoft.com/bookings/>

**\*\*NOTE:** You must book your appointment at least 6 hours in advance; appointments are 15 minutes; multiple students can attend together if desired.

**Course Coordinator:**

**Laura Shelly**

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**Teaching Assistant:**

**Avesh Chadee**

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**Course Description:** A lecture course that introduces cellular metabolism, the process by which living organisms extract and utilize energy from their environment. Topics include: bioenergetics; oxidative phosphorylation; aspects of carbohydrate, lipid, and amino acid metabolism; regulation of metabolism; and the integration of metabolic pathways.

**Prerequisites:** [BIOB11H3 or (BIOB10Y3)] and CHMB41H3

**Exclusions:** CHMB62H3, BCH210H, BCH242Y, (BCH310H)

**Lectures:** *This is an online asynchronous course.* Six, 30-minute lecture videos will be recorded each week and made available through Quercus. Lecture notes (in PowerPoint format) will be made available at the same time.

Tentative Lecture Topics:

- 1 – Fundamental Concepts in Bioenergetics and Metabolism
- 2 – Glycolysis
- 3 – Glycogen Metabolism, Gluconeogenesis, and the Pentose Phosphate Pathway
- 4 – Pyruvate Dehydrogenase Complex
- 5 – Citric Acid and Glyoxylate Cycles
- 6 – Chemiosmotic Theory
- 7 – Respiratory Electron Transport System
- 8 – ATP Synthase
- 9 – Fatty Acids: Storage, Mobilization, Catabolism, and Synthesis
- 10 - Amino Acid Metabolism

**Textbook:** There is no required textbook for this course; however, in my experience, many students enjoy having a textbook to supplement their lecture notes. If you so desire, I would recommend the following textbook:

*Bioenergetics 4*, by D.G. Nicholls et al. (2013)

\*\*This book is more advanced than a typical introductory biochemistry textbook and does not cover all the material that is covered in this course, but it is considered the foremost authority on bioenergetics and metabolism.

\*\*An e-book version of this textbook is available for free via the UTSC library's website. UTSC's license agreement with the publisher of this textbook permits students to use this textbook for course study but does not permit me to post any content of this textbook to Quercus. I will post suggested readings from this textbook on Quercus; however, this textbook may discuss material not covered in lecture, and I may discuss material in class not covered by this textbook. You are only responsible for the material covered in class.

### **Evaluation:**

Term Tests	35%	(25% best; 10% worst)
Journal Clubs	30%	(5 article reviews x 5% each; 5% participation)
Final Exam	35%	

### **Important Notes Regarding Evaluations:**

#### **Term Tests**

There are two Term Tests in this course, **which will be held online via Quercus**. The dates and times of the Term Tests will be determined by the Registrar's Office during the first few weeks of the semester, and I will post this information on Quercus as soon as it is available.

Term Tests may examine any material covered in this course, but the lectures emphasized on each Term Test will be announced on Quercus. Term Tests will be 2 hours and will comprise of short answer questions only. Students will be evaluated based on the reasonableness, clarity, and conciseness of their written answers to the questions. Students will have some choice with regards to which questions they answer (e.g., answer 1 of 2 short answer questions). **The Term Test questions will require students to think critically and creatively about the lecture content as students will be expected to explain novel observations and solve problems. This reflects my belief that undergraduate students need to develop not only their scientific knowledge but, more importantly, their competency for thinking, reasoning, and scientific inquiry.**

To help students prepare for the Term Tests, optional quizzes (here optional means not worth any marks) will be posted on Quercus each week. Students are strongly encouraged to discuss these quizzes with the course instructor when they encounter any difficulties, either by email or during office hours. **New this semester**, I will be providing detailed, audio walk-throughs of a few

questions each week so that students receive more support with regards to how to approach the quiz/test questions.

Students will be permitted to consult their notes during Test Tests. Moreover, students will be permitted to collaborate with each other during the Term Tests via Google Docs. Links to these Google Docs will be made available at the start of each test. The purpose of this collaboration is i) to maintain exam fairness by ensuring that all students have access to the same information, ii) to encourage students to support each other's skill development, and iii) to foster community and dialogue among students.

If you know in advance that you cannot write a Term Test at the scheduled time because it conflicts with some other valid activity, please notify the course instructor as soon as possible so that arrangements can be made for you to write the Term Test at an alternative time. Any such alternative time must be before the scheduled date of the Term Test.

If you miss a Term Test due to medical illness, then you must submit a Self-Declaration of Student Illness Form, which is available at the following link:

<https://www.utsc.utoronto.ca/biosci/sites/utsc.utoronto.ca/biosci/files/u26/Self%20Declaration%20of%20Student%20Illness%20Fall%202018.pdf>

This form must be submitted to the course coordinator via email **within three days** after the Term Test has taken place.

If you miss a Term Test for any other valid reason, please consult with the course instructor as soon as possible. The course instructor will determine whether the reason given for a missed Term Test is valid in accordance with university policies. Also, the course coordinator may ask for any documentation required to verify the reason given.

Students who miss one Term Test for a valid reason (medical or otherwise) will not be permitted to write a make-up Term Test; rather, the weight of their Final Exam will be increased by 10%. (The weight of their remaining Term Test will be 25%).

Students who miss both Term Tests for valid reasons will not be permitted to write make-up Term Tests; rather, the weight of their Final Exam will be increased by 35%.

Students who miss a Term Test for any invalid reason will receive a grade of zero for that Term Test.

### **Journal Clubs**

The details of the Journal Club will be outlined in a video posted on Quercus. This presentation will constitute part of this syllabus.

### **Final Exam**

The Final Exam will be scheduled by the Registrar's office (August 16-29) and will be worth 35% of the final grade (unless, for reasons stated above, it has a higher weight). It will be 3 hours

and will cover all course material, though it will place emphasis on the material discussed since the last Term Test. It will have the same format as the Term Tests.

## **Accessibility Needs:**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in SW302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca).

## **Academic Integrity:**

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's *Code of Behaviour on Academic Matters* (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

*In papers and assignments:*

- using someone else's ideas or words without appropriate acknowledgement
- submitting your own work in more than one course without the permission of the instructor
- making up sources or facts
- obtaining or providing unauthorized assistance on any assignment.

*On tests and exams:*

- using or possessing unauthorized aids;
- looking at someone else's answers during an exam or test
- misrepresenting your identity

*In academic work:*

- falsifying institutional documents or grades
- falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. There are other offences covered under the Code, but these are the most common. Please respect these rules and the values that they protect.

## **Copyright in Instructional Settings:**

If a student wishes to audio-record, photograph, video-record, or otherwise reproduce lecture presentations, course notes, or other similar materials provided by instructors, he or she must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an

infringement of copyright and is absolutely prohibited. In the case of private use by students with disabilities, the instructor's consent will not be unreasonably withheld.