

University of Toronto Scarborough – Department of Biological Sciences
BIOC13 – Biochemistry II: Bioenergetics and Metabolism – Summer 2019

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Course Coordinator: **Jennifer Campbell**
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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: Tuesdays 6:10-9pm, SW143

Lecture notes will be posted (in PowerPoint format only) on Quercus ~24 hours before each lecture. NOTE: I reserve the right to make changes to the lecture notes after they are posted.

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, and Catabolism
- 10 – Fatty Acids: Biosynthesis

Journal Club Schedule:

On the following dates, we will use the last hour of the lecture (8-9pm) to conduct journal clubs:

May 14th, May 21st, Jun 4th, Jun 25th, Jul 9th, Jul 23rd

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 6% each)
Final Exam	35%	

Important Notes Regarding Evaluations:

Term Tests

There are two Term Tests in this course, which are held outside of class time. 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 cover any material covered in this course, but the lectures emphasized on each Term Test will be announced in class and 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, solve problems, and develop their own hypotheses. 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 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 (preferred).*

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 detailed UTSC Medical Certificate filled out by the physician who saw you on the day of the Term Test. This note must be submitted to the course coordinator as soon as possible following the Term Test, whether in person or via email. Other medical notes will not be accepted, and if the UTSC Medical Certificate is not completed to the satisfaction of the course coordinator, it may be refused. The UTSC Medical Certificate can be found via the following link:

http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf.

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 instructor 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 to 45%. (The weight of their remaining Term Test will be 25%.)

Students who miss both Term Tests for valid reasons (medical or otherwise) will not be permitted to write any make-up Term Tests; rather, the weight of their Final Exam will be increased to 65%, and they will be asked to submit an additional written assignment worth 5%, which will be due no later than the last day of classes (Tuesday, August 6th by 11:59pm).

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 PowerPoint presentation given during the first journal club meeting. This presentation will be posted on Quercus and will constitute part of this syllabus.

Final Exam

The Final Exam will be scheduled by the Registrar's office (August 10-23) 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.

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.