

# Course Outline: EDKP 445 – Exercise Metabolism

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## General Information

University: McGill (downtown campus)

Course #: EDKP 445

Term: Fall

Year: 2019

Course pre-requisite(s): EDKP 395 (Exercise Physiology)

Course schedule: Tuesdays and Thursdays, 11:35 am – 12:55 pm

Number of credits: 3.0

Course location: Currie Memorial Gymnasium

475 Pine Avenue West, Room 408/409

## Instructor

Tyler Churchward-Venne, Ph.D.

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Phone: (514) 398-4184 ext. 00839

Office location: Currie Memorial Gymnasium,

475 Pine Avenue West, Room A205

Office hours: By appointment via E-mail

## COURSE OVERVIEW

Metabolism refers to the sum of biochemical reactions occurring in a living organism. The focus of this course is on key metabolic, biochemical, and molecular processes that occur during and after physical exercise. Transitioning from rest to exercise places unique demands on the body causing the rate at which certain biochemical reactions occur to change dramatically; this process constitutes *metabolic control*. The first part of the course emphasizes principles of basic biochemistry that are particularly relevant to exercise performance, recovery, and adaptive remodeling. The second part of the course emphasizes the ways in which exercise modifies metabolism with a focus on carbohydrate, lipid, and protein related metabolism. Attention will also be placed on contemporary nutritional approaches that modify metabolism during exercise and facilitate post-exercise recovery.

## LEARNING OUTCOMES

Upon completion of this course, the student will:

1. Be able to describe and explain key metabolic reactions and how they change during and after physical exercise.
2. Be able to describe and explain the separate and integrative responses of fuel metabolism (i.e. carbohydrate, lipid, and protein/amino acid) to exercise.
3. Be able to describe and explain the mechanisms underpinning some key contemporary nutritional supplements/dietary practices to augment exercise metabolism, adaptation, and/or performance.
4. Improve their oral communication/presentation skills and enhance their capacity to work effectively with others on a group assignment.

## INSTRUCTIONAL METHOD

The instructional methods used in this course will encompass lectures, chapter readings, group interaction/discussion, and group presentations.

## RECOMMENDED COURSE MATERIALS

1. Tiidus PM, Tupling AR, & Houston ME. *Biochemistry Primer for Exercise Science*, 4<sup>th</sup> Edition. Human Kinetics, Champaign IL, USA, 2012.

*Note:* A limited number of reserved copies are available at the McGill University Humanities and Social Sciences Library. Please use the following link to check availability:

<https://mcgill.on.worldcat.org/courseReserves/course/id/14759315>

## SUPPLEMENTARY COURSE MATERIALS

1. Mougios V. *Exercise Biochemistry*, 2<sup>nd</sup> Edition. Human Kinetics, Champaign IL, USA, 2020.

*Note:* Please make arrangements with Dr. Churchward-Venne if you would like to review this supplementary text.

## COURSE CONTENT AND SCHEDULE (\*subject to change\*)

Date	Description	Readings
September 3	Course introduction	
September 5	Amino acids, peptides, and proteins	Chapter 1
September 10	Enzymes	Chapter 2
September 12	Gene transcription and protein synthesis	Chapter 3
September 17	Effects of exercise of gene expression	Chapter 3
September 19	Energy systems and bioenergetics I <i>*Guest lecture</i>	Chapter 4
September 24	Energy systems and bioenergetics II	Chapter 4
September 26	Oxidative phosphorylation I	Chapter 5
October 1	Oxidative phosphorylation II	Chapter 5
October 3	Oxidative phosphorylation III <i>*X-choice question due</i>	Chapter 5
October 8	Midterm Examination (in class)	
October 10	Carbohydrate metabolism I	Chapter 6
October 15	Carbohydrate metabolism II <i>*Presentation team &amp; papers</i>	Chapter 6
October 17	Carbohydrate metabolism III	Chapter 6
October 22	Lipid metabolism I	Chapter 7
October 24	Lipid metabolism II	Chapter 7
October 29	Lipid metabolism III	Chapter 7
October 31	Protein metabolism I	Chapter 8
November 5	Protein metabolism II	Chapter 8
November 7	Protein metabolism III <i>*Guest lecture</i>	Chapter 8
November 12	Student presentations <i>*X-choice question due</i>	
November 14	Student presentations	
November 19	Student presentations	
November 21	Student presentations	
November 26	Student presentations	
November 28	Student presentations	

\*Lecture slides will be posted on the EDKP 445 MyCourses website in advance of each class.

## COURSE EVALUATION

1. Midterm examination (Tuesday, October 8<sup>th</sup>, in class).....**30%**
    - *Will cover material from September 3 - October 3, 2019*
  2. Group research paper presentation (in class).....**30%**
  3. Participation.....**10%**
    - *2.5% per X-choice question; 5% for Group research paper presentation assessment*
  4. Final examination (During exam period, date TBA).....**30%**
    - *Will cover material from October 10 - November 7 inclusive, 2019*
- \*\*Students are responsible for all material covered in lectures\*\***

## GROUP RESEARCH PAPER PRESENTATION

Students will be provided with a list of important, relevant published manuscripts (by early October). Students will be asked to form teams of 2-3 (depending on the total number of students in the course) and select as a group their top 4 manuscripts they would like to present. On or before **October 15, 2019** students will e-mail Dr. Churchward-Venne the names of their group members and the titles of the top 4 manuscripts they would like to present. Dr. Churchward-Venne will then assign each group a manuscript to present based on their top 4 choices. Each group member is expected to contribute to the presentation and present the manuscript to the class as follows:

- What is the research question being addressed and why is it relevant (what is the rationale for the study)?
- What is the hypothesis being tested?
- What methods are being used to test the hypothesis?
- What were the main outcomes of the study?
- Was the hypothesis confirmed or rejected and how does this impact the field?

Presentation must be given using Microsoft *PowerPoint* and e-mailed to Dr. Churchward-Venne as a PowerPoint file (pptx. file) 48 hours before your presentation. Presentations should be no longer than 20 minutes and will be followed by 5 minutes of question/answer. Rule of thumb is 1 slide per minute of presentation time.

**\* A grading rubric will be supplied**

## PARTICIPATION

Students will be required to submit via e-mail two (2) multiple choice questions, each with 4-5 possible answers, including one (1) correct answer. Each multiple-choice question must be e-mailed to Dr. Churchward-Venne as an attachment (e.g. Microsoft *Word* or PDF) on the dates indicated above prior to both the mid-term and final exam. A select number multiple choice questions submitted by students will be incorporated into the midterm and final exam.

Students are expected to attend the Group Research Paper Presentations of their peers and ask questions following the presentations. Each student will be required to fill out a grading rubric/comment form for one (1) Group Research Paper Presentation and submit it after the presentation during class-time. The grading rubric/comment form will be supplied by Dr. Churchward-Venne. Students will be informed in advance regarding which Group Research Paper Presentation they will be expected assess via the grading rubric/comment form.

## LANGUAGE OF SUBMISSION

“In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives”.

« Conformément à la Charte des droits de l’étudiant de l’Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l’un des objets est la maîtrise d’une langue). »

## ACADEMIC INTEGRITY

“McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures” (see [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/) for more information).

« L’université McGill attache une haute importance à l’honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l’on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l’étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/)). »

## ADDITIONAL STATEMENTS

- ✓ The [University Student Assessment Policy](#) exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations.
- ✓ Note that to support academic integrity, your assignments may be submitted to text-matching or other appropriate software (e.g., formula-, equation-, and graph-matching).
- ✓ © Instructor-generated course materials (e.g., lecture slides, handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.
- ✓ As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with Dr. Churchward-Venne and the [Office for Students with Disabilities](#), 514-398-6009.
- ✓ McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather.  
« L’Université McGill est sur un emplacement qui a longtemps servi de lieu de rencontre et d’échange entre les peuples autochtones, y compris les nations Haudenosaunee et Anishinabeg. Nous reconnaissons et remercions les divers peuples autochtones dont les pas ont marqué ce territoire sur lequel les peuples du monde entier se réunissent maintenant. »

- ✓ [End-of-course evaluations](#) are one of the ways that McGill works towards maintaining and improving the quality of courses and the student's learning experience. You will be notified by e-mail when the evaluations are available. Please note that a minimum number of responses must be received for results to be available to students.
- ✓ In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.
- ✓ Additional policies governing academic issues which affect students can be found in the McGill Charter of Students' Rights (see [document](#)).
- ✓ McGill has policies on sustainability, paper use and other initiatives to promote a culture of sustainability at McGill. (See the [Office of Sustainability](#).)
- ✓ The use of MC2 devices must, in all cases, respect policies and regulations of the University, including in particular the following:
  - The Code of Student Conduct and Disciplinary Procedures;
  - The Policy Concerning the Rights of Students with Disabilities;
  - The Policy on the Responsible Use of McGill IT Resources.
- ✓ No audio or video recording of any kind is allowed in class without the explicit permission of the instructor.
- ✓ Mobile computing and communication devices are permitted in class insofar as their use does not disrupt the teaching and learning process.