



McGill University
Department of Kinesiology & Physical Education
EDKP 395: Exercise Physiology
Course Outline, Fall 2022

Instructor

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Currie Memorial Gymnasium
475 Pine Avenue West, Room A204 (same hallway as the computer lab!)
Office hours: Wednesdays 12:00 – 1:30pm, Currie A204

Teaching Assistants

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Lecture Schedule (see Page 3 below)

Tuesdays and Thursdays, 1:05pm – 2:25pm, Currie Gymnasium, Room 408/9

Laboratory Schedule (see Page 4 below)

EDKP 395-002 2609: Friday, 9:35 – 10:25 AM
EDKP 395-003 2610: Friday, 10:35 – 11:25 AM
EDKP 395-004 2611: Friday, 11:35 AM – 12:25 PM
EDKP 395-005 2612: Friday, 12:35 – 1:25 PM
EDKP 395-006 2613: Friday, 1:35 – 2:25 PM
EDKP 395-007 7455: Friday, 2:35 – 3:25 PM

Location: Currie Gymnasium, Adriano Tassone Teaching Laboratory, Room 304

COURSE OVERVIEW

Examination of the physiological responses of the muscular, metabolic, neural, circulatory, and respiratory systems to acute and chronic exercise. In acknowledgement of the ever-evolving body of knowledge that dictates the principles of exercise physiology, emphasis will be placed on the understanding and interpretation of original, peer-reviewed, published research studies. Students will also gain experience in the collection, analysis, interpretation, and reporting of research data in the exercise physiology field with the ultimate goal of increasing appreciation and understanding of the ongoing genesis of exercise physiology knowledge through the scientific method.

COURSE OBJECTIVES

By the end of this course students will have developed an understanding of the fundamentals of exercise physiology, with a specific focus on the integrative nature of the human body's response to exercise. Students will have developed an understanding of the practical components involved in exercise physiology research, and will have developed their capacity to analyze and interpret the results of exercise physiology experiments and peer-reviewed publications. Students will have developed their scientific reading, writing, and presentation skills.

SUPPLEMENTARY COURSE TEXTS

1. McArdle WD, Katch FI & Katch VL. Exercise Physiology: Nutrition, Energy, and Human Performance, 8th Edition. Wolters Kluwer, Lippincott Williams & Wilkins, New York, NY, USA, 2015.
2. ACSM's Advanced Exercise Physiology, 2nd Edition. Editors: Farrell PA, Joyner MJ & Caiozzo VJ. Wolters Kluwer, Lippincott Williams & Wilkins, New York, NY, USA, 2012.

A limited number of reserved copies of McArdle, Katch & Katch are available at the McGill University Humanities and Social Sciences Library. Copies of both textbooks are available to be borrowed from Dr. Usselman (email charlotte.usselman@mcgill.ca to request a short-term loan).

COURSE EVALUATION

Laboratory assignments	45%
Lab 1	15%
Lab 2	15%
Lab 3	15%
Laboratory preparedness	7.5%
Article "show & tell" assignment participation	7.5%
Midterm assessment (48 hrs; Oct. 13-14).....	10%
Journal club presentation	10%
Cumulative assessment (48 hrs; Nov. 17-18)	20%

Date	Topic	Instructor
Thu., Sep. 1	Course introduction	CU
Tue., Sep. 6	Bioenergetics and its control	CU
Thu., Sep. 8	Wingate test article “show & tell” (example!)	CU + TAs
Tue., Sep. 13	Exercise metabolism	CU
Thu., Sep. 15	Neuro-muscular control of movement	CU
Tue., Sep. 20	How to write a lab report	CU + TAs
Thu., Sep. 22	Cardiovascular response to exercise 1	CU
Tue., Sep. 27	Cardiovascular response to exercise 2	CU
Thu., Sep. 29	BP control article “show and tell” (**includes in-class participation grades)	-
Tue., Oct. 4	Cardiovascular response to exercise 3	CU
Thu., Oct. 6	Cardiovascular response to exercise 4	CU
Fri., Oct. 14	(help session for midterm assessment)	CU
Tue., Oct. 18	Muscle O ₂ delivery response to exercise 1	CU
Thu., Oct. 20	Muscle O ₂ delivery response to exercise 2	CU
Tue., Oct. 25	VO _{2max} article “show and tell” (**includes in-class participation grades)	-
Thu., Oct. 27	Pulmonary physiology of exercise 1	D. Jensen
Tue., Nov. 1	Pulmonary physiology of exercise 2	D. Jensen
Thu., Nov. 3	Pulmonary physiology of exercise 3	D. Jensen
Tue., Nov. 8	Pulmonary physiology of exercise 4	D. Jensen
Thu., Nov. 10	Acid-base balance during exercise + Sample journal club presentation	CU + Peer Mentors
Tue., Nov. 15	Thermoregulation during exercise	CU
Thu., Nov. 17	How to get involved with research	CU + TAs
Tue., Nov. 22	Student journal clubs 1	(students)
Thu., Nov. 24	Student journal clubs 2	(students)
Tue., Nov. 29	Student journal clubs 3	(students)
Thu., Dec. 1	Student journal clubs 4	(students)

LABORATORY SCHEDULE				
Topic	Date	Data Available	Optional Due Date (with TA feedback)	Final Due Date (no feedback)
Laboratory 1: The Wingate anaerobic cycling test	Fri., Sep. 23	Tue., Sep. 27	Tue., Oct. 4	Tue., Oct. 11
Laboratory 2: Blood pressure regulation during exercise	Fri., Oct. 7	Tue., Oct. 11	Tue., Oct. 18	Tue., Oct. 25
Laboratory 3: Measurement of exercise tolerance ($\dot{V}O_{2max}$)	Fri., Oct. 28	Tue., Nov. 1	(NONE)	Fri., Nov. 11

*Lab assignments are due on the dates indicated by **no later than 4:30 pm EST.**

LABORATORY POLICIES, PROCEDURES AND METHODS OF EVALUATION

Laboratory Policies & Procedures

- **Laboratory Preparedness:** All students **must** arrive to each laboratory:
 1. Having **read the lab handout** thoroughly such that they are **fully prepared** to complete any aspect of the laboratory,
 - Note that TAs will ask “pop quiz”-type questions periodically to confirm that students are adequately prepared.
 - Also note that videos of the labs may be available to aid students in their preparation.
 2. Dressed in **appropriate attire** and having **consumed a proper pre-exercise meal** to participate in a maximal exercise maneuver,
 3. Having completed the **2020 PAR-Q+ questionnaire**, signed and printed for submission to the TAs,
 4. **On time.**

**TAs will grade students on “laboratory preparedness” each lab (scale out of 5). The average of these grades over the 3 labs will make up 7.5% of your final grade in the course.
- **Attendance:** Student attendance at each laboratory is **mandatory**. Your unexcused or unauthorized absence from a scheduled laboratory will result in a loss of **10% from your final grade for that lab**. Students who plan to be absent for varsity athletics, family obligations or similar commitments must communicate by email with Dr. Usselman as far in advance of the conflict as possible. In the event that a student cannot attend a scheduled laboratory due to circumstances beyond their control (e.g., personal or family health issue, etc.), they are expected to communicate with Dr. Usselman as soon as possible and may be asked to provide supporting documentation (e.g., doctors note), when necessary and appropriate. There will be no make-up labs for unexcused or unauthorized absences.
- **Punctuality:** Unexcused or unauthorized lateness to a scheduled laboratory will result in a participation grade of zero.
- Unless you have prior permission from Dr. Usselman and/or the Teaching Assistant(s) to switch lab sections, you are expected to attend the laboratory section for which you are

registered. This has important implications for tracking attendance, punctuality, etc. as outlined above.

- Handle the equipment carefully and with respect. In the event that you damage something, please inform your Teaching Assistant(s) so that it can be repaired or replaced as soon as possible. Do not remove any equipment from the undergraduate teaching laboratory and please tidy up after yourself.

Laboratory Reports & Methods of Evaluation

- Laboratory reports may be written **individually or in pairs**.
- Students are expected to consult the Lab Report Grading Criteria when preparing their lab reports.
- There is a Sample Lab Report posted on MyCourses to assist students in preparing their lab reports.
- Reports are due on the dates outlined in the table on Page 3 above. *Unexcused or unauthorized* late reports will be **penalized 10% per day** and will not be accepted after more than **3 days** past the due date, including weekends. In the event that a student cannot submit their report on time due to circumstances beyond their control (e.g., personal or family health issue, etc.), then they must speak to Dr. Usselman as soon as possible and may be asked to provide supporting documentation (e.g., doctors note), when necessary and appropriate.
- Lab reports must be double-spaced and be submitted **as Word documents**. Reports must conform to the format and page limitations outlined below, unless stated otherwise:
 - 1 inch (or 2.54 cm) margins & 12 point Times New Roman font
 - Title Page (1 page)
 - Introduction (limit to ≤ 2 double-spaced pages)
 - Results (limit to ≤ 3 double-spaced pages, not including figures and tables)
 - Discussion (limit to ≤ 4 double-spaced pages)
 - References
- Lab reports must be computer generated and grammatically correct. Students should use appropriate scientific terminology throughout the report. Full words should be used rather than abbreviations; however, certain standard abbreviations are acceptable (e.g., “kg” for “kilogram” and “cm” for “centimeter”). Other abbreviations may be appropriate if they are defined upon first use; for example, Heart rate (HR), rate of oxygen consumption ($V'O_2$), ventilation ($V'E$), respiratory exchange ratio (RER), etc.
- **Title Page** should include: Course code; academic term and year; lab number and title; student(s) name(s) and McGill ID number(s); date; and name of the instructors and your Teaching Assistant(s).
- **Introduction:** Follow the directions given in each lab handout. The introduction provides clear, concise and relevant background information that places the rest of the report/experiment in context. The introduction is often used to highlight what is known, what is not known and what needs to be addressed in order to advance our understanding of a particular topic. This then sets the stage to (i) describe the primary purpose(s), aim(s) or objective(s) of the experiment and (ii) provide a directional hypothesis for your study.
- **Methods:** Clearly describe the study in a way that would easily enable replication of the study. Participant characteristics are described, as well as equipment/tools that were used.
- **Results:** Follow the directions given in each lab handout. The results section provides a clear and concise verbal description of results, with specific reference to tables and figures.

- **Table and Figures:** Number and title all tables and figures. Titles should be sufficiently detailed to allow the reader to understand it, even if it were separated from the rest of the report. Use Arabic numbers (e.g., 1, 2, 3) and refer to graphs as “figures” and abbreviate in the text as “Fig. 1.” To the extent possible, tables and figures should be embedded within the text of the results, close to where they are first referenced.
- **Discussion:** Follow the directions given in each lab handout; that is, use the discussion points in your lab handout to help guide your discussion. The discussion is the most important part of your report: it's the section that helps reveal your understanding of the experimental study results and their interpretation.
 - Many students have trouble separating “results” and “discussion.” The results section should state what you observed, while avoiding interpretation of the results. Your interpretation, explanation, analysis and comparison of study results to those of previous reports (with appropriate citations), should be addressed in the discussion.
 - Students should strive to interpret and explain their results in terms of theoretical issues; for example, what is the nature and source(s) of sex-differences in the physiological and perceptual response to exercise at a standardized submaximal power output? Consider the following when writing your discussion:
 - What have I/we found?
 - Do the results support our hypothesis?
 - What do the results clearly indicate?
 - Explain what you know with certainty based on your results: draw reasonable conclusions and avoid over interpretation of your results.
 - What is the real or perceived significance of the results?
 - How do your findings relate to the available literature?
 - If there are differences between your study results and those in the published literature, how can they be explained? Were the participants different? Were the experimental methods and procedures different?
 - What questions have you answered? What question(s) remain?
 - The discussion section of each lab report should end with a short paragraph (2-5 sentences) entitled “Conclusions,” which clearly summarizes the main finding(s) and/or take home message(s) of the experiment.
- **Citations** are notes in the body of your report, which indicate the sources of the statements you make. Do not plagiarize (this is a serious offense!) and be sure to reference each scientific statement appropriately. Rule of thumb: If what you've written is not common knowledge, then it needs to be cited. Consider citations as a guide for those who may want to learn more about a particular area of research and as a defense against the skeptic who doesn't believe or agree with your interpretation of results.
 - If the citation has one or two authors then cite in the text as follows: “The increase in ventilation is similar to that previously reported (Deakin, 2005; Smith & Jones, 2001) and likely reflects...”
 - Alternatively, if the citation has three or more authors then cite in the text as follows: “The increase in ventilation is similar to that previously reported (Mortensen et al., 2004) and likely reflects...”
- **References:** The “Reference List” appears at the end of the report and contains publication information for each of the documents that you cited in your report. Students are welcome (and encouraged) to use referencing software (e.g. EndNote) to make this process much easier. There are many acceptable formats for reference lists. Any format that clearly indicates the source of the information is accepted for this course. Here is an example:

- Muscat KM, Kotrach HG, Wilkinson-Maitland CA, Schaeffer MR, Mendonca CT, Jensen D. Physiological and perceptual responses to incremental exercise testing in healthy men: Effect of exercise test modality. *Applied Physiology Nutrition and Metabolism*. 40(11): 1199-209, 2015.
- If you reference a textbook, be sure to include the edition number, the number of the chapter(s) used, and the page range(s) of the chapter(s) used.
- Students are strongly encouraged to use web-based search engines, namely PubMed (<http://www.ncbi.nlm.nih.gov/pubmed/>) and Google Scholar (<https://scholar.google.ca/>), to access journal articles not listed in the laboratory handout to help with the interpretation of experimental study results. To this end, please do not rely exclusively on the references provided in the lab handouts. Finally, it is inappropriate in scientific writing to reference unpublished materials, **including course notes, the lab handout, or websites** (e.g., Wikipedia).

ARTICLE “SHOW AND TELL”

This exercise is designed to give students experience:

- 1) Searching the literature (e.g. via PubMed) for peer-reviewed scientific articles,
- 2) Reading, understanding, and summarizing articles in a variety of different populations.

Prior to article “show and tell” days, students will be provided with an article summarizing a basic component of exercise physiology research (e.g. the Wingate test, the VO_{2max} test). Students will then find an article closely related to this component (i.e. an article in which the Wingate/ VO_{2max} test/etc is the central methodology used in the study), but which applies to a topic and/or population of the student’s choice.

Articles should be **original research articles published in a peer-reviewed journal** (no review articles or meta-analyses, please).

On “show and tell” days, students will be divided up into groups. Moderated by a TA or Peer Mentor, each student will take their turn telling the others about their article. Students should be prepared to ask each other questions about the articles they’ve chosen, and to answer questions about their articles. Conversations are intended to be informal and loosely-structured.

Participation in the “show and tell” discussion will be graded out of 5 by the TA or Peer Mentor. The average of these grades over the 2 “show and tell” days will make up 7.5% of your final grade in the course. Unexcused or unauthorized lateness absence to the “show and tell” discussion will result in a participation grade of zero.

JOURNAL CLUB POLICIES, PROCEDURES AND METHODS OF EVALUATION

- ✓ The journal club assignment will allow students to delve into a specific research topic relevant to exercise physiology in more detail than can be covered in class. Students are encouraged to select a journal club article that they find particularly interesting.
- ✓ Journal clubs will be completed **as groups of up to 6 students**.
- ✓ A sample journal club presentation will be done by the Peer Mentors prior to the commencement of student presentations.
- ✓ Students should note that a thorough understanding of (and presentation of) the findings of a research paper may require additional reading and research beyond the article of interest (e.g. background reading to properly understand methodologies, concepts, etc.). Students are encouraged to begin work on their journal club assignments early to provide adequate time to understand their article.

Journal Club Assignment Components

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1. An **in-class presentation** (10-15 mins) will summarize the key components of the research paper.
2. The presenting group will lead an **in-class discussion** centred around the article (5-10 minutes), which can either be incorporated into the presentation or conducted at the end of the presentation.
3. Groups will prepare an **Instagram post** using Canva to summarize the article in a manner suitable for a lay (i.e. non-scientific or EDKP 395) audience. Posts should be designed to be visually engaging while also providing an accurate representation of the content of the paper. Reference(s) must be included in the figure caption. Instagram posts will be presented at the end of the in-class presentations, and outstanding posts will be included on Dr. Usselman's lab Instagram account (@CHAR_Lab) as part of an "EDKP 395 Instagram Takeover" in November/December (with the presenting group's permission).

****Note that the presentation + discussion + Instagram post presentation should not exceed 20 minutes.**

- Journal club presentations will be graded according to the following (**60% of journal club grade**):
 - i. **Rationale (/5)** – Why was the study conducted? Why is it important?
 - Hint: This information will be found in the Introduction section of the paper.
 - ii. **Key Methods (/10)** – How did the authors design their study? (e.g. sample size, longitudinal vs. cross-sectional design)
 - Participants/subjects – What was taken into account? (e.g. for humans – age, sex, physical fitness, race/ethnicity, hormonal status, etc.; for animals – strain, sex, age, fitness, hormones) What were the key techniques used to measure physiological outcomes?
 - *N.B.* An exhaustive list of all techniques/methodologies used is **not** necessary (and can get boring for the audience!). Groups should summarize the principal methods which are required to understand the key findings of the paper. e.g. A good example of something to skim over is complex mathematical equations or biochemical treatment protocols – as a general rule of thumb, if it'll take more than 1 minute to explain, you can probably skip it! (Feel free to discuss this with Dr. Usselman if you are unsure of whether certain details are necessary to present.)
 - iii. **Key Findings & Interpretation (/20)** – What were the key findings of the paper?
 - As above, no need to present EVERYTHING! Choose the most important/interesting findings of the study. *Hint:* Authors usually highlight their key findings in the form of figures!
 - Be sure to explain what these findings mean! (*Hint:* The interpretation of the key findings will be summarized in the Discussion section.)
 - iv. **Relevance/Implications (/10)** – What are the implications for these findings? (e.g. Does this study change our understanding of human physiology? Does it have clinical implications?)
 - v. **Strengths and Limitations (/10)**
 - What was particularly good about this study? (e.g. strong study design which accounted for sex/hormones, used gold standard methods, answered a long-standing question in physiology, etc.)

- What could have been improved upon in this study? (Hint: There is almost always a Limitations section at the end of the Discussion which will list these for you! Although feel free to discuss your own limitations!)
- vi. Style (aka pizzazz/comedy/flair/use of memes/GIFs) (/5)**
- Did you keep our attention through an engaging and/or entertaining presentation?
 - N.B. Please use common sense in your selection of safe-for-work memes/GIFs.
- Groups will be graded on their capacity to generate an engaging in-class discussion (15% of journal club grade):
- i. **Quality of discussion prompts (/5)** – Is there evidence that the group put thought into discussion prompts that would provoke participation from the class?
 - ii. **Demonstration of knowledge/capacity to answer questions (/10)** – Did the group demonstrate evidence of having thoroughly understood the article and related physiology through their ability to participate in the discussion and/or answer questions from the class?
- Finally, groups will be graded on the quality of their Instagram posts (25% of journal club grade):
- i. **Scientific quality of content (/10)** – Is the information included in the post scientifically accurate (i.e. an accurate representation of what was presented in the article)? Does the post present the article in a manner that allows the viewer to quickly understand key components of the article, including study rationale, key methods, and key findings? Were key reference(s) included in the figure caption?
 - ii. **Style (aka pizzazz/comedy/flair) (/10)** – Was the post visually engaging? Did the post make the viewer want to learn more (i.e. swipe to the right and/or scroll down to read the full caption)?
 - iii. **Grammar/spelling/sentence structure (/5)**

MIDTERM ASSESSMENT

- The midterm assessment will be an essay-style answer which will encompass students' understanding of the integrative nature of exercise physiology. An exercise stimulus will be described, including specifics regarding the participant, environment, exercise duration, intensity, etc. In response, each student will write an essay describing the responses of specific physiological variables to the stimulus over the amount of time indicated. Note that this midterm assessment is designed to give the students experience in answering a question of this nature, as the final exam will be of similar format (although much broader in scope).
 - Students' essay answers will be graded by TAs and Dr. Usselman, and this grade is worth **10%** of the final grade.
- The midterm will be delivered **online** (i.e. via MyCourses).
- Students will have **48 hours** to complete the midterm.
- The midterm assessment question will be made available on October 13th at 12:00am (i.e. midnight) and is due by October 14th at 11:59pm.

FINAL EXAM

- The final assessment will be an essay-style answer which will encompass students' understanding of the integrative nature of exercise physiology. An exercise stimulus will be

described, including specifics regarding the participant, environment, exercise duration, intensity, etc. In response, each student will write an essay describing the responses of specific physiological variables to the stimulus over the amount of time indicated.

- Students' essay answers will be graded by TAs and Dr. Usselman, and this grade is worth **20%** of the final grade.
- The midterm will be delivered **online** (i.e. via MyCourses).
- Students will have **48 hours** to complete the midterm.
- The final assessment question will be made available on November 17th at 12:00am (i.e. midnight) and is due by November 18th at 11:59pm.
- The final exam will encompass material delivered **over the entirety of EDKP 395**, with a heavy emphasis on material presented in lectures.

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/ 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/).

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. *Note that students intending to submit assignments in French must notify Dr. Usselman at the beginning of the semester.*

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).

ADDITIONAL STATEMENTS

- ✓ **Process for objecting to grades:** Any student who feels that they were unfairly awarded a grade (e.g. on labs or journal clubs,) will present their case to Dr. Usselman in writing, at the end of the semester. Should the student and Dr. Usselman choose to move forward with the re-grading of the assignment, it is understood that there is no guarantee that the student's grade will improve, and it is possible that the student's grade on the assignment will be lowered.
 - Note that Dr. Usselman will not "bump" grades at the end of the semester (e.g. from an 84 to an 85). Students wishing to receive an A in the course are encouraged to make use of all support offered, including attending lectures, office hours, and availing themselves of early lab submission deadlines in order to receive constructive feedback.
- ✓ 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., handouts, notes, summaries, exam questions) 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. Usselman and [Student Accessibility and Achievement](#), 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.
- ✓ [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.