

PHTH 440 - CLINICAL EXERCISE PHYSIOLOGY

Instructor: Marc Roig, Ph.D.

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Virtual office hours: Upon request.

Laboratory instructor: Ana Maria Moga, MSc.

Email: ana.moga@mcgill.ca

Virtual office hours: Wednesday: 11:00-12:00AM on Zoom (upon request).

Lecture days & time: Wednesday and Friday: 14:30-16:00 PM. Most lectures will be pre-recorded or live on Zoom.

Dates: September 3 to December 3.

COURSE OVERVIEW



McGill University is situated on the traditional territory of the Kanien'kehà:ka, a place which has long served as a site of meeting and exchange amongst nations. We recognize and respect the Kanien'kehà:ka as the traditional custodian of the lands and waters on which we meet today.

INSTRUCTIONAL METHODS

24 x 1.5 hours of lectures and quizzes

- **Module 1: Exercise physiology**: will cover basic concepts of exercise physiology and metabolism as well as of neural control of movement and muscle structure and function.
- **Module 2: Acute responses to exercise**: will cover common physiological responses to acute exercise of the different bodily systems with an emphasis on the cardiorespiratory system.
- **Module 3: Exercise testing**: will cover basic principles of exercise testing and guidelines for the interpretation of the most commonly used tests to assess cardiorespiratory fitness, strength and flexibility.
- **Module 4: Chronic adaptations to exercise**: will cover main physiological adaptations to chronic exercise (training) with an emphasis on the cardiorespiratory, muscular and nervous system.
- **Module 5: Exercise prescription**: will cover general concepts of exercise prescription with a special emphasis on clinical populations.

1 x 3 hours laboratory practice

- **Laboratory practice**: one laboratory session on how to perform pulmonary function (PFT) and graded exercise tests (GXT).

1 x 20 minutes case study presentation

- **Presentation of case study**: one class presentation solving a clinical case for exercise prescription.

MESSAGE REGARDING REMOTE DELIVERY

Due to the COVID-19 this course has been redesigned to be delivered remotely.

- **Lectures**: Most lectures will be pre-recorded and launched on my courses the day of the lecture or one day earlier so students can watch them from home at their own pace. Each pre-recorded lecture will last approximately 45-50 minutes. Some lectures will be delivered **live** via Zoom (see schedule). At the end of each module, we will have a short (25-30 min) live Zoom review session where students can ask the instructor questions regarding the lectures or the readings of each module. All zoom live and review sessions will be recorded and made available to students later. Dates and time of each review session are provided in the schedule.
- **Quizzes**: Quizzes are aimed at reviewing the information provided during lectures and

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in the readings to prepare students for the final exam. Five quizzes, each one corresponding to each module, will be completed remotely. The date and exact time of each quiz are provided in the schedule. Quizzes are mandatory.

- **Laboratory:** This is the only part of the course that will not be delivered remotely. Lab sessions will take place for one week where the lectures of the course will be stopped. Students can access a video showing an overview of the procedures of the laboratory session (see video on MyCourses/content/Lab Video). Attending the laboratory session is mandatory.
- **Case study presentations:** At the end of the course students will present their case study to the instructor and the rest of the class in a live Zoom session. The instructor will ask questions at the end of the presentation. The dates and time of the presentations of each group are provided in the program. Participation of all members of the group in the case study presentation is mandatory.
- **Final examination:** The final exam will be completed in person. The exam will have 50-60 questions. Questions will have a format like the one used in the quizzes. The final examination includes all the materials of the course, including lectures, readings, case presentations and podcasts.

EVALUATION

20%: Laboratory report.

20%: Quizzes.

30%: Presentation of case study.

30%: Final examination.

Laboratory report

Ana Maria Moga (ana.moga@mcgill.ca) is the instructor responsible for the laboratory practice. Questions regarding the laboratory sessions, groups, reports and grades need to be directed at her. Only 8 time slots are available, and these slots will be taken on a first come first-served basis. Students will need to form groups of 5 (students can sign up on MyCourses and select the group based on availability). If the laboratory session takes place, students will come to the Jewish Rehabilitation Hospital (JRH) in Laval. The laboratory session will last 3 hours approximately. Two of the students will volunteer as testing subjects (please bring sports clothing). **Please note that the laboratory practice requires blood sampling so do not volunteer if you are apprehensive to this procedure.** The laboratory instructor will teach students how to do the initial assessment, perform a pulmonary function test (PFT) and a graded exercise test (GXT).

The laboratory practice will be assessed by one per-group laboratory report of **no more than 1500 words excluding tables, figures and references**. Times New Roman 12 font, double line spacing and margins set at 1cm are required. Use the most convenient reference style. The exercise testing data collected during the laboratory practice will be used for writing the laboratory report. Detailed instructions of the tasks of the laboratory

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practice will be provided by Ana Maria Moga during a Zoom lecture. The report needs to be submitted on MyCourses no later than December 6.

The objective of the report is to present a comprehensive analysis and interpretation of the data collected in the laboratory. The report will be evaluated based on the following criteria:

Presentation (10%): accurate and complete description and presentation and of the data (clinical and exercise test findings) provided.

Interpretation (10%): accurate and critical analysis and interpretation of the data (exercise test findings) provided in relation to normative values.

Peer evaluation (-5%): evaluation of each member of the group by their peers. **Only when the score provided is below 5, students will email ana.moga@mcgill.ca with the name of the group member(s) evaluated and the mark given. Do NOT send Ana Maria Moga an email if your evaluation score is 5.** Consider the quantity and quality of the work performed by you peers and assess it based on the criteria of the evaluation grid using whole numbers (1 to 10). This assessment will be kept strictly confidential. Please note that the **peer evaluation score DOES NOT add points to your mark, it only subtracts them (e.g., you need to obtain a 5 from all members of your group if you want to keep your mark).**

Evaluation grid*

	10 (Excellent)	8 (Very good)	6 (Good)	4 (Satisfactory)	0 (Unsatisfactory)
Presentation					
Interpretation					
Peer evaluation					

Please note that although style is not formally in the grid, it will be considered. Aspects such as writing quality, coherence, clarity, lack of grammatical mistakes and typos and accuracy in referencing will be considered. More than 5 typos/grammatical mistakes, lack of clarity and accuracy in referencing will lower the mark significantly. Please note that even though each criterion is assessed independently, a poor score in style may affect the rest of the criteria.

Quizzes

During some of the lecture days, we will have quizzes that will prepare students for the multiple-choice question final exam. There are **5 quizzes** during the course and **each** one counts 4% of the final mark (20% total). Each quiz covers the material given in one of the modules. Due to the COVID-19, the quizzes will be completed remotely. Each quiz will have 12-15 questions that will need to be completed in 30 minutes. **All quizzes will start and finish at the same time (see schedule for details). Don't be late so you can complete the quiz without problems.**

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Presentation of case Study

Students will work in groups of 5 (you can sign up on MyCourses and select the groups) to prepare a 15 + 5 minutes presentation about a specific case study. Presentations will be delivered by all members of the group on one of the 3 last days of the course (see program). A copy of the power point presentation should be sent to the course instructor (marc.roigpull@mcgill.ca) no later than **Nov 24. After this date, the presentation cannot be modified.** The objective of the presentation is to evaluate the capacity of students to perform an initial assessment of a patient and prepare a comprehensive exercise program based on the clinical condition/s and the goals of the patient. **On the first day of class, an example will be provided.**

The presentation should contain the following sections:

Initial assessment: determine the risk level of the patient and define absolute and relative contraindications to exercise based on the information provided. Identify the most common contraindications and things to consider during initial assessment. Describe which clinical tests you will do/require and mention additional information that you are lacking and that you would like to have.

Exercise testing: define and describe which exercise tests are needed in this specific case. You cannot do all the tests, but you can select and prioritize the most important ones to be used. Explain why you choose those tests and if modifications of the protocols are required for this patient. Describe which outcomes you will obtain and how and when will you be measuring them.

Exercise prescription: using the information provided and gathered during the exercise testing develop a specific training program including the types of exercises and parameters required (frequency/intensity/volume). Discuss the progression of training, how you will establish this progression and establish specific milestones that the patient will need to achieve.

The presentation will be evaluated based on the following criteria:

Completeness (10%): all sections described above must be presented. The use of diverse, high-quality sources of information (e.g. electronic databases, journals, recommendations) will be considered. The idea is to gather as much information as possible to perform a critical assessment, and design an appropriate exercise testing and prescription program.

Interpretation (10%): Accurate and critical interpretation of the information provided (e.g. medical history, laboratory tests and diagnosis). It is important to identify the most important information in relation to exercise testing and prescription. Identify red flags (e.g. contraindications and precautions to consider), facilitators and barriers and plan your exercise testing and prescription accordingly.

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Questions (10%): in the last 5-10 minutes the instructor will ask questions in relation to the case study. Responses will be evaluated based on your ability to respond appropriately and accurately.

Peer evaluation (-10%): evaluation of each member of the group by their peers. **Only when the score provided is below 10, students will send marc.roigpull@mcgill.ca with the name of the group member(s) evaluated and the mark given. Do NOT send an email if your evaluation score is 10.** Consider the quantity and quality of the work performed by you peers and assess it based on the criteria of the evaluation grid using whole numbers (1 to 5). This assessment will be kept strictly confidential. Please note that the **peer evaluation score DOES NOT add points to your mark, it only subtracts them (e.g., you need to obtain a 10 from all members of your group if you want to keep your mark).**

Evaluation grid*

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Completeness					
Interpretation					
Questions					
Peer-evaluation					

Please note that although style is not formally in the grid it will be considered. Aspects such as writing quality, coherence, clarity, lack of grammatical mistakes and typos and accuracy in referencing in the power point will be considered. More than 5 typos/grammatical mistakes, lack of clarity and accuracy in referencing will lower the mark significantly. Please note that even though each criterion is assessed independently, a poor score in style may affect the rest of the criteria.

Final examination

Multiple-choice questions like the ones used for the quizzes plus some questions based on short clinical cases.

COURSE MATERIALS

Main bibliographic resources (required)

Original and review articles relevant to the course content to be covered in each lecture will be posted on the PHTH 440 MyCourses site (www.mcgill.ca/mycourses/). Students are encouraged to read these materials before each lecture. Podcasts are also part of the course material. You can access the podcast Masters in Exercise in any podcast platform (Apple, Spotify, Anchor).

Reference textbooks (not required)

Exercise physiology

- McArdle WD, Katch FI & Katch VL. Exercise Physiology: Nutrition, Energy and Human Performance, 8th Edition. Lippincot Williams & Wilkins 2015

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- Brooks GA, Fahey TD, Baldwin KM. Exercise Physiology. Human Bioenergetics and its Applications. 4th Edition. McGraw Hill, New York, NY, USA, 2005.

Clinical exercise physiology

- Ehrman JK, Gordon PM, Visich PS & Keteyian SJ. Clinical Exercise Physiology, 2nd Edition. Human Kinetics, Windsor, ON, Canada, 2009.
- LeMura L & von Duvillard S. Clinical Exercise Physiology: Application and Physiological Principles. Lippincott Williams & Wilkins, New York, NY, USA, 2004.

Exercise testing

- Wasserman K, Hansen JE, Sue DY, Stringer WW, Sietsma KE, Sun XG & Whipp BJ. Principles of Exercise Testing and Interpretation: Including Pathophysiology and Clinical Applications, 5th Edition. Lippincott Williams & Wilkins, New York, NY, USA, 2012.
- Jones NL. Clinical Exercise Testing, 4th Edition. WB Saunders Company, Philadelphia, Pennsylvania, USA, 1999.

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SCHEDULE

#	Date	Lecture
1	Sept 3	Course introduction + <i>Presentation case study by Marc Roig</i>
Module 1: EXERCISE PHYSIOLOGY		
2	Sept 8	Exercise physiology I
3	Sept 10	Exercise physiology II
4	Sept 15	Exercise physiology III
		Review of Module 1
Module 2: ACUTE RESPONSES		
5	Sept 17	Acute responses I + Quiz 1
6	Sept 22	Acute responses II
7	Sept 24	Acute responses III
		Review of Module 2
Module 3: EXERCISE TESTING		
8	Sept 29	Exercise testing I + Quiz 2
9	Oct 1	Exercise testing II
10	Oct 6	Exercise testing III
		Review of Module 3
Module 4: CHRONIC ADAPTATIONS		
11	Oct 8	Training adaptations I + Quiz 3
12	Oct 13	Training adaptations II
13	Oct 15	Training adaptations III
14	Oct 20	Training adaptations IV
		Review of Module 4
15	Oct 22	<i>Presentation of laboratory session by Ana Maria Moga</i>
Laboratory week from October 25-29		
Module 5: EXERCISE PRESCRIPTION		
16	Nov 3	Exercise prescription I + Quiz 4
17	Nov 5	Exercise prescription II
18	Nov 10	Exercise prescription III
19	Nov 12	Exercise prescription IV
20	Nov 17	Exercise prescription V
21	Nov 19	Exercise prescription VI
		Review of Module 5
	Nov 24	Case study presentation needs to be submitted + Quiz 5
22	Nov 26	Presentations (groups 1-3)
23	Dec 1	Presentations (groups 4-7)
24	Dec 3	Presentations (group 8)
	Dec 6	Laboratory report needs to be submitted
Quizzes		Review Sessions
Quiz 1: Sept 17 from 15:30 to 16:00 Quiz 2: Sep 29 from 15:30 to 16:00		Module 1: Sept 11 from 15:30 to 16:00 Module 2: Sept 23 from 15:30 to 16:00

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Quiz 3: Oct 8 from 15:30 to 16:00	Module 3: Oct 14 from 15:30 to 16:00
Quiz 4: Nov 3 from 15:30 to 16:00	Module 4: Oct 28 from 15:30 to 16:00
Quiz 5: Nov 24 from 15:30 to 16:00	Module 5: Nov 13 from 15:30 to 16:00

 **Live classes (zoom)**  **Laboratory week**  **Quizzes**

LEARNING OUTCOMES

The learning objectives of the course have been classified using the essential competency levels for Physiotherapists in Canada. The course will help students develop the following core competencies:

Expert:

1. Explain the principles of exercise physiology and metabolism.
2. Describe the main physiological responses to acute and chronic exercise.
3. Be able to understand the principles of exercise testing and to interpret the results of clinical exercise tests.
4. Learn how to safely and effectively perform PFT as well GXT.
5. Explain the principles for the safe and effective prescription of exercise in special populations.
6. Know the evidence behind the effectiveness of exercise interventions in special populations and in some of the most prevalent health clinical conditions.

Communicator:

1. Demonstrate effective and appropriate verbal, non-verbal, written communication when interacting with patients (peers) during the laboratory practice.
2. Be able to collect, note and analyze data and share data during the laboratory practice.
3. Be able to present main findings of research to other students in an effective and appropriate manner during the presentation of the term paper.

Collaborator:

1. Demonstrate the ability to work respectfully and collaborative during the different group assignments and presentations.

Manager:

1. Demonstrate organizational skills to establish priorities and individualized roles in the group assignments.

Advocate:

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1. Promote a healthy lifestyle and the prevention of functional limitations through the practice of physical activity.
2. Promote the use of different types of exercise as a therapeutic tool in rehabilitation.
3. Increase the visibility and relevance of physical therapists in the testing and prescription of exercise in clinical populations.

Scholarly practitioner:

1. Be able to critically evaluate the quality of scientific evidence from the literature through the review of the literature of the term paper.
2. Show the ability to formulate clinical questions and use the available resources to answer those questions in the term paper.

Professional:

1. Contribute to the development of the role of physical therapy in clinical exercise prescription

POLICY STATEMENTS

Right to submit in English or French written work that is to be graded [approved by Senate on 21 January 2009]:

"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."

"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 Statement [approved by Senate on 29 January 2003]:

"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"

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(pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/.)"

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