PHTH 440 CLINICAL EXERCISE PHYSIOLOGY

Credits: 3

Instructor: Marc Roig PhD
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Office hours: by appointment only

Day: Monday & Wednesday

Place: McIntyre Medical Building, Room 1034

Time: 10:05am - 11:25am (Jan 5-Apr 14)

Course Structure and Instructional Method:

24 x 1.5 hours lectures

- Block 1: Exercise Physiology (lectures 1-6): will cover basic concepts of exercise physiology and metabolism as well as of neural control of movement and muscle structure and function.
- Block 2: Acute responses to exercise (lectures 7-10): will cover common physiological responses to acute exercise of the different bodily systems with an emphasis on the hormonal and cardiorespiratory system.
- Block 3: Chronic responses to exercise (lectures 11-14): will cover main physiological adaptations to chronic exercise with an emphasis on the cardiorespiratory, muscular and well as the nervous system.
- Block 4: Exercise testing (lectures 15-18): will cover basic principles of exercise testing and guidelines for the interpretation of the most commonly used tests to assess cardiorespiratory fitness.
- Block 5: Exercise prescription (lectures 19-24): will cover general concepts of exercise prescription with a special emphasis on special and clinical populations.

1 x 3.5 hours laboratory practice

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

Learning Objectives: 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:

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 develop the role of physical therapy in clinical exercise

Evaluation:

25%: Midterm examination: lectures 1-13
30%: Term paper & presentation
20%: Laboratory report
25%: Final examination: lectures 15-23

Midterm/final examination (50% final mark):
Multiple-choice questions.

Term paper & presentation (30% final mark): Students will work in groups of 6 (an email with the names of the groups needs to be sent no later than Jan 13th). The instructor will randomly assign each group to a clinical condition. Students will need to write a review (no more than 3500 words excluding references, figures and tables) investigating the evidence against or in favor of the effectiveness behind the use of a specific exercise intervention. A short power point presentation (15 minutes) outlining the main findings of the paper should be prepared for the final class of the course. The paper will be evaluated based on the following criteria:

Style (5%): writing quality, coherence, clarity, lack of grammatical mistakes and typos, accuracy in referencing.

Search (5%): completeness (i.e. electronic databases, hand searching, grey literature) and systematic search of the different available sources (at least one or two databases).

Analysis (5%): objective and balanced appraisal of the evidence based on the quality of the sources and the results of the studies. To analyze the methodological quality of the selected studies and integrate this in the interpretation of the results is key.

Interpretation (5%): accurate and critical interpretation of the evidence based on the results of the analysis.

Presentation (10%): clear, comprehensive and collaborative (all members of the group should participate).

Evaluation grid

	5 (Excellent)	4 (Very good)	3 (Good)	2 (Satisfactory)	1 (Unsatisfactory)
Style					
Search					
Analysis					
Interpretation					
	10 (Excellent)	8 (Very good)	6 (Good)	4 (Satisfactory)	2 (Unsatisfactory)
Presentation					

Evaluation Criteria

Introduction

- Includes basic epidemiological data of the disease including incidence/prevalence/morbidity/mortality
- Clearly outlines objectives of the paper justifying the selection of the exercise intervention

Methods

- Clearly defines PICO (Population/Intervention/Comparison/Outcomes)
- Contains inclusion and exclusion criteria to narrow down the search (which papers you will include and or exclude based on scope and quality)
- Provides a complete/systematic search plan (databases/key words) including major databases and other resources.
- Explains how methodological quality is to be assessed.
- Describes statistical methods if necessary.

Results

- Shows a detailed description of the results of the search so that it can be easily replicated.
- Gives information about papers that have been included and excluded.
- Provides a description of the papers selected (intervention/population/outcomes/results)
- Provides a quantitative (optional) and qualitative (mandatory) analysis of the results

Discussion

- Discusses the evidence based on the results of the search
- Weighs the evidence based on the methodological quality of each paper (this is key)

Conclusion

- Summarizes main points of the review based on the evidence
- Outlines weaknesses/limitations of the review
- Suggests gaps and directions for further research based on the results of the review

Laboratory report (20% final mark): Students will come to the MEMORY-LAB located at the Jewish Rehabilitation Centre (JRH) in Laval in the same groups of 6 formed for the term paper. The laboratory practice will last 3.5 hours approximately. Two of the students will volunteer as testing subjects (please bring sports clothing). Students will be instructed by a TA on how to perform a PFT and a GXT. The laboratory practice will be assessed by a laboratory report of no more than 1500 words (excluding tables, figures and references). The data from one of the students will be used for writing the laboratory report. The general objective of the report is to present a comprehensive analysis and interpretation of the collected data. These are the aspects to be evaluated.

Assistance: assistance to the laboratory practice is mandatory.

Style: writing quality, coherence, clarity, lack of grammatical mistakes and typos.

Analysis: accurate and complete description of the data (clinical and exercise test findings) provided.

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

Evaluation grid

	5 (Excellent)	4 (Very good)	3 (Good)	2 (Satisfactory)	1 (Unsatisfactory)
Assistance					
Style					
Analysis					
Interpretation					

Course Materials: Main bibliographic resources (required): References of book chapters as well as 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.

Additional bibliographic resources (recommended): For those who want to expand their knowledge additional references relevant to the course content to be covered in each lecture will be provided.

Other reference textbooks (not required):

Exercise physiology

- McArdle WD, Katch FI & Katch VL. Exercise Physiology: Nutrition, Energy and Human Performance, 7th Edition. Lippincot Williams & Wilkins 2010
- Powers SK & Howley ET. Exercise Physiology: Theory and Application to Fitness and Performance, 8th Edition. McGraw Hill, New York, USA, 2012.
- 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, 1997.

PROGRAM (subject to change)

	Date	Title of Lecture
EXERCISE PHYSIOLOGY		
1	Jan 5	Introduction
2	Jan 7	Bioenergetics
3	Jan 12	Exercise metabolism (I)
4	Jan 14	Exercise metabolism (II)
5	Jan 19	Neural control of movement
6	Jan 21	Skeletal muscle structure and function
ACUTE RESPONSES TO EXERCISE		
7	Jan 26	Hormonal responses to exercise
8	Jan 28	Circulatory and respiratory responses to exercise (I)
9	Feb 2	Circulatory and respiratory responses to exercise (II)
10	Feb 4	Circulatory and respiratory responses to exercise (III)
CHRONIC RESPONSES TO EXERCISE		
11	Feb 9	Adaptations to exercise (I)
12	Feb 11	Adaptations to exercise (II)
13	Feb 16	Adaptations to exercise (III)
14	Feb 18	Midterm exam – in class (Lectures 1-13)
EXERCISE TESTING		
15	Feb 23	Cardiopulmonary testing
16	Feb 25	Pathophysiology
	March 2	Study break
	March 4	Study break
17	March 9	Clinical exercise testing
18	March 11	Clinical applications of exercise testing
	March 16	Laboratory week
	March 18	Laboratory week
EXERCISE PRESCRIPTION		
19	March 23	Special populations I Term paper needs to be handed in at the end of the lecture
20	March 25	Special populations II
21	March 30	Clinical populations I
22	April 1	Clinical populations II
23	April 6	Clinical populations III
24	April 8	Paper presentations Laboratory report needs to be handed in at the end of the lecture
TBD		Final exam – during exam period (Lectures 15-24)

Special Requirements for Course Completion and Program Continuation: In order to pass the course, a grade of at least C+ (60%) must be obtained as a total course mark. Please refer to the rules and regulation for information regarding final and supplemental examinations.

This course falls under the regulations concerning theoretical and practical evaluation as well as individual and group evaluation. Please refer to the section on marks in the Rules and Regulations for Student Evaluation and Promotion.

Plagiarism/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/)."

Right to submit in English or French written work that is to be graded: 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)."

Disability: "If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 514-398-6009 before you do this."

Copyright: Instructor generated course materials (e.g., 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.

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.