POTH 434 MUSCULOSKELETAL BIOMECHANICS

Credits: 3

Prerequisites: POTH 225 (Introduction to Biomechanics)

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Course Description: This is a lecture-based course, primarily covering the biomechanical properties of musculoskeletal tissues, the mechanical factors involved in their injury, and their potential for adaptation and recovery. Some fundamental principles of motion will also be reviewed, with the aim of integrating the biomechanics of motion with the properties of the biological tissues involved. The students will learn how these principles relate to traumatic and chronic injury and scientifically based clinical evaluations and treatments. Students are expected to have a firm understanding of the topics covered in the prerequisite course POTH 225 (Introduction to Biomechanics: Rehabilitation Sciences), as the much of the content of POTH 434 will expand on this previous material.

Course Structure: The course will take place over two (2) 1.5-hour sessions each week, for 13 weeks. The course will be primarily lecture-based, with any additional instructional methods and approaches to be announced.

Optional Tutorial: An optional 1.5-hour tutorial, given by the course instructor, will be held once a week, unless otherwise posted.

Course Topics:

Section 1 – Biomechanical Concepts

- Tissue Mechanics – Basic Concepts
- Tissue Mechanics – Behaviour Under Load
- Stability and Control

Section 2 – Passive Tissues

- Ultrastructural Components
- Bone
- Joints
- Ligaments and Joint Capsules
- IV Discs
- Peripheral Nerves

Section 3 – Active Tissues

- Tendon
- Skeletal Muscle
- Joint Stability
- Coordinated Movement

Student Learning Objectives:

Over the duration of the course, the student will acquire knowledge related to the biomechanics of the musculoskeletal system that can be applied and translated to practice. This course will cover essential competencies and milestones related to the domains of Scholarship and Communication.

Upon completion of this course, the student will be able to:

Learning objectives
1. Describe, compare, and contrast the fundamental biomechanical properties of various musculoskeletal tissues.
2. Compare and contrast the mechanisms through which various musculoskeletal tissues become injured, recover, and adapt to specific loading conditions.
3. Integrate the fundamental biomechanical properties of musculoskeletal tissues and musculoskeletal clinical conditions with prior knowledge of anatomy, physiology, physics, and mathematics.

4. Describe the potential effects of exercise interventions, as well as other therapeutic techniques, on the health and biomechanical properties of various musculoskeletal tissues.
5. Apply the requirements for functional movement with the biomechanical properties of the musculoskeletal system.
6. Apply each of these concepts into their analysis and critique of the current scientific and clinical literature.
7. Produce clear, written work that effectively communicates an understanding of the biomechanical properties of musculoskeletal tissues of the human body.

Course Materials:

Handouts: The instructor's PowerPoint presentation notes, and supplementary materials, will be available through MyCourses during the semester.

Textbook: No required text.

Additional Readings: References will be suggested for each topic, which the students may use as readings to supplement the lecture material.

Copyright of course materials: 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.

Student Assignments and Evaluation:

Assignment/Evaluation	Value	Date
Exam 1	25%	TBD
Exam 2	25%	TBD
Final Exam	50%	TBD

***The content and/or evaluation scheme in this course is subject to change.**
Text matching software will not be used.

Special Requirements for Course Completion and Program Continuation: 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.

Attendance: Students are expected to attend all lectures. Attendance for tutorials is optional.

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" (Approved by Senate on 29 January 2003) (See McGill's guide to academic integrity 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 procédures disciplinaires. » (Énoncé approuvé par le Sénat le 29 janvier 2003) (pour de plus amples renseignements, veuillez consulter le guide pour l'honnêteté intellectuelle de McGill.)

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 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." (Approved by Senate on 21 January 2009)

« 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. » (Énoncé approuvé par le Sénat le 21 janvier 2009)

Technology in Class: Your respectful attentive presence is expected, therefore while you are permitted to use your laptop in class, it is understood that you will not be using your laptop or cell phone for social purposes during class time (e.g. email, msn, sms, social media). Your cell phone should be on silent during class time and phone calls should only take place during the break or after class.

Course Accessibility: If you have a disability, please contact McGill Student Accessibility and Achievement to organize a meeting with an advisor and to ensue that any needed accommodations can be organized in a timely manner.

Course evaluations: End-of-course evaluations are one of the ways that McGill works towards maintaining and improving the quality of courses and the students' learning experience. You will be notified by e-mail when the evaluations are available.

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