



Department of Kinesiology & Physical Education

# Biomechanics of Human Movement

## EDKP 206

### COURSE OUTLINE | Winter 2023

**Lectures** Monday, 9:35-11:25 AM Currie 408/9

**Labs** Monday, 2:35-4:25 PM  
 Tuesday, 8:35-10:25 AM Currie 304  
 Thursday, 8:35-10:25 AM (Tassone Lab)

**COURSE DESCRIPTION:** This course presents the fundamentals of biomechanical analysis and applies general principles of mechanics and math to analyze human movement. Kinematic and kinetic concepts will be studied, and students will be able to apply knowledge of biomechanics to understand human posture and movement for activities such as sport and exercise.

**Pre-requisites:** PHYS 101 or PHYS 131

**Instructor:** Caitlin Mazurek, PhD(c)

**Email:** [caitlin.mazurek@mcgill.ca](mailto:caitlin.mazurek@mcgill.ca) or [caitlin.mazurek@mail.mcgill.ca](mailto:caitlin.mazurek@mail.mcgill.ca)

**Office Hours & Location:** By appointment (please email to schedule)  
 Currie 402

**Communication:**

- For questions about course content: please post your questions in the appropriate discussion board on myCourses
- For any other questions, please send an email with "EDKP206" in the subject field. Response time is within 48 hours (weekends & holidays excluded)

**Teaching Assistants:** Yiyang Chen, Kristin Higgins, Laura Holman, Emily Russell

**Graders:** Andrew Phillips, Kerrigan Sunday

**Recommended Text:** Oatis, Carol (2017) *Kinesiology: The Mechanics & Pathomechanics of Human Movement*. 3rd ed.

**Course Structure:** Lectures x 11 Labs x 12 Exams x 2

## EVALUATION SUMMARY

Evaluation will be carried out in accordance with McGill University policy and will be based on the following criteria:

Assignment	Due Date	% of total grade
Lab Attendance		5%
Lecture Tasks (1% x 5)	TBA	5%
Group Reports (5% x 4)	Jan 23, Feb 6, Mar 13, Mar 27	20%
Midterm Exam	Week 7 – Feb 20	25%
Group Project	Presentation recordings due Apr 11	15%
Final Exam	TBD	30%

**Lab Attendance:** Students are expected to attend the lab sessions they are scheduled for. Students will receive a “0” for lab attendance if they exceed three *unexcused* absences.

**Lecture Tasks:** Students will be assigned 5 tasks during lectures throughout the semester varying from discussion board posts to brief “quizzes” or short submissions, etc. for 1% of their total grade each. Tasks will remain open for 1 week following their assignment and can be completed even if you are not in attendance when assigned.

**Group Reports:** Four reports worth 5% of your total grade each will be completed with your assigned lab groups throughout the semester based on weekly lab content. One submitted copy per group must be submitted to myCourses.

**Midterm Exam:** This exam will be comprised of multiple-choice questions, short answers, and calculation questions intended to assess students’ learning of lecture and lab content. The midterm exam includes a combination of lab and lecture material from week 1 to week 6 of the course. The midterm exam is worth 25% of the total course grade.

**Group Project:** The final group project assesses the students’ understanding of key biomechanical concepts, the ability to assess existing scientific literature, and think critically to create a research question. Students will work in groups to create a biomechanical research question related to a selected topic. Students will be responsible for an oral presentation recorded in advance via Zoom and submitted to myCourses, as well as a live Q&A session during their scheduled lab time. Presentation should include literature review (including knowledge gap), research question, hypothesis, and proposed methods (including participant information, data collection procedures, rationale for biomechanical analysis methods, and limitations). Each group will also submit 1 brief Word doc listing the contributions of each group member to the project.

**Final Exam:** This exam will be comprised of multiple-choice questions, short answers, and calculation questions intended to assess students’ learning of lecture and lab content. The final exam will be a cumulative exam including a combination of lab and lecture material from the entire course with emphasis placed on week’s 8-12. The final exam is worth 30% of the total course grade.

**Late Assignments:** Assignments submitted after their deadline will be eligible to receive up to 80% of the original point value for the assignment. Submissions later than 1 week after the deadline will not be accepted. *Lecture tasks may not be submitted late.*

**Grading Disputes:** If you are unsatisfied with a grade for an assignment, you may submit a written request to Cait for a regrade. In doing so, you agree to accept whatever grade you are given by Cait on the assignment (whether it is lower or higher than the grade originally given by the grader).

**IMPORTANT DATES AT MCGILL:** <https://www.mcgill.ca/importantdates/key-dates>

Winter 2023

## Key Academic Dates &amp; Other Important Dates

- **Classes begin:** Wednesday, January 4
- **Winter Reading Break:** from February 27 to March 3
- **Classes end:** Thursday, April 13
- **Study Days:** Saturday, April 15 and Sunday, April 16
- **Exams begin:** Friday, April 14
- **Exams end:** Friday, April 28 (11 days, including evening exams)

Other important dates built around the Key Academic Dates include:

- **Deadline to cancel registration:** Saturday, December 31, 2022
- **Deadline to register without penalty** (new students only): Wednesday, January 4
- **Add/Drop deadline:** Tuesday, January 17
- **Course or University Withdrawal with refund deadline:** Tuesday, January 24
- **Course or University Withdrawal WITHOUT REFUND deadline:** Tuesday, March 7

Legal holidays. Administrative offices are closed on the following dates:

- **Good Friday:** April 7, 2023
- **Easter Monday:** April 10, 2023

**ACADEMIC STATEMENTS:**

*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 right applies to all written work that is to be graded, from one-word answers to dissertations. Instructor addition: French/English dictionaries will be permitted during exams (however, supplemental notes marked within the dictionary will not be tolerated, see following statement of 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: [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/)).*

**LAND ACKNOWLEDGEMENT:**

*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 many First Nations including the Kanien'kehà:ka of the Haudenosaunee Confederacy, Huron/Wendat, Abenaki, and Anishinaabeg.*

## TENTATIVE COURSE SCHEDULE EDKP 206 2023

Week	Date	Topic (lecture/lab)	Prior to Class	Out of Class
1	Jan 9	Course Intro & Basic Concepts in Biomechanics		Oatis Ch. 1
	Jan 9/10/12	Free body diagrams: intro to force & moments	**Need calculator** Review Oatis Ch. 1	Week 1 Problem Bank (optional)
2	Jan 16	Mechanical Properties of Materials Biomechanics of Bone and Cartilage	Oatis Ch. 2, 3, 5	
	Jan 16/17/19	Free body diagrams: calculating joint reaction forces and moments	**Need calculator**	Complete Report 1 Week 2 Problem Bank (optional)
3	Jan 23	Biomechanics of Tendons and Ligaments	Oatis Ch. 6 <b>Submit Report 1</b>	
	Jan 23/24/26	Work, Power, & Energy	Crash Course Video (YouTube)	Week 3 Problem Bank (optional)
4	Jan 30	Biomechanics of Skeletal Muscle Electromyography	Oatis Ch. 4	
	Jan 30/31/ Feb 2	Electromyography (EMG)		Complete Report 2 Week 4 Problem Bank (optional)
5	Feb 6	Biomechanics of the Hip and Knee	Oatis Ch. 38-43 <b>Submit Report 2</b>	
	Feb 6/7/9	Force Plates (GRF/CoP)		Week 5 Problem Bank (optional)
6	Feb 13	Biomechanics of the Ankle and Foot	Oatis Ch. 44-46	Week 6 Problem Bank (optional)
	Feb 13/14/16	Midterm review		
7	Feb 20	Midterm		
	Feb 20/21/23	No labs		
<b>Reading Week Feb 27-Mar 3</b>				

Week	Date	Topic (lecture/lab)	Prior to Class	Out of Class
8	Mar 6	Gait Biomechanics	Oatis Ch. 47, 48	
	Mar 6/7/9	Walking/Running Gait Video Analysis & Interpreting Gait Waveforms		Complete Report 3 Week 8 Problem Bank (optional)
9	Mar 13	Biomechanics of the Spine	Oatis Ch. 32-34 <b>Submit Report 3</b>	
	Mar 13/14/16	Qualitative Kinematic Video Analysis	Download Kinovea	Week 9 Problem Bank (optional)
10	Mar 20	Biomechanics of the Shoulder and Elbow	Oatis Ch. 8-13	
	Mar 20/21/23	3D Motion Capture + create groups for project		Complete Report 4 Week 10 Problem Bank (optional)
11	Mar 27	Biomechanics of the Wrist and Hand Introduce Group Project	Oatis Ch. 14-16, 19 <b>Submit Report 4</b>	Week 11 Problem Bank (optional)
	Mar 27/28/30	Group Project: Searching the Literature	Email finalized groups	
12	Apr 3	Biomechanical Applications		Final Exam study guide
	Apr 3/4/6	Group Project Prep		<b>Finish group presentations</b>
13	Apr 12*	Group Project Viewing + Live Q&A (Thurs Lab)	<b>Submit presentation recordings</b>	
	Apr 11/12*	Group Project Viewing & Live Q&A's		
<b>TBD — FINAL EXAM 35% between April 14 to 28</b>				