Queen's University
School of Kinesiology and Health Studies

Course Name: **KNPE 453/3.0** Locomotor Neuromechanics	**Course Instructor:** Anthony Chen	**Contact Hours:** TBA
		Prerequisite: Level 3 or above in a KIN Plan KNPE 254/3.0 and KNPE 261/3.0

Course Description:

The purpose of this course is to provide you with a comprehensive understanding of the mechanics, energetics, and control of human locomotion. We will explore current theories in biomechanics and motor control, as well as the foundational behavioral and sensorimotor evidence that underpin these theories. A focus will be placed on applying this understanding to the rehabilitation of movement disorders and the design and control of robotic assistive devices.

Exclusion:

KNPE 493 (Topic: Locomotor Neuromechanics)

Course Texts (Optional):

Learning Outcomes:

- Understanding the relationship and interplay between body mechanics and nervous system control.
- Understanding why metabolic energy cost is considered not only an important outcome of movement, but also a relevant control objective.
- Understanding the importance of mechanics, energetics, and locomotor control when designing rehabilitation strategies and assistive devices.
- Acquiring basic programming and signal processing knowledge used in neuromechanical research.
- Enhancing scientific communication skills through interpreting, presenting, and discussing scientific literature in Neuromechanics.
- Cultivating scientific and communication skills through planning, completing, and presenting a locomotor research project.

Course Evaluation:

Article reflections (4 x 3.75%)	15%
Weekly peer participation (16 x 0.5%)*	8%
Student Presentations (2 x 15%)	30%
Workshop Check In's (3 x 2%)	6%
MATLAB Onramp Tutorial	1%
Term Project Midterm Assignment	15%
Term Project Final Paper	10%
Term Project Final Presentation	15%

*1% Bonus for Full Completion

Course Outline

Review concepts	Complex neuromechanical model
Mechanical models of locomotion & the cost of walking	Assessing real-world locomotion
Partitioning the cost of running	Gait retraining
Sensory components of gait	Robotic assistance in locomotion
Presentation self-reflection and goal	