Course Description:

Central to the relation between brain and behaviour is the problem of how movements are organized and controlled. The scientific field of study concerned with this problem is generally known as Motor Control. Students of motor control have available to them a variety of approaches with which to examine the nature of movement organization and control. These approaches to the study of motor control occur at different levels of resolution, requiring different perspectives, and utilizing different concepts and tools. At a biomechanical level, the student seeks to understand the physical basis for movement and the mechanical factors, or rules that govern human movement. At a neurophysiological level, the student seeks insights into the neuronal machinery and the functional neural interactions that underlie motor control. At a behavioural level, the student seeks to understand the processes underlying movement without reference to their physical instantiation.

KIN 330 draws upon the frameworks offered by neurophysiology, biomechanics, experimental psychology and cognitive neuroscience, with particular emphasis on a behavioural analysis of movement. The focus of this course is upon the mechanisms and principles which govern motor control as well as the research methods commonly used in motor control research. Students of this course will gain an understanding of the current state of knowledge and its development, and an appreciation of a number of contemporary issues in motor control.

Prerequisites and/or Course Restrictions:

Enrolment is restricted to students with 3rd year or higher standing in Kinesiology. KIN 330 builds directly on the foundations established in KIN 230 and assumes knowledge covered in KIN 230.

Course Format:

The course will consist of two lectures per week.
General Learning Objectives:

As part of the learning objectives of this course, students will:

1. Discuss some of the major theoretical issues in the field of sensorimotor neuroscience.
2. Discuss fundamental principles and concepts in the study of human sensorimotor control.
3. Discuss how methods from psychology and neuroscience are used to study sensorimotor control.
4. Discuss factors that influence information processing and motor preparation.
5. Discuss the neurophysiological correlates of motor preparation.
6. Discuss feedback and feedforward processes in sensorimotor control and adaptation.
7. Discuss the dissociation between perception and action in visual-motor control.
8. Discuss dynamical systems principles in the study of sensorimotor coordination.
9. Discuss the rationale of research methods and the links between theory and experiment.
10. Facilitate active learning, critical thinking, and problem solving skills in the study of human sensorimotor control.

Course Evaluation:

- **Mid-Term 1 Exam**  
  **Date:** October 16, 2018  
  **Weight:** 25%
- **Mid-Term 2 Exam**  
  **Date:** November 13, 2018  
  **Weight:** 25%
- **Final Examination**  
  **Date:** December Exam Period  
  **Weight:** 50%

The Mid-term and Final Exams will consist of multiple-choice and open-ended questions and will cover lecture material and assigned lecture readings. The Final Exam will be cumulative and inclusive of all lecture material covered in the course.

Students must write all exams. Failure to write an exam will result in a mark of zero for that exam. Note that the University sets the date for the Final examination. This course will adhere to the date set by the University. As per University regulations, there will be no exceptions to the date of the Final.

The exam weightings will be used to convert raw marks to a final grade percentage at the completion of the course. **There will be no scaling of grades nor reallocation of the exam weightings.**
General Course Topics and Sequence:

Lectures

Introduction

Motor Behaviour and Information Processing Framework – A Review

Sensorimotor Transformations in Response Selection and Preparation [Readings: 1 – 4]

Principles of Stimulus-Response Compatibility and Cognitive Translation
Electrophysiological and Neuromotor Indices of Response Selection and Preparation –
Muscle Activation Patterns, Cortical Activation, and Cortico-Spinal Excitability
in Response Selection and Preparation

Sensorimotor Transformations in Perceptual-Motor Integration [Readings: 5 – 7]

Sensori-Motor Integration and the Reafferenre Principle
Forward and Inverse Computational Models in Motor Control
Internal Models and Sensorimotor Adaptation

Sensorimotor Transformations in Visual-Motor Control [Readings: 8 – 10]

Visual Systems for Perception and Action
Dissociations between Perception and Action
Intentional and Automatic Processes in Visual-Motor Control

Sensorimotor Constraints in Perceptual-Motor Coordination [Readings: 11 – 12]

Degrees of Freedom Problem
Coordination Dynamics: A Dynamical Systems Approach
Dynamics of Inter-Limb Coordination
Required Readings:

There is no required textbook for KIN 330. Required readings will be in the form of research articles that can downloaded from the Library or though Canvas. Students are responsible for assigned readings. The readings contain more material than can be covered directly in class. Students are responsible for this material and it will appear on exams.

Lecture Readings


UBC Attendance Policy:

Regular attendance is expected of students in all their classes. Students who neglect their academic work and assignments may be excluded from the Final examination. Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.

Last date for withdrawal without a W on your transcript: September 18, 2018
Last date for withdrawal with a W instead of an F on your transcript: October 12, 2018

The University accommodates students with disabilities who have registered with the Access and Diversity Office. The University accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled tests and examinations. Please let your instructor know in advance, and in writing, preferably in the first week of class (or a minimum of three weeks prior), if you will require any accommodation on these grounds. Students who plan to be absent for varsity athletics, family obligations, or other similar authorized commitments, cannot assume they will be accommodated, and should discuss their commitments with the instructor before the drop date. Please consult the UBC Academic Calendar for further information on UBC Policies and Regulations.