

**THE UNIVERSITY OF BRITISH COLUMBIA**  
**SCHOOL OF KINESIOLOGY**  
**COURSE SYLLABUS**

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<b>Program:</b> Kinesiology <b>Course #:</b> KIN 330 (3), Section 001 <b>Day/Time:</b> Tue/Thu 8:00 am – 9:20 am  <b>Instructor:</b> Dr. Romeo Chua <b>Office:</b> 205 Osborne Centre Unit 2 <b>Lab:</b> Perceptual-Motor Dynamics Lab <b>Hours:</b> during tutorials or by appointment <b>Phone:</b> 604-822-1624 <b>Email:</b> romeo.chua@ubc.ca	<b>Term/Year:</b> September – December 2019 <b>Course Title:</b> Human Motor Behaviour II <b>Location(s):</b> MacLeod 202
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**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.

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**PREREQUISITES AND/OR COURSE RESTRICTIONS**

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

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**COURSE FORMAT**

The course will consist of two lectures per week with supplementary tutorials. Tutorial hours will provide students the opportunity to seek assistance.

The instructor will be available for assistance during tutorials. Tutorial times will be posted on the Canvas course site.

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**GENERAL LEARNING OBJECTIVES**

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

1. Discuss 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.

Additional, more detailed, learning objectives will be presented during lectures.

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**LEARNING ASSESSMENTS**

Mid-Term Exam 1	<b>October 8, 2019</b>	25%
Mid-Term Exam 2	<b>November 7, 2019</b>	25%
Final Examination	(December 3 – 18 Period)	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.**

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**GENERAL COURSE TOPICS AND SEQUENCE****Lectures*****Introduction***

Motor Behaviour and Information Processing Framework – A Review

***Sensorimotor Transformations in Response Selection and Preparation***

[Readings: 1 – 3]

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

***Sensorimotor Transformations in Perceptual-Motor Integration***

[Readings: 4 – 6]

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

***Sensorimotor Transformations in Visual-Motor Control***

[Readings: 7 – 9]

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: 10 – 12]

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

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## LEARNING MATERIALS

There is no required textbook for KIN 330. Required readings will be in the form of research articles that can be downloaded from the Library or through 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.

### Required Readings

1. Bayliss AP (2007). Mixed signals: Stimulus-response compatibility and car indicator light configuration. *Applied Cognitive Psychology, 21*, 669-676.
2. Roggeveen AB, et al. (2007). Lateralized readiness potentials reveal motor slowing in the aging brain. *Journal of Gerontology: Psychological Sciences, 62B*, 78-84.
3. Duque J, et al. (2010). Evidence for two concurrent inhibitory mechanisms during response preparation. *The Journal of Neuroscience, 30*, 3793-3802.
4. Pisella L, et al. (2002). Dissociated long lasting improvements of straight-ahead pointing and line bisection tasks in two hemineglect patients. *Neuropsychologia, 40*, 327-334.
5. Diedrichsen J, et al. (2005). Cerebellar involvement in anticipating the consequences of self-produced actions during bimanual movements. *Journal of Neurophysiology, 93*, 801-812.
6. Brooks JX (2015). Learning to expect the unexpected: rapid updating in primate cerebellum during voluntary self-motion. *Nature, 18*, 1310-1317.
7. Schindler I, et al. (2004). Automatic avoidance of obstacles is a dorsal stream function: evidence from optic ataxia. *Nature Neuroscience, 7*, 779-784.
8. Cameron BD et al (2009). Cognitive constraint on the 'automatic pilot' for the hand: Movement intention influences the hand's susceptibility to involuntary online corrections. *Consciousness and Cognition, 18*, 646-652.
9. Schenk T, et al. (2005). The use of visual feedback is independent of visual awareness: evidence from visual extinction. *Experimental Brain Research, 167*, 95-102.
10. Kelso JAS, et al. (1979). On the coordination of two-handed movements. *Journal of Experimental Psychology: Human Perception and Performance, 5*, 229-238.
11. Almeida QJ, et al. (2003). Disruptive influences of a cued voluntary shift on coordinated movement in Parkinson's disease. *Neuropsychologia, 41*, 442-452.
12. Temprado JJ, et al. (2002). Attentional demands reflect learning-induced alterations of bimanual coordination dynamics. *European Journal of Neuroscience, 16*, 1390-1394.

**Course Canvas Site:** <http://canvas.ubc.ca>

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**UNIVERSITY POLICIES**

Regular attendance is expected of students in all their classes (including lectures, laboratories, tutorials, seminars, etc.). Students who neglect their academic work and assignments may be excluded from the final examinations. Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on the UBC Senate website (<https://senate.ubc.ca/policies-resources-support-student-success>).

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**IMPORTANT DATES**

Last date for withdrawal without a W on your transcript: September 17, 2019.

Last date for withdrawal with a W instead of an F on your transcript: October 11, 2019

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