Program: Kinesiology

Course #: KIN 419 (3), Section 001

Formerly KIN 357

Term/Year: January – April 2022

Course Title: Laboratory Investigations in Neuromechanical Kinesiology

Day/Time: Tue: 11:00 – 12:30 pm
           Wed: 10:00 am – 12:00 pm
           Wed: 12:00 pm – 2:00 pm
           Wed: 2:00 pm – 4:00 pm

Location(s):
           Tue: CHBE 103
           Wed: G1 Kinesiology Learning Ctr, Osborne Unit #2

Instructor: Dr. Romeo Chua

Office: 205 Osborne Centre Unit 2

Lab: Perceptual-Motor Dynamics Lab

Hours: during labs or by appointment

Phone: 604-822-1624

Email: romeo.chua@ubc.ca

Teaching Assistant: Gregg Eschelmuller, MSc

Office: 128 Osborne Centre Unit 2

Hours: during labs or by appointment

E-mail: gregg.eschelmuller@ubc.ca

COURSE DESCRIPTION

Integration and application of laboratory principles and techniques for experimental investigations of topics in Neuromechanical Kinesiology, including human motor behaviour, neurophysiology, and biomechanics.

The objective of this laboratory course is to provide students an opportunity to gain hands-on experience with tools and techniques related to Neuromechanical Kinesiology. Each lab activity is designed around a basic research question drawn from topics within the areas of Neuromechanical Kinesiology. KIN 419 draws upon the empirical frameworks offered by motor behaviour, neurophysiology, biomechanics, and cognitive neuroscience, with particular emphasis on a behavioural analysis of movement.

PREREQUISITES AND/OR COURSE RESTRICTIONS

Enrolment is restricted to students with 3rd year standing or higher standing in Kinesiology.

COURSE FORMAT

The course will consist of one lecture and one 2-hour lab session per week.

Lectures/Discussions will be held in classroom CHBE 103.

Labs will be held in the Kinesiology Learning Centre (Osborne Gym G1 – Neuro-Mechanical Kinesiology Section).

Students are expected to attend the lectures and complete all labs.

Course Canvas Site: http://canvas.ubc.ca
GENERAL LEARNING OBJECTIVES

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

1. Apply skills and techniques essential and applicable to neuromechanical kinesiology and rehabilitation sciences.
2. Demonstrate a conceptual understanding of the elements of the human cognitive, neural, and mechanical systems.
3. Apply knowledge of anatomy, physiology, and psychology to describe human movement and motor control in anatomical, mechanical, and neuro-behavioural terms.
4. Demonstrate knowledge of data collection and analysis techniques related to behavioural response measurements, electromyography, kinetic and kinematic analysis, and other methods typically employed in laboratory investigations related to Neuromechanical Kinesiology.
5. Demonstrate personal and social responsibility towards class and laboratory participation.

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

LABORATORY LECTURE AND ACTIVITIES

The objective of the labs is to provide students an opportunity to gain hands-on experience with tools and techniques related to Neuromechanical Kinesiology. Each lab activity is designed around a basic research question or technique drawn from topics within the areas of human motor behaviour, neurophysiology, and biomechanics.

A lecture-discussion and lab handout/assignment is associated with each lab activity. The lecture-discussion is intended to provide some of the background and theory content for the laboratory investigation. The lab is used to carry out the laboratory activity (apparatus set-up, data collection, data analysis). The weekly discussion and lab handouts will provide a background and description of the lab activity, as well as an outline of the type of information (e.g., questions, data, presentation of results, discussion) that students are expected to obtain, complete, and submit.

Brief laboratory assignments, consisting primarily of presentation of data and the results of analyses, as outlined in lab handouts must be completed and submitted individually for each lab.

All material covered in the weekly discussions, labs, as well as assigned Lab Readings, will be evaluated in lab and final exams.

Students are expected to understand the concepts and research methodologies involved, the rationale underlying the methodologies, the data collection and analyses, the nature of the data, and the links between background concepts and experiment. Students are responsible for all labs and assignments. There are no make-up labs. If a student misses a lab for any reason, it is their responsibility to know what was done in the lab, obtain data, and complete the assignment.
LEARNING MATERIALS

Class notes and lab handouts will be made available through the course website. Students are required to bring these notes and printed copies of lab handouts to class.

A research article will accompany each lab and is intended to provide an example of the application of the lab techniques to a research question in areas related to Neuromechanical Kinesiology. Content from these articles, with respect to the basic question, experimental methods and protocols, and basic results will be covered in the exams.

LEARNING ASSESSMENTS

Assessment 1  Lab Participation and Assignments
Format       Attendance, participation, completion of lab activities and assignment.
Details      Students are expected to attend, participate, and complete each lab. For each lab, a short assignment that consists of the presentation of lab results and completion of lab questions must be submitted individually.
Due Date     Assignments are due by 12:00 pm on the Monday following the lab, unless otherwise indicated. No exceptions.
Learning Outcomes To demonstrate an understanding of fundamental laboratory concepts, techniques, and data collection and presentation.

Assessment 2  Written Exams (2)
Format       Short and long answer questions
Details      Students will be required to answer concept, application, methodology, and procedure questions based on the prescribed lectures, laboratory activities, and assigned research articles.
Learning Outcomes To demonstrate an understanding of the fundamental theoretical principles, laboratory concepts and techniques in the neuromechanical study of human movement.

Grading

<table>
<thead>
<tr>
<th>Assessment/Assignments</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Lab Participation/Assignments:</td>
<td>30%</td>
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<tr>
<td>Written Exam 1:</td>
<td>30%</td>
</tr>
<tr>
<td>Written Exam 2:</td>
<td>40%</td>
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</table>

Students must write all exams. Failure to write an exam will result in a mark of zero for that exam.

The weightings from lab participation and exams will be used to convert raw marks to a final grade percentage at the completion of the course. There will be no reallocation of assessment weightings. Exams will not be rescheduled for any reason other than a medical issue or family emergency. Written documentation must be presented in order for the test to be rescheduled. If you do not contact your instructor, you will be given a score of zero on the assessment.
**LABORATORY PLAN**

Note: *The specific topic for each week may be subject to change.*

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 12</td>
<td>Introduction to MATLAB *</td>
</tr>
<tr>
<td>January 19</td>
<td>Signal Processing using MATLAB</td>
</tr>
<tr>
<td>January 26</td>
<td>Basics of Electromyography</td>
</tr>
<tr>
<td>February 2</td>
<td>Human Stretch Reflexes</td>
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<tr>
<td>February 9</td>
<td>Long-Latency Stretch Reflex</td>
</tr>
<tr>
<td>February 16</td>
<td>Electromyographic Patterns of Movement</td>
</tr>
<tr>
<td><strong>February 23</strong></td>
<td><strong>Reading Week</strong></td>
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<tr>
<td><strong>March 1</strong></td>
<td><strong>In-class Midterm</strong></td>
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<tr>
<td>March 2</td>
<td>Anticipatory Postural Responses</td>
</tr>
<tr>
<td>March 9</td>
<td>Postural Sway and Centre of Pressure</td>
</tr>
<tr>
<td>March 16</td>
<td>Muscle Vibratory Illusion</td>
</tr>
<tr>
<td>March 23</td>
<td>Prism Adaptation</td>
</tr>
<tr>
<td>March 30</td>
<td>Stimulus-Response Compatibility</td>
</tr>
<tr>
<td>April 6</td>
<td>Open Lab</td>
</tr>
</tbody>
</table>

* Students will be expected to use MATLAB and Microsoft Excel. Both applications are free for UBC students.

For information on how to install MATLAB, or use an online web-based version, see:
- [https://it.ubc.ca/news/matlab-free-ubc-students](https://it.ubc.ca/news/matlab-free-ubc-students)
- [https://ubc.service-now.com/kb_view_customer.do?sysparm_article=KB0015540](https://ubc.service-now.com/kb_view_customer.do?sysparm_article=KB0015540)
- [https://www.mathworks.com/products/matlab-online.html](https://www.mathworks.com/products/matlab-online.html)

Note that you will first have to register your eligibility at:
- [https://ubc.service-now.com/kb_view.do?sysparm_article=KB0016447](https://ubc.service-now.com/kb_view.do?sysparm_article=KB0016447)
# TOPICS and READINGS

## Basics of Data Acquisition

### Introduction to MATLAB

### Introduction to Basic Data Acquisition, LabChart Software

* Basics of Data Acquisition ADInstruments
  * Introduction to LabChart 8 for Windows

## Electrophysiological Measures of CNS Responses

### Basics of Electromyography in Kinesiology


### Reflex Connections - The Human Stretch Reflex


### Reflex and Voluntary Response Interaction – The Long Latency Reflex


## Motor Preparation of Goal-Directed Movements

### Control of Rapid Voluntary Movements – Electromyographic Patterns of Movement


### Anticipatory Postural Responses during Voluntary Movement


## Sensorimotor Integration

### Control of Posture and Balance – Postural Sway and Centre of Pressure


### Muscles Spindles and Position Sense – The Muscle Vibratory Illusion


### Sensorimotor Integration and Adaptation – Prism Adaptation


## Cognition, Perception, and Perceptual-Motor Translation

### Stimulus-Response Compatibility

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).

IMPORTANT DATES

Last date for withdrawal without a W on your transcript: January 21, 2022.

Last date for withdrawal with a W instead of an F on your transcript: March 4, 2022

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COVID-19 INFORMATION

Provincial Health Orders and UBC policy now mandate masks in all indoor spaces on campus. These spaces include classrooms, labs, residence halls, libraries, and common areas such as lobbies, hallways, stairwells, and elevators.

You are required to wear a non-medical mask during our class meetings, for your own protection and for the safety and comfort of everyone else in the class. For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space. Non-medical masks that cover our noses and mouths are a primary tool for combating the spread of Covid-19.

There may be students who have medical accommodations for not wearing a mask. Students who wish to request an exemption to the indoor mask mandate must do so based on one of the grounds for exemption detailed in the PHO Order on Face Coverings (COVID-19). Such requests must be made through the Center for Accessibility. After review, students who are approved for this accommodation will be provided with a letter of accommodation to share with instructors teaching courses in which they are registered.

Please maintain a respectful environment.

If you are sick, it is important that you STAY HOME. Complete a self-assessment for Covid-19 symptoms here: BC COVID-19 Self-Assessment Tool.

If you miss class because of illness:
- Make a connection early in the term to another student or a group of students in the class. You can help each other by sharing notes.
- Consult the class resources on Canvas and refer to Syllabus on exam policies.
- If you are concerned that you will miss a key activity due to illness, contact the instructor to discuss.

If you are feeling ill and cannot attend class for an in-class assessment, please email the instructor right away.

If you are feeling ill at the time of a Final Exam, DO NOT attend the exam. You must apply for deferred standing (Academic Concession: Final Exam) through Kin Academic Advising. Students who are granted deferred standing (SD) will write the Final Exam at a later date.

IN-TERM CONCESSION

If you need to apply for academic concession for in-term work, apply online through Kin Advising: Academic Concession: In-Term Work.