KIN 416 – Neuromuscular Integration
Fall 2015

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Office hours: By appointment before or after class (please contact via email to make arrangements)
(Note: Specific hours will be made available prior to the midterm and final exam)

Course Calendar Description:
An examination of the neural processes involved in the maintenance of posture and the control of movement. The course will explore the role of the spinal and supraspinal regions in sensorimotor control of limb and whole-body movements. The course will also address the changes in neural control that occur following neurologic injury and the implications for rehabilitation.

Course Objectives:
At the end of the course you should be able to:
• Describe the structure and functional roles of various peripheral and central nervous system (CNS) structures known to be involved in the control of human movement
• Explain the basic neurophysiological processes underlying the control of human movement
• Relate movement disturbances to the sites of peripheral and/or CNS damage
• Understand how to apply general neurophysiological principles and methods to concrete clinical or experimental situations
• Identify and determine the appropriateness of common assessment techniques used to investigate neuromuscular function in clinical and research settings
• Discuss critically, current scientific literature related to neuromuscular integration

Course material:
No textbook is required. Lecture and supplementary materials will be posted on UW LEARN to augment lecture material. Specific readings will be assigned prior to guest lectures.

Suggested references include:
1. Khan Academy: www.khanacademy.org (many helpful and free teaching videos about a wide range of topics that may be useful beyond this class).


### LECTURE SCHEDULE

***NOTE Schedule subject to change as guest speakers are scheduled***

**Lecture times:** Monday, Wednesday 6:30 – 7:50 PM  
**Location:** BMH 1016

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<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
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| Week 1 | Sept 14, 16 | Course introduction  
Overview of Central & Peripheral Nervous Systems  
Cellular Communication  
Peripheral Effectors - Morphology, Physiology, Function |
| Week 2 | Sept 21, 23 | Sensory Systems  
Peripheral Affectors - Morphology, Physiology, Function |
| Week 3 | Sept 28, 30 | Sensory Systems con’t  
Spinal Cord Neurophysiology – Basic Sensorimotor Integration |
| Week 4 | Oct 5, 7 | Spinal Cord Neurophysiology  
Monosynaptic & Polysynaptic Reflexes |
| Week 5 | Oct 12, 14 | ***THANKSGIVING - NO CLASS***  
Techniques to measure movement and nervous system |
| Week 6 | Oct 19, 21 | ***Mid-term (in class OCT 21)***  
Sensorimotor control centres  
Subcortical control of movement |
| Week 7 | Oct 26, 28 | Neural Control of Posture & Locomotion |
| Week 8 | Nov 2, 4 | Upper-Limb Sensorimotor Control  
The Cortex – Movement Controller |
| Week 9 | Nov 9, 11 | Disordered Motor Control Case Studies  
Tentative: Guest Speaker, Dr. Alison Schinkel-Ivy, Evaluating and training balance control post-stroke |
Week 10  Nov 16, 18  Disordered Motor Control Case Studies  
Tentative: Guest Speaker, Dr. George Mochizuki: Upper-limb spasticity post-stroke

MAKE UP  NOV 21  NO CLASS – content to review at home & work on assignment

Week 11  Nov 23, 25  Neuroplasticity, Motor Learning & Rehabilitation

Week 12  Nov 30, Dec 2  Assignment Presentations  
Course Review

EVALUATION

Overall Evaluation:
Midterm test 30% (Oct 21 – in class)
Guest Speaker assignments 10% (details below, due 1 week following presentation)
Major assignment 20% (details below, due November 27)
Final exam 40% (scheduled during final exam period)

***LATE PAPERS WILL BE PENALIZED 1/3 PER DAY (I.E. 3 DAYS LATE YOU WILL RECEIVE A 0)***

Midterm Test:
The test will be written in class on Wednesday, October 21, 2014. The format will be a combination of multiple choice, short answer, diagram/graph and long answer questions that will cover content from the start of the course. The value of the test will be 30% of the course grade.

Guest Speaker Assignments:
Cross-disciplinary experts have been invited to present their research and discuss a topic relevant to neuromuscular integration. To prepare, students will be assigned readings (2 or 3 papers).

For EACH Presentation (Handed in at start of class on presentation day):
Students will submit a short (2-3 paragraph, 1 page MAX) summary of the assigned readings and 2 questions that you would like to see answered during the presentation, or that you would ask if not covered in the presentation.

For ONE Presentation (Due one week following presentation by 6:30PM, electronic submission):

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For ONE Presentation (Due one week following presentation by 6:30PM, electronic submission):

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Following ONE presentation (students pick which one), students will be asked to reflect on the presentation and submit a short, essay-style response. Details of the specific presentation topics and format for assignment will be provided in class.

The value of these assignments together will be 10% of the course grade; the bulk of the grade comes from the essay-style response. The specific marking breakdown will be discussed in class.

**Major Assignment:**
The paper will be due on Friday November 27 by 5 pm (electronic submission). The paper will either be: (1) A review of an alternative or new treatment for a specific motor control disorder; or, (2) A proposed study focused on a research question related to human neuromuscular control that you feel needs research. The details of the specific topic and the format of the paper will be provided in class. TOPICS MUST BE APPROVED BY INSTRUCTOR. In addition, during the last 2 classes (Nov 30, Dec 2), students will provide a brief, informal oral presentation of their papers to the class. This will be approximately 3 minutes long (PowerPoint slides are not permitted) and simply be an opportunity to provide an overview of your paper topic. Specific details will be provided in class.

**Final Exam:**
The final exam will occur during the final exam period and therefore, the date, time, and location will be scheduled by the University. The format will be a combination of multiple choice, short answer, and diagram/graph style questions that will cover all lecture material, with the majority coming from week 6 (after the first midterm) until the end of class. The value of the exam will be 40% of the course grade.

**A note about Technology in the Classroom**
As a student in this course, you are expected to commit to active learning and participation throughout the term. Please keep in mind that technology use in the classroom can be disruptive. In fact, a recent study found that students who multitasked (e.g., surfed non-course related websites on a computer) during lectures took poorer lecture notes and performed 11% worse on a related test. Further, those students who were in the view of a multitasking peer scored 17% lower on a related test compared to students who were NOT in view of a multitasking peer (Sana et al., 2013).


**Academic Integrity, Grievance, Discipline, Appeals, Note for Students with Disabilities and Turnitin:**

**Academic integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]
Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com and alternatives: Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This verifies that use of all material and sources in assignments are documented. Details will be provided about the arrangements for the use of Turnitin and alternatives in this course.

Note: Students will be given reasonable option if they do not want to have their assignment screened by Turnitin. See Academic Integrity - Guidelines for Instructors for more information.