



HK*3100 Neuromuscular Physiology - DRAFT

Winter 2020

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.50

Version 1.00 - November 13, 2019

1 Course Details

1.1 Calendar Description

Normal muscle movement is controlled by the motor cortex or by reflexes within the context of the sensory environment. This course will introduce key concepts in motor control of mammalian, human movement, coordination of movement, motor program selection, motor program execution, motor unit recruitment, skeletal muscle excitation-contraction coupling. This course is required for students wishing to gain certification by the Ontario Kinesiology Association.

Pre-Requisites:

1 of BIOM*3200, HK*3810, ZOO*3600

Restrictions:

Restricted to B.Sc., Major in Human Kinetics or Neuroscience Minor.

1.2 Course Description

This course presents key concepts about the control and coordination of human movement through an examination of neurophysiological and functional neuroanatomical processes.

1.3 Timetable

Lecture: Monday, Wednesday, Friday 11:30-12:20 ROZH 103

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor:

Dr. Leah Bent

Email: lbent@uoguelph.ca
Office: ANNU 331
Office Hours: TBC

2.2 Teaching Assistants

Teaching Assistant: Tushar Sharma
Email: tushar@uoguelph.ca
Office Hours: By email appointment

Teaching Assistant: Michael Apollinaro
Email: mapollin@uoguelph.ca
Office Hours: By email appointment

3 Learning Resources

3.1 Required Resources

HK*3100 Course Package (Other)

- Available in the Guelph Book Store
 - This package is a collection of selected chapters from Kandel: Principles of Neural Science [4th edition] and Enoka: Neuromechanics of Human Movement [3rd edition].
 - The readings complement the material presented in class, and should be the first place to go for clarification of course concepts.
 - Please note that some lecture material will not be covered in the readings and the readings may go into the details not covered in lecture.
 - Additional mandatory readings will be posted on CourseLink throughout the semester.
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4 Learning Outcomes

Neuromuscular physiology is a broad scientific discipline, which includes many topics and sub-topics. It is impossible to cover them all in detail in a brief, twelve-week course. The goal of this course is to introduce foundational concepts in this field while providing an opportunity for deeper exploration/discussion on specific topics of interest.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Develop an appreciation of the current scientific understanding in the field of

- neuromuscular physiology and some of the questions which remain unanswered
2. Be able to integrate knowledge from different research areas to evaluate neuromuscular concepts
 3. Have increased scientific literacy; strengthened through critical evaluation of the strengths and weaknesses of primary research in the field of neuromuscular physiology
 4. Become a more proficient scientific writer (with a focus on using clear, concise, scientific language)
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5 Teaching and Learning Activities

This course employs a learner-centered approach to facilitate a deep understanding of the many aspects of human neuromuscular physiology. Independent learning along with group discussions are important features of this course. Course material is presented in lecture and complemented with assigned journal articles and supplementary course package readings. To encourage lecture attendance and peer-collaboration, incomplete lecture slides will be provided on CourseLink prior to each lecture. The discussion board will be a key source of peer, TA and instructor support. Independent learning will be assessed through a literature critique assignment, which provides an opportunity for you to critically assess primary literature in the neuromuscular field. The midterm and final exam will test your understanding of the lecture material and assigned readings through both topic specific and integrative questions.

5.1 Course Topics

- MUSCLE AND MOTOR UNITS
Structure, function, recruitment, fatigue
- SOMATOSENSORY RECEPTORS
Muscle spindle, golgi tendon organ, skin (cutaneous) receptors, joint receptors
Kinesthesia, proprioception
- SPINAL CORD NEUROPHYSIOLOGY
Spinal reflex loops
Stretch reflexes, long loop reflexes, influences within the spinal cord
Central pattern generators
- POSTURE, BALANCE AND LOCOMOTION
The vestibular system
Motor & postural control strategies
Where does sensory input fit in?
- HIGHER LEVEL CONTROL

Motor cortex and sensory cortex
 The cerebellum
 The basal ganglia
 Cortical pathways

5.2 Courselink Discussion Board

- **Topic Summary:** At the end of each lecture topic (highlighted above) you will be encouraged in lecture to independently reflect upon: i) key concepts you learned ii) concepts that need more clarification and iii) areas that you want to learn more about and to post them on the discussion board. TAs and the instructor will monitor and respond to these points clarifying areas of confusion. Common areas will form the basis of future review lectures.
- **Exam Question Brainstorm:** A great way to learn is to think like a teacher! A discussion thread will be created for you to come up with, and provide answers to your own exam questions. You will have access to other students' questions/answers and are encouraged to provide your own thoughts. 5% of the midterm and final exam marks will be taken from questions presented on the discussion board (pending adequate participation).

6 Assessments

6.1 Assessment Details

Journal Article Quiz 1 (2.5%)

Due: Fri, Jan 24, 11:59 PM, Complete on Courselink

- These quizzes are designed to evaluate your comprehension of the assigned journal article.
- The quizzes will consist of 5 multiple-choice questions randomly chosen from a list of 10 to 15.
- The quizzes will be up on CourseLink for a week and once you have begun, it will only remain open for 60 minutes to complete.
- It is expected that you read the article before attempting the quiz and answers to the questions will be taken up in class on January 23rd and Feb 27th (TBC in class as we move through the material).

- Quizzes address learning objectives 1-3

Journal Article Quiz 2 (2.5%)

Due: Fri, Feb 28, 11:59 PM, Complete on Courselink

- These quizzes are designed to evaluate your comprehension of the assigned journal article.
- The quizzes will consist of 5 multiple-choice questions randomly chosen from a list of 10 to 15.
- The quizzes will be up on CourseLink for a week and once you have begun, it will only remain open for 60 minutes to complete.
- It is expected that you read the article before attempting the quiz and answers to the questions will be taken up in class on January 23rd and Feb 27th (TBC in class as we move through the material).
- Quizzes address learning objectives 1-3

Journal Article Summary for Review (5%)

Date: Two weeks before final paper is due

A written overview of the journal article that was chosen. The summary should be 300 words and should highlight the methodology of the paper as well as the main take home points of the work. The summary is different from the abstract and will focus on the significance of the work. This exercise to ensure that each student is comfortable with the information in their chosen article before setting out to write the review

Journal Article Review (20%)

Due: Either Feb 28th OR March 20th (depending on article chosen), In Class AND online

- Due: electronic copy online AND hard copy in class
- This deadline is the absolute latest this item will be accepted without penalty.
- If handed in late a 10% penalty applies per day.
I encourage you to try and submit early.
- This assignment provides you an opportunity to 1) read and evaluate primary literature in the neuroscience field as well as 2) gain experience in scientific writing. You will select from four journal articles provided during the first week of class. Three are designated topics from the first half of the course, as their topics will be discussed in lecture before the midterm, while the other three are designated for the latter half.
- There will be an equal number of students critiquing each article so you may not get your first choice. They are distributed as a first come-first serve basis.

- To choose an article you must sign onto CourseLink and select the article that you prefer. Once the max number of students has chosen a specific article, it will no longer be available for selection.
- The critique will be a maximum of five double spaced pages and must include a minimum of five additional primary references. You are given 9 weeks to complete the assignment. **DO NOT LEAVE THIS ASSIGNMENT TO THE WEEK BEFORE IT IS DUE!!** It requires thorough planning and extensive research of the scientific field.
 - This assignment is designed to be flexible, providing room for you, the author, to structure the critique as you see fit. However; within this flexibility there are formatting guidelines, which need to be followed. Within these guidelines you are encouraged to be creative exploring the literature and have fun working on this assignment. There is a detailed description of the Journal Article Critique assignment including guidelines and a marking rubric provided on CourseLink.
 - The written critique address learning objectives 1-4

Midterm Exam (30%)

Date: Thu, Feb 14, 5:30 PM - , 6:50 PM

- The midterm addresses learning objective 1-3

Final Exam (40%)

Date: TBA, TBA

- The final exam addresses learning objective 1-3

7 Course Statements

7.1 When you find yourself unable to meet an in-course requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing/e-mail, with your name, student ID# and e-mail contact. Where possible, this should be done in advance of the missed work or event. See the undergraduate calendar for information on regulations and procedures for academic consideration.

7.2 Late Policy

The penalty for late submission of the Journal Article Critique is a reduction of 10% per day. The critique must be submitted on CourseLink by the start of class and a hard copy must also be handed in at the beginning of class on the date it is due. There will be no extension for the journal article quizzes as the answers to the questions will be discussed in lecture the following day.

7.3 Laptops

They are permitted but not recommended in lecture. Incomplete class slides will be provided on CourseLink prior to class and note taking will include both writing concepts as well as drawing diagrams and adding to figures. Many students find sitting behind laptops distracting so please be conscious of this if you choose to bring a laptop to lecture.

7.4 Communication

As per University regulations, all students are required to routinely check their uoguelph.ca email. This is the official route of communication between the University and its students. In addition, students are required to check CourseLink for further course specific communications.

7.5 Emailing

To encourage independent learning, emailing the lecturer or teaching assistants about concepts should be the last resort after reading lecture slides, primary literature and using the discussion board. If you do send an email, please DO NOT email the lecturer or teaching assistants the same questions individually, and allow at least 24 hours for a response.

7.6 Conduct in a Large Class

This is a large class but you are not a small part of it! It takes commitment from everyone to make our time together as valuable as possible. In order for you to get the most of the class please consider the following:

- All testable exam material comes from lectures. Complete lecture slides will not be provided.
- It is expected that you come to lecture prepared to learn and participate. This involves arriving on time and staying to the end, bringing the incomplete class notes and having reviewed the readings each week. Coming to class prepared will allow you and your classmates to get the most out of in class discussions.
- The due dates for the journal article critique are fixed. It is critical that these deadlines are met as extensions will only be granted in the most extreme situations. If a deadline cannot be met, you must inform the instructor in person or by email as soon as possible.
- It is expected that you help maintain a safe and positive environment for yourself and your classmates to learn. In lecture this means limiting distractions to the students around you (cell phones, laptops, talking, packing up early etc)

as well as treating your fellow classmates, the teaching assistants and instructor with respect at all times.

- If you have a problem with the course material or in the way it is being presented, it is expected that you respectfully bring up your concerns with the course instructor as soon as possible.
- Providing a challenging and supportive learning environment is a priority of this course and involves a team effort from all of us.

8 Department of Human Health and Nutritional Sciences Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work

through personal struggles that may be impacting their academic performance.

<https://www.uoguelph.ca/counselling/>

- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.selfregulationskills.ca/>

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community—faculty, staff, and students—to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>
