Western University
Faculty of Health Sciences
School of Kinesiology

KIN 4430F – Neuromuscular Physiology
Fall 2020

Instructor: Dr. Anita Christie **Office:** Arts & Humanities Bldg Rm 3G16 **Email:** achris95@uwo.ca **Phone:** 519/661-2111 x80984 **Office Hrs:** by appointment **Instructor:** Dr. Charles Rice **Office:** Health Sciences Bldg Rm 411D **Email:** crice@uwo.ca **Phone:** 519/661-2111 x81628 **Office Hrs:** by appointment **TAs:** Alex Paish: apaish5@uwo.ca Ena St. John: estjohn3@uwo.ca Tyler Vermeulen: tvermeu2@uwo.ca Alex Zero: azero@uwo.ca	**Lectures:** Tu 1:30pm - 3:30pm Th 1:30pm – 2:30pm **Instruction Mode:** Online Join by Zoom Meeting ID: 972 3016 4857 Passcode: neuro

NOTE: All course information including grades, assignment outlines, deadlines, etc. are available via OWL. Check the website regularly for course announcements.

Calendar Course Description (including prerequisites/anti-requisites):
This course will focus on the structure and function of skeletal muscle with a particular emphasis on muscle plasticity and the adaptive response to exercise.

Prerequisite(s): Kinesiology 2230A/B.
Extra Information: 3 lecture hours. Note: Priority to BSc(Hon) Kinesiology students.

You are responsible for ensuring that you have successfully completed all course pre-requisites, and that you have not taken an anti-requisite course.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

NOTE: If you wish to enroll in this course without the stated pre-requisite(s), you must obtain written approval from the course instructor. The approval should then be forwarded to your academic counsellor.

My Course Description
The focus is on the structure and function of the neuromuscular system with an emphasis adaptive responses to exercise, aging, and disease.

Learning Outcomes

Upon completion of this course, students will be able to:

1. Identify and understand concepts of basic skeletal muscle and spinal motor neuron architecture and physiology as they relate to voluntary movement in health, exercise training and some clinical situations.
2. Appreciate and critically evaluate the limitations in understanding of the function of various key processes, and their adaptability in response to exercise and disuse.
3. Explore and synthesize this information in a research context.
4. Develop skills in the written expression of ideas through analysis of research papers and exams.
5. Further develop abilities of critical reflection on ideas in scientific understanding relating to the above topics, and integration with other courses of the curriculum.

Course Format:
This course will be provided online, with synchronous learning sessions, meaning lectures will be held in real-time at the scheduled class time. It is strongly to your benefit to virtually attend these live sessions. Please see below for policies about online etiquette for this course.

All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

Required Course Material:

Any required readings will be posted on OWL.

There is no single text required for the course but selected textbooks are listed for background or review material and with sections directly related to the course lecture topics. For review and fundamental understanding of the main concepts discussed in the course refer to one, or more of the following textbooks available in the library or on-line:

a) McIntosh, B.R., Gardiner, P.F. and McComas, A.J. *Skeletal Muscle: Form and Function, 2nd ed*., Human Kinetics Publishers, Champaign, Ill., c2006. Chapts: 1-4, 9, 10, 12, 13, 15, 16-21, & 22.
b) Gardiner, P.F.*Neuromuscular Aspects of Physical Activity 1st or 2nd ed.* Human Kinetics Publishers, Champaign, Ill., c2001 or c2010
c) Kandel E., Schwartz J.H., Jessell T., Siegelbaum S.A., and Hudspeth, A.J. *Principles of Neural Science*, McGraw-Hill Companies, New York, NY, 2013.

PLEASE NOTE:
Lectures introduce a topic and give focus, and required assignments expand on some of the topics to appreciate current research directions. For the course and readings - understand concepts and not technical details

Course Evaluation:

Grade Source	Percentage of Course Grade
Quizzes	5%
Participation	5%
Term Assignment Proposal	5%
Term Assignment	20%
Mid-term Exam	30%
Cumulative Final Exam	35%
Total	**100%**

Quizzes (5%): Quizzes will be completed through Owl, with a time limit. They will be available from Friday-Tuesday on weeks when they are assigned. There will be **no make-up quizzes**.

Participation (5%): During most lectures, questions will be posed that students will respond to in discussion boards or through links provided on OWL. Questions requiring a submitted response will be clearly denoted. Responses must be posted prior to the subsequent lecture to be counted. Responses must be relevant to the questions posed but will not be marked for correctness. However, feedback may be provided. Students must answer 80% of questions posed for full participation credit. Fewer than 80% of questions answered will be graded as follows: 70-79%=4/5; 60-69%=3/5; 50-59%=2/5; 40-49%=1/5; <40%=0/5.

Term Assignment (25%): - Students will choose a topic related to skeletal muscle function or the neural control of skeletal muscle and write a brief comprehensive review of the topic. A minimum of 5 primary, peer-reviewed journal articles is required. A brief one-page typed (double-spaced) proposal including: the topic, key points to be addressed, and a list of the references to be used, is due **Thursday, October 10th at 1:30 pm** (beginning of class) – **5%**. The length of the comprehensive review will be 4-6 typed pages (double-spaced), excluding references, due **Thursday, November 21st at 1:30 pm** (beginning of class) – **20%**. No extensions without penalty - 10% deduction per day. Further details will be provided on OWL.

Written Exams (65%): 2 exams each designed to be 2 hours in duration. Examinations will be open-book, essay and/or short answer format and will be submitted on OWL. Exams will be available for at least 24 hours prior to the due date/time. **There will be no make-up mid-term exam.** If the mid-term is missed and appropriate documentation is provided, the grade will be redistributed to the final exam (i.e. the final exam will be worth 65%).

Midterm (30%) – due date: Tuesday October 20th

Cumulative Final (35%) – due date: scheduled by the registrar in the December exam schedule

Assignments are due as stated in the course syllabus and will not be accepted late, except under medical or other compassionate circumstances. Submitting a late assignment without appropriate documentation will result in a zero (0) grade. A missed mid-term examination, without appropriate documentation will result in a zero (0) grade. Acceptable reasons might include hospital stays, serious illness, family emergencies (like serious accidents, illness or death) or similar circumstances.

COURSE OVERVIEW

TOPIC	INSTRUCTOR
Introduction	Rice, Christie
Skeletal muscle – structure & function; and the motoneurone • introduction/review of muscle, structure/function, related factors in control of force and phenotypic determinants. • model of striated muscle • overview of motoneurone and action potential generation and propagation • neuromuscular transmission	Rice
Skeletal muscle and motoneurone disorders • ALS • Muscular Dystrophy • Myasthenia gravis	Christie
Neuromuscular transmission, and the motor unit (MU) • coordination of neural and muscular factors in the generation and control of muscle force • special properties and features of motor units – e.g. length/tension, force/velocity, power, potentiation • MU recruitment	Rice
Motor unit properties and adaptations • rate coding of motor units and adaptations	Rice
Motor unit control • Excitatory and inhibitory inputs • Cortical control • Reflex pathways	Christie
Neuromuscular adaptations • Fatigue • Exercise • Inactivity and aging	Rice, Christie
Central Disorders (time permitting) • E.g. Stroke, traumatic brain injury, cerebellar disorders, basal ganglia disorders	Christie
Review	Rice, Christie

***Note: Course Content:** Our plan is that the topics listed above will be covered, but it is possible that time will not permit all topics to be covered, or that other topics may be added or substituted.

IMPORTANT DATES

Date	Event
Thursday, September 10	**First Day of class**
Tuesday, September 22	**Quiz 1 due by 11:55pm**
Tuesday, September 29	**Quiz 2 due by 11:55pm**
Tuesday, October 6	**Quiz 3 due by 11:55pm**
Thursday, October 8	**Assignment Proposal due by 11:55pm**
Tuesday, October 20	**Midterm Exam due by 11:55pm**
November 2-6	**Fall Reading Week No Class**
Tuesday, November 17	**Quiz 4 due by 11:55pm**
Tuesday, November 24	**Quiz 5 due by 11:55pm**
Thursday, December 3	**Assignment due by 11:55pm**
Tuesday, December 8	**Last day of class**

Course/University Policies

1. **Statement on Use of Personal Response Systems ("Clickers")**
If Personal Response Systems ("Clickers") are used in the course, a reference to the Guidelines for their use (Guidelines are shown below). Instructors are to communicate clearly to students information on how clickers are used including: how the student's privacy will be protected, how clickers may be used by the instructor for data gathering and for evaluating the students, and why they cannot be used by anyone but the student (since the students involved in misuse of a clicker may be charged with a scholastic offence).

2. **Academic offences**: They are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

A) Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the

system. Use of the service is subject to the licensing agreement, currently between Western University and Turnitin.com http://www.turnitin.com

B) Computer marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

3. **Electronic Device Usage:**

During Exams - Unless you have medical accommodations that require you to do so, or explicit permission from the instructor of the course, you may not use any of the following electronic devices during ANY of the tests, quizzes, midterms, examinations, or other in-class evaluations: cellphones, smart phones, smart watches, smart glasses, audio players or recorders of any sort, video cameras, video games, DVD players, televisions, laptop/notebook/netbook computers, flashlights or laser pointers.

During Lectures and Tutorials: Although you are welcome to use a computer during lecture and tutorial periods, you are expected to use the computer for scholastic purposes only, and refrain from engaging in any activities that may distract other students from learning. Please be respectful to your fellow students and turn the sound off. If the professor receives complaints from other students regarding noise or other disruptive behavior (e.g. watching videos on YouTube.com, updating your Facebook status, playing Solitaire), your classroom privileges will be revoked. From time to time, your professor may ask the class to turn off all computers, to facilitate learning or discussion of the material presented in a particular class. **Unless explicitly noted otherwise, you may not make audio or video recordings of lectures – nor may you edit, re-use, distribute, or re-broadcast any of the material posted to the course website.**

4. **Health and Wellness:**
Information regarding health and wellness-related services available to students may be found at http://www.health.uwo.ca/.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/) for a complete list of options about how to obtain help.

5**. Support Services**
There are various support services around campus and these include, but are not limited to:
1. *Student Development Centre* -- *http://www.sdc.uwo.ca/ssd/*
2. *Student Health & Wellness* -- http://www.health.uwo.ca/
3. *Registrar's Office* -- *http://www.registrar.uwo.ca/*
4. *Ombudsperson Office* -- *http://www.uwo.ca/ombuds/*

6. **Accommodation, Illness Reporting and Academic Considerations**:
http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: Academic Accommodation for Students with Disabilities.

Academic Consideration for Student Absence
https://www.uwo.ca/fhs/kin/undergrad/academic/consideration/index.html

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For Western University policy on Consideration for Student Absence, see
Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs
and for the Student Medical Certificate (SMC), see:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar.

7. **Examination Conflicts**: A student with examinations having flexible submission times (e.g., where one or more examination is a take-home examination) cannot request alternative arrangements unless a conflict cannot be avoided by rescheduling writing the exam to a different time within the window specified by the instructor. This applies to direct conflicts as well as "heavy load" conflicts (e.g., three exams within a 23-hour period). The student should discuss any concerns about a potential conflict and/or request accommodation with their academic counselling unit prior to the deadline to drop a course without academic penalty

In the case of online examinations, an "Examination Conflict Room," which may be assigned when a student is scheduled to write two proctored exams concurrently, will be interpreted as arrangements for continuous proctoring.

8. **Grades**: Where possible assignment objectives and rubrics will be posted on OWL. Should you have a concern regarding the grade you received for an assignment or feel that it is unfair in any way, you must wait 24 hours from the receipt of the assignment to approach the instructor or TA. In doing so, please make an appointment and prepare in writing, with evidence, why you feel your grade is inappropriate. Please be aware that in requesting a grade reassessment, your grade could go up/down/or stay the same. Note that calculations errors (which do occur!) should be brought to my attention immediately.

Generally, students can expect some form of feedback on their performance in a course before the drop date.

- □ November 12th, 2020 (for first term half-courses)
- □ November 30th, 2020 (for full-year courses)
- □ March 7th, 2021 (for second term half-or full year courses)

A+	90-100	*One could scarcely expect better from a student at this level*
A	80-89	*Superior work that is clearly above average*
B	70-79	*Good work, meeting all requirements and eminently*
C	60-69	*Competent work, meeting requirements*
D	50-59	*Fair work, minimally acceptable.*
F	below 50	*Fail*

Rounding of Grades (for example, bumping a 79 to 80%):
This is a practice some students request. **This practice will not occur here.** The edges of this course are clear and sharp. The mark attained is the mark you achieved and the mark assigned; there is no rounding to the next grade level, or 'giving away' of marks. Please don't ask me to do this for you; the response will be "please review the course outline where this is presented".

9. **Contingency Plan for an In-Person Class Pivoting to 100% Online Learning:** In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor

10. **Online Etiquette**: Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please "arrive" to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- [suggested for classes larger than 30 students] In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- [suggested for cases where video is used] please be prepared to turn your video camera off at the instructor's request if the internet connection becomes unstable
- unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the "raise hand" function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of "netiquette":

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.

- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

11. **Online Learning Support**
If you require support with online learning tools and resources, please refer to the Faculty of Health Sciences Online Teaching and Learning Support Jira request links for students

12**. Student Code of Conduct**
The purpose of the Code of Student Conduct is to define the general standard of conduct expected of students registered at Western University, provide examples of behaviour that constitutes a breach of this standard of conduct, provide examples of sanctions that may be imposed and set out the disciplinary procedures that the University will follow. For more information, visit https://www.uwo.ca/univsec/pdf/board/code.pdf