

**KIN 4430F – Neuromuscular Physiology
Fall 2024**

Instructor: Dr. Anita Christie Office: Thames Hall 4183 Email: achris95@uwo.ca Phone: 519-661-2111 x80984 Office Hrs: By appointment Instructor: Dr. Charles Rice Office: Thames Hall 4145 Email: crice@uwo.ca Phone: 519-661-2111 x87072 Office Hrs: By appointment TAs: Alexander Zero (azero@uwo.ca) Alicia Kells (akelss@uwo.ca)	Lectures: Tu 1:30pm - 3:30pm Th 1:30pm – 2:30pm Instruction Mode: In-person: PAB 148
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NOTE: All course information including grades, assignment outlines, deadlines, etc. are available via [OWL Brightspace](#). Download the Brightspace Pulse App to stay up-to-date on course communication and enable your notification settings within “Communications” in the top toolbar. Check the website regularly for course announcements. If students need assistance with OWL Brightspace, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the [Western Technology Services Helpdesk](#) online or by phone at 519-661-3800 or ext. 83800 for technical support. Current versions of all popular browsers (e.g., Safari, Chrome, Edge, Firefox) are supported with OWL Brightspace; what is most important is that you update your browser frequently to ensure it is current. All JavaScript and cookies should be enabled.”

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.

Course Description

The focus is on the structure and function of the neuromuscular system with an emphasis on 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 in-person, with synchronous learning sessions, meaning lectures will be held in real-time at the scheduled class time. Lectures will not be recorded. 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. Chaps: 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 (best 4 of 5)	5%
Term Assignment Proposal	5%
Term Assignment	25%
Mid-term Exam	30%
Cumulative Final Exam	35%
Total	100%

Quizzes (5%): Quizzes will be completed through Owl, with a time limit. On weeks when they are assigned, quizzes will be available by Friday and will be due on Monday (see below for dates). The best 4 out of 5 quiz scores will count toward your final grade. There will be **no make-up quizzes**. If you miss a quiz, the score will be recorded as zero and, if it is your only zero, will be dropped from the final quiz score calculation.

Term Assignment (30%): - 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 by **Friday, October 25th at 11:55 pm – 5%**. The length of the comprehensive review will be 4-6 typed pages (double-spaced), excluding references, due by **Friday, November 29th at 11:55 pm – 25%**. No extensions without penalty - 10% deduction per day. Further details will be provided on OWL.

Written Exams (65%): 2 exams, each in-person and 2 hours in duration. Exams will be a combination of multiple choice and short answer questions. The mid-term will be held in class. There will be **no make-up exams**. If the mid-term is missed, with appropriate documentation, the mid-term grade will be re-weighted to the final exam. The final exam will be cumulative and the date and location will be scheduled by the registrar's office.

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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • ALS • Muscular Dystrophy • Myasthenia gravis 	Christie
Neuromuscular transmission, and the motor unit (MU) <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • rate coding of motor units and adaptations 	Rice
Motor unit control <ul style="list-style-type: none"> • Excitatory and inhibitory inputs • Cortical control • Reflex pathways 	Christie
Neuromuscular adaptations <ul style="list-style-type: none"> • Fatigue • Exercise • Inactivity and aging 	Rice, Christie
Central Disorders (time permitting) <ul style="list-style-type: none"> • 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 5	First day of class
Monday, September 16	Quiz 1 due by 11:55pm
Monday, September 23	Quiz 2 due by 11:55pm
Tuesday, October 1	Quiz 3 due by 11:55pm
Tuesday, October 8	Midterm Exam in class
October 14 - 18	Fall Reading Week No Class
Friday, October 25	Assignment Proposal due by 11:55pm
Monday, November 4	Quiz 4 due by 11:55pm
Monday, November 11	Quiz 5 due by 11:55pm
Friday, November 29	Assignment due by 11:55pm
Thursday, December 5	Last day of class

Course/University Policies

Support Services

There are various support services around campus and these include, but are not limited to:

1. Academic Support and Engagement - <http://academicsupport.uwo.ca>
2. Wellness and Well-being - <https://www.uwo.ca/health/>
3. Registrar's Office -- <http://www.registrar.uwo.ca/>
4. Ombuds Office -- <http://www.uwo.ca/ombuds/>

The websites for Registrarial Services (<http://www.registrar.uwo.ca>), and the same for affiliated university colleges when appropriate, and any appropriate Student Support Services (including the services provided by the USC listed here: <http://westernusc.ca/services/>) and the Student Development Services, should be provided for easy access.

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

Statement on Gender-Based and Sexual Violence

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

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>

Absence from Course Commitments

Students must familiarize themselves with the Policy on [Academic Consideration – Undergraduate Students in First Entry Programs](#)

Students missing course work for medical, compassionate, or extenuating circumstances can request academic consideration by completing a request at the central academic consideration portal. Students are permitted one academic consideration request per course per term **without** supporting documentation. Note that supporting documentation is **always** required for academic consideration requests for examinations scheduled by the office of the registrar (e.g., December and April exams) and for practical laboratory and performance tests (typically scheduled during the last week of the term).

Students should also note that the instructor may **designate** one assessment per course per term that requires supporting documentation. This designated assessment is described elsewhere in this document. Academic consideration requests may be denied when flexibility in assessment has already been included. Examples of flexibility in assessment include when there are assessments not required for calculation of the final grade (e.g. 8 out of 10 quizzes), when there is flexibility in the submission timeframe (e.g. 72 hour no late penalty period), or when timed assessments (e.g., quizzes) are available over an extended period of time (e.g., when you are given a 72 hour time period to start – and finish – the assessment).

Please note that any academic considerations granted in this course will be determined by the instructor of this course, in consultation with the academic advisors in your Faculty of Registration, in accordance with information presented in this course syllabus. Supporting documentation for academic considerations for absences due to illness should use the [Student Medical Certificate](#) or, where that is not possible, equivalent documentation by a health care practitioner.

Accommodation for Religious Holidays

Students should review the policy for [Accommodation for Religious Holidays](#). Where a student will be unable to write examinations and term tests due to a conflicting religious holiday, they should inform their instructors as soon as possible but not later than two weeks prior to writing the examination/term test. In the case of conflict with a midterm test, students should inform their instructor as soon as possible but not later than one week prior to the midterm.

Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examination dates. The Faculty of Health Sciences has set School-specific dates for these Special Examinations. Please speak with your instructor about the date on which the Special Examination for this course will be held.

Academic Offences

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Plagiarism

Student work is expected to be original. Plagiarism is a serious academic offence and could lead to a zero on the assignment in question, a zero in this course, or your expulsion from the university. You are plagiarizing if you insert a phrase, sentence or paragraph taken directly from another author without acknowledging that the work belongs to him/her. Similarly, you are plagiarizing if you paraphrase or summarize another author's ideas without acknowledging that the ideas belong to someone else. All 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 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 (www.turnitin.com).

Use of Artificial Intelligence for the Completion of Course Work

Within this course, you may only use artificial intelligence tools (e.g., "ChatGPT") in ways that are specifically authorized by the course instructor. All submitted work must reflect your own thoughts and independent written work.

Re-submission of Previously Graded Material

Without the explicit written permission of the instructor, you may not submit any academic work for which credit has been obtained previously, or for which credit is being sought, in another course or program of study in the University or elsewhere.

Use of Statistical Pattern Recognition on Multiple Choice Exams

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.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review [The policy on Accommodation for Students with Disabilities](#)

Correspondence Statement

The centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner. Students are further expected to attend to announcements presented through Brightspace, and to read emails generated in this way.

Use of Electronic Devices

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 electronic devices (e.g., cell phones, tablets, cameras, smart glass, smart watches, or iPods) during ANY tests, quizzes, midterms, examinations, or other in-class evaluations. **These devices MUST either be left at home or with your belongings at the front of the room. They MUST NOT be at your test/exam desk or in your pocket. Any student found with a prohibited device will receive an automatic grade of zero on the test or exam.**

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. 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.

Copyright and Audio/Video Recording Statement

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. 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.

Contingency Plan for an In-Person Class Pivoting to 100% Online Learning

In the event of a situation that requires this course to pivot to online content delivery, 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 Brightspace 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

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.

Online Proctoring

Tests and examinations in this course may be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>.

Grades

Where possible assignment objectives and rubrics will be posted on OWL.

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

- November 12th, 2024 (for first term half-courses)
- December 2nd, 2024 (for full-year courses)
- March 7th, 2025 (for second term half-or full year courses)

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

Rounding of Grades (for example, bumping a 79 to 80%):

This is a practice some students request. The final grade documented is the grade that you have achieved. 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".

Appealing a Grade Within this Course

You have the right to appeal any grade within this course. The grounds for a grade appeal may be one or more of: medical or compassionate circumstances, extenuating circumstances beyond the student's control, bias, inaccuracy, or unfairness. All grounds advanced in a request for relief must be supported by a clear and detailed explanation of the reasons for the request together with all supporting documentation.

Appeals generally proceed in this order:

1. Course instructor (informal consultation)
2. Department Chair (submission of written request)
3. The Dean of the Faculty (submission of written request)

In the case of perceived procedural unfairness, steps 2 and 3 are carried out within the Department and Faculty offering the course. In the case of extenuating medical or compassionate circumstances that impact on a grade, steps 2 and 3 are carried out within a student's Home Department and Faculty.

A request for relief against a mark or grade must be initiated with the instructor as soon as possible after the mark is issued. In the event that the instructor is not available to the student, or fails to act, or if the matter is not resolved satisfactorily with the instructor, a written request for relief must be submitted to the Chair of the Department within three weeks of the date that the mark was issued. In the case of a final grade in a course, the written request for relief must be submitted to the Chair of the department by January 31st (for first-term half courses) or June 30th (for second-term half courses or full-year courses).