

MCMASTER UNIVERSITY
Department of Kinesiology

Kinesiology 2C03 - Neuromuscular Exercise Physiology

Winter Term, 2018

Instructor: Dr. Audrey Hicks

Office: IWC 204

Telephone: x24643

E-mail : hicksal@mcmaster.ca

Office Hours: Wednesdays 2:00 – 4:00pm

DESCRIPTION

This course is designed to provide students with an understanding of neuromuscular physiology as it applies to exercise. After a comprehensive review of the physiology of muscle contraction, force generation and neural control, the acute adjustments to exercise and adaptations that occur in response to physical training will be covered. The course builds upon the foundation of knowledge gained through the KINESIOL 1A03 and 1AA3 (Anatomy and Physiology) courses, and students will be expected to be familiar with fundamental concepts previously introduced during their first year of study.

OBJECTIVES

- to broaden your knowledge and understanding of skeletal muscle physiology and motor control
- to understand neuromuscular physiology as it applies to exercise and sport contexts
- to provide laboratory experiences that reinforce the theoretical knowledge gained in the classroom and apply it to specific movement experiences and muscular demands

REQUIRED RESOURCES

There is no specific textbook for the course; however, a courseware pack called the 2C03 Handbook is available for purchase that contains representations of most of the PowerPoint slides that will be presented during lectures. Students are encouraged to bring the coursepack to each lecture and to make notes within the coursepack. If students require additional reference material in the form of a traditional textbook, the course instructor may offer suggestions for supplementary resources.

As indicated above, it is expected that students will enter the course with a solid fundamental understanding of basic anatomy and physiology, i.e., to a level developed following the introductory course KINESIOL 1A3/1AA3 (Anatomy and Physiology). In this regard, students may

find it useful to refer back to their introductory anatomy and physiology textbook in order to review fundamental concepts previously introduced.

Digital Learning Resources:

This course will incorporate regular i-Clicker tests, so each student is expected to have an i-Clicker (must be registered to this course using your macid).

TOPIC OUTLINE

TOPIC: MUSCLE PHYSIOLOGY

- Muscle structure and contractile mechanism
- Excitation-contraction coupling
- Twitch, summation, and tetanus
- Contraction types
- Force- and power-velocity relations
- Stretch-shortening cycle
- Force-length relation
- Strength curves

TOPIC: NEURAL CONTROL OF MUSCLE CONTRACTION

- Motor units
- Motor unit types
- Gradation of contraction
- Motor unit activation in exercise

TOPIC: NEUROMUSCULAR FATIGUE

- Definition of fatigue
- Exercise intensity and time to fatigue failure
- Sites and causes of fatigue
- Factors affecting fatigability

TOPIC: STRENGTH, POWER, AND SPEED PERFORMANCE

- Measurement of strength
- Strength and power
- Strength and speed
- Strength and endurance
- Factors affecting strength performance

TOPIC: EXERCISE-INDUCED MUSCLE DAMAGE AND SORENESS

- Description and mechanisms
- Features associated with muscle damage
- Factors affecting the extent of muscle damage
- Adaptation to muscle damage

LABORATORY COMPONENT

1. Purpose

Laboratory exercises serve to (1) reinforce concepts presented in lectures and readings, and (2) provide the opportunity to apply this knowledge in a laboratory setting. There will be opportunities for all students to actively participate in every lab. There will be four labs during the course, spaced approximately 2-3 weeks apart. Specific lab dates will be announced during the first week of classes and will be listed on the front page of your 2C03 Handbook.

2. Lab Manuals

The *2C03 Handbook* contains the laboratory outlines and assignments, and the front page of the Handbook lists the weeks in which the 4 labs will take place.

3. Lab Sections

You have been scheduled into a lab section as designated on your timetable. If you have not been given a lab slot or if a conflict arises for academic reasons (e.g., a course is rescheduled), you will have the opportunity during the first week of classes to transfer into a different lab section. Note that potential transfers depend on space availability. Lab changes will be permitted **ONLY** for academic reasons (e.g., an altered timetable at the start of the second term). In this case, you **MUST** obtain written permission/confirmation (in the form of an e-mail message) from both the lab instructor for the lab you are vacating and the lab instructor for the lab you are joining.

4. Lab Attendance

Attendance to the scheduled labs and participation in the laboratory exercises are mandatory. If you are unable to attend a lab for a legitimate reason, it is up to you **to contact your lab TA and make arrangements to attend a different lab in that week**. If you are sick the entire week that the lab is taking place, you must follow the procedure of submitting an MSAF to notify me (and your TA) of your absence. In cases of submitting an MSAF for a missed lab, the 2.5% weighting of the lab will be added to the weighting of your first 2 midterms (1.25% to each exam).

5. Lab Submission Procedure

- Lab reports are considered **individual assignments** and thus normal University policies regarding academic honesty will apply.
- The report for a particular lab should be handed in to your lab instructor at the beginning of your next scheduled lab session.
- Lab reports **MUST** be typed and the pages **MUST** be stapled together; labs held together with a paper clip or folded page corners will **NOT** be accepted. Graphs are to be created using graphics software (e.g., using Microsoft Excel); hand-drawn graphs are not acceptable. Each lab report **MUST** include a separate cover page that lists student name, ID number, lab number, name of lab instructor, and lab time slot.

- Failure to hand in your lab at your next lab session will result in a mark of ZERO being assigned for that report, unless there is a legitimate reason (see below). In legitimate cases where the lab report cannot be handed in on the correct day (e.g. an MSAF has been submitted due to illness), the report will be due to your TA on the first day back from your illness. A **late penalty of 1 mark/day** will be applied for submissions after this time.
- DO NOT submit labs to the course instructor or attempt to slide them under office doors or into mailboxes. All lab reports MUST be submitted in person directly to your lab instructor during your assigned lab session. The submission procedure for the final lab will be outlined by your lab instructor.

EVALUATION

The following system shall be used to determine the student's final grade. Note that changes to the grading scheme are NOT permitted under any circumstances.

Midterm #1:	25% (Wednesday, January 31)
Midterm #2:	25% (Wednesday, Mar 7)
Final exam:	35%
Laboratory reports:	10%
Clicker tests (weekly):	5%
 TOTAL:	 100%

The midterm tests, scheduled by the instructor and written during a regular 50-min lecture slot, will consist of 25 multiple-choice questions. The final exam, scheduled by the Registrar's Office, will consist of 50 multiple-choice questions, and will cover material **from the entire term, although greater weighting will be on material covered after the 2nd midterm**. Some sample exam questions are provided in the 2C03 Handbook.

i-Clicker evaluation: Weekly i-clicker tests will be held at the end of Friday's class. It is expected that 40-45 questions will be delivered over the course of the term. Evaluation will be based on the following:

80-100% questions correct	= 5%
65-79% questions correct	= 4%
50-64% questions correct	= 3%
35-49% questions correct	= 2%
20-34% questions correct	= 1%
<20% questions correct	= 0%

****No accommodations will be provided for missing the weekly i-clicker tests.**

POLICY REGARDING DEFERRED TESTS AND EXAMS

Students who miss the term tests for legitimate reasons such as illness may be allowed to write a deferred or "make-up" test. **Note: the format is different from the regularly scheduled test/exam and usually requires written responses to short-answer or essay-type questions.** For the 2018 winter term, the make-up midterms will be written on **Monday, April 2 (time tbd)**. It is up to the student to contact the Instructor regarding being given permission to write a deferred midterm (permission is dependent upon proper procedures being followed with regard to missing the scheduled test). Since the midterm is worth 25%, you cannot submit an MSAF without first reporting to the Associate Dean's office (with documentation). Details on these regulations can be found at:

http://academiccalendars.romcmaster.ca/content.php?catoid=13&navoid=2208#Requests_for_Relief_for_Missed_Academic_Term_Work

Students may not use the MSAF to report missing the Registrar-scheduled final exam. If the scheduled final exam is missed, students can apply to the Associate Dean's office, Faculty of Science for permission to write in the deferred final exam schedule. **Under no circumstances will the instructor re-schedule a final exam for individual students.**

ACADEMIC INTEGRITY

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences (e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript reading "Grade of F assigned for academic dishonesty", and/or suspension or expulsion from the university). It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at: <http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf>

The following illustrates only three forms of academic dishonesty:

- Plagiarism (e.g. the submission of work that is not one's own or for which other credit has been obtained),
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone (905-525-9140, ext. 28652) or e-mail(sas@mcmaster.ca). For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities.

ON-LINE LEARNING RESOURCES

Students should be aware that, when they access the electronic components of this course (e.g. through Avenue), private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

MODIFICATIONS TO COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

FEEDBACK

It really helps us improve our services when we hear from our students, faculty and staff about what we can do better. A feedback process brings to our attention situations in which we may not have adequately considered accessibility and allows us to better plan for accessibility in the future.