



Land Acknowledgement

We respectfully acknowledge the Syilx Okanagan Nation and their peoples, in whose traditional, ancestral, unceded territory UBC Okanagan is situated.

HES 486: Muscle Fatigue

Instructor: Chris McNeil

Instructor Email: chris.mcneil@ubc.ca

Duration: Term 1 Winter 2024

Delivery Modality: In-Person

Course Location: ART 204

Course Days: Mon/Wed

Class Hours: 2:00 PM - 3:30 PM

Office hours: Appointments can be arranged by email (chris.mcneil@ubc.ca)

Course Description

Physiological mechanisms within the central nervous system and muscle fibres which contribute to muscle fatigue. The influence of various factors (e.g., sex, age, disease) on muscle fatigue. Formerly offered as HMKN 415. Credit will be granted for only one of HES 486 or HMKN 415 [3-0-0]

Prerequisites: Either (a) HES 240 or (b) HMKN 206; and either (a) HES 305 or (b) HMKN 310; and either (a) HES 321 or (b) HMKN 315; and either (a) HES 340 or (b) HMKN 205.

Course Format

This is a lecture-based course that has some lectures replaced by lab-based experiments to: i) explore firsthand the concepts discussed during lectures; and ii) collect data for lab reports.

Course Overview, Content, and Objectives

Muscle fatigue produced by physical activity is a common experience for healthy young people, and is magnified in many populations (e.g., patients with cancer, heart failure or chronic lung disease, stroke survivors, and the elderly) such that the performance of daily tasks can be limited. For this reason, there is considerable value in improving our understanding of its mechanisms. Hence, from a content perspective, the main objective of this course is to examine the elements of the neuromuscular system that contribute to fatigue-related impairments of motor function.

Beyond the scope of the specific content, the other primary objective of the course is to improve your ability to communicate concisely in written and oral formats. Regardless of your future career, you are likely to encounter situations when you have a limited number of words or amount of time to present information to peers, colleagues, or some other audience. As such, with detailed instruction and feedback, you will be given multiple opportunities to try the same task in order to build on your experiences and enhance critical communication skills.

Learning Outcomes

Upon successful completion of this course, students will be able to...

- 1) Explain mechanisms at the level of the brain, spinal cord and muscle fibres that contribute to the loss of force or power, and evaluate how the task performed influences the extent to which a mechanism contributes
- 2) Interpret neuromuscular data to determine the underlying physiological mechanisms
- 3) Differentiate between important and unimportant experimental details, and convey the relevant information clearly and concisely in a written format
- 4) Survey published literature, and, based on knowledge acquired during the course, develop a simple research proposal to study fatigue in a clinical population, the relevance of which can be clearly and concisely conveyed via a written document and during brief oral presentations
- 5) Communicate effectively in group discussions as well as collaborate both productively and respectfully with others to complete shared tasks

Learning Materials

The course does not have a textbook; however, there will be some assigned readings posted to Canvas.

Assessments of Learning

- Mid-term Exam (LO1, LO2) – October 9 20%
- Lab Report 1 (LO2, LO3) – October 16 10%
- Lab Report 2 (LO2, LO3) – November 6 15%
- Research Proposal (LO1, LO4, LO5) 30%
 - 3-min presentation – November 4
 - 10-min presentation – November 27 or December 2
 - Written proposal – December 4
- Final exam (LO1, LO2) – sometime between December 9-20: 25%

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All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the Course Instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline.

Tentative Course Schedule and Learning Outcomes

Date	Topic and/or Assessments	Learning Outcomes
Wed, Sept 4	Course syllabus; introduction to fatigue	LO1
Mon, Sept 9	Central fatigue 1	LO1, LO2, LO5
Wed, Sept 11	Central fatigue 2	LO1, LO2, LO5
Mon, Sept 16	Central fatigue 3	LO1, LO2, LO5
Wed, Sept 18	Central fatigue 4; prep for lab 1	LO1, LO2, LO5
Mon, Sept 23	Lab 1 (group A) – meet in ART 120 at designated time	LO2, LO3, LO5
Wed, Sept 25	Lab 1 (group B) – meet in ART 120 at designated time	LO2, LO3, LO5
Mon, Sept 30	National Day for Truth and Reconciliation – no class	
Wed, Oct 2	Lab results; discussion of lab report and research proposal	LO1, LO2, LO3, LO5
Mon, Oct 7	Review for midterm	LO1, LO2
Wed, Oct 9	Midterm exam	LO1, LO2
Mon, Oct 14	Thanksgiving – no class	
Wed, Oct 16	Peripheral fatigue 1; lab report 1 due	LO1, LO2, LO5
Mon, Oct 21	Peripheral fatigue 2	LO1, LO2, LO5
Wed, Oct 23	Lab 2 (group B) – meet in ART 120 at designated time	LO2, LO3, LO5
Mon, Oct 28	Lab 2 (group A) – meet in ART 120 at designated time	LO2, LO3, LO5
Wed, Oct 30	Peripheral fatigue 3; lab results	LO1, LO2, LO3, LO5
Mon, Nov 4	Peripheral fatigue wrap-up; proposal presentations (3min)	LO1, LO2, LO4, LO5
Wed, Nov 6	Sex-based differences and fatigue; lab report 2 due	LO1, LO2, LO5
Mon, Nov 11	Reading Week – no class	
Wed, Nov 13	Reading Week – no class	
Mon, Nov 18	Age-based differences and fatigue	LO1, LO2, LO5
Wed, Nov 20	COPD and fatigue	LO1, LO2, LO5
Mon, Nov 25	Hypoxia and fatigue	LO1, LO2, LO5
Wed, Nov 27	Final (10-min) proposal presentations	LO4, LO5
Mon, Dec 2	Final (10-min) proposal presentations	LO4, LO5
Wed, Dec 4	Review for final exam; written proposal due	LO1, LO2, LO4, LO5

Other Course Policies:

Late Policy

See "HES UGC Policies" document on Canvas

Missed Exam Policy

See "HES UGC Policies" document on Canvas

Missed Activity Policy

See "HES UGC Policies" document on Canvas

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating usually result in a failing grade or mark of zero on the assignment or in the course. Careful records are kept to monitor and prevent recidivism.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar.

Final Examinations

You can find the [Senate-approved term and examination dates here](#). Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 27-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are representing the University, the province, or the country in a competition or performance; serving in the Canadian military; observing a religious rite; working to support themselves or their family; or caring for a family member. Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.

Further information on Academic Concession can be found under Policies and Regulation in the [Okanagan Academic Calendar](#).

Grading Practices

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.

Further information on Grading Practices can be found in the [Okanagan Academic Calendar](#).

Student Service Resources:

Disability Resource Centre

The Disability Resource Centre (DRC) facilitates disability-related accommodations and programming initiatives to that ameliorate barriers for students with disabilities and/or ongoing medical conditions. If you require academic accommodations to achieve the objectives of a course please contact the DRC at:

UNC 215 250.807.8053

Email: drc.questions@ubc.ca

Web: www.students.ok.ubc.ca/drc

Equity and Inclusion Office

Through leadership, vision, and collaborative action, the Equity & Inclusion Office (EIO) develops action strategies in support of efforts to embed equity and inclusion in the daily operations across the campus. The EIO provides education and training from cultivating respectful, inclusive spaces and communities to understanding unconscious/implicit bias and its operation within in campus environments. UBC Policy 3 prohibits discrimination and harassment on the basis of BC's Human Rights Code. If you require assistance related to an issue of equity, educational programs, discrimination or harassment please contact the EIO.

UNC 325H 250.807.9291

Email: equity.ubco@ubc.ca

Web: www.equity.ok.ubc.ca

Office of the Ombudperson

The Office of the Ombudperson for Students is an independent, confidential and impartial resource to ensure students are treated fairly. The Ombuds Office helps students navigate campus-related fairness concerns. They work with UBC community members individually and at the systemic level to ensure students are treated fairly and can learn, work and live in a fair, equitable and respectful environment. Ombuds helps students gain clarity on UBC policies and procedures, explore options, identify next steps, recommend resources, plan strategies and receive objective feedback to promote constructive problem solving. If you require assistance, please feel free to reach out for more information or to arrange an appointment.

UNC 328 250.807.9818

Email: ombuds.office.ok@ubc.ca

Web: www.ombudsoffice.ubc.ca

Student Learning Hub

The Student Learning Hub is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with academic integrity, study skills and learning strategies**. Students are encouraged to visit often and early to build the skills, strategies and behaviors that are essential to being a confident and independent learner. For more information, please visit the Hub's website.

LIB 237 250.807.8491

Email: learning.hub@ubc.ca

Web: www.students.ok.ubc.ca/slh

Sexual Violence Prevention and Response Office (SVPRO)

The Sexual Violence Prevention and Response Office (SVPRO) is a confidential place for those who have been impacted by any form of sexual or gender-based violence, harassment, or harm, regardless of where or when it took place. SVPRO aims to be a safer space for all UBC students, faculty, and staff by respecting each person's unique and multiple identities and experiences. All genders and sexualities are welcome.

Nicola Townhome 120, 1270 International Mews 250.807.8053

Email: svpro@okanagan@ubc.ca

Web: www.svpro.ok.ubc.ca

Wellbeing and Accessibility Services (WAS)

Wellbeing and Accessibility Services (WAS) supports holistic student wellbeing in body, mind, and spirit. Students can access nurses, physicians and counsellors for health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. WAS is also home to the Disability Resource Centre, Spiritual and Multi-Faith Services, and Campus Health and Education. If you require assistance with your health, please contact Wellbeing and Accessibility Services for more information or to book an appointment.

UNC 337 250.807.9270

Email: healthwellness.okanagan@ubc.ca

Web: www.students.ok.ubc.ca/was

Walk-In Well-Being Clinic

The Walk-In Well-Being clinic offers no-fee, brief, single-session psychological services. Sessions are led by a doctoral student in clinical psychology and supervised by a registered psychologist (UBCO Faculty member). Clinicians can provide support with stress management, sleep, self-care, depression, anxiety, interpersonal issues, substance misuse, coping with academic demands/stressors, and provide options for connecting to additional resources. Virtual or in-person sessions are available at the UBCO Psychology Clinic, located in ASC 167 with or without an appointment, on Tuesdays and Thursdays between 10 am and 3 pm from September to June, excluding campus closures.

UNC 337 250.807.8421 (ext. 1)

Email: ipc.ok@ubc.ca

Web: <https://psych.ok.ubc.ca/psychology-clinic/walk-in-wellness/>

Safewalk

Don't want to walk alone at night? Not too sure how to get somewhere on campus? Call Safewalk at **250-807-8076**.

Web: www.security.ok.ubc.ca