



**HES 321 – Laboratory Techniques in Exercise Science**  
**School of Health and Exercise Sciences**  
**Winter Term 2, January to April 2025**

**Land Acknowledgement**

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

**Instructor Information**

January 6 – February 14

*Instructor:* Scott Thrall

*Email:* [s.thrall@ubc.ca](mailto:s.thrall@ubc.ca)

*Office:* ART 127

*Office hours:* **By appointment (i.e., send an email and we'll arrange a time to meet)**

February 24 – April 8

Dr. Chris McNeil

[chris.mcneil@ubc.ca](mailto:chris.mcneil@ubc.ca)

ART 133

**\*\*Please do not use Canvas to contact your instructors because we are not notified of new messages, which means your message could sit for days before it is noticed\*\***

**Other Instructional Staff (Teaching Assistants)**

- Alex Paish ([adpaish@student.ubc.ca](mailto:adpaish@student.ubc.ca))
- Jiawen Lim ([jiawen13@student.ubc.ca](mailto:jiawen13@student.ubc.ca))

**Course Delivery**

This course includes a lecture and lab component, both of which will be delivered **in-person**. Lab attendance is mandatory, and students are expected to attend lectures as well.

**Lectures: Tuesdays and Thursdays from 3:30-5pm in SCI 337**

A skeleton version of lecture slides will be provided in advance of each topic, with the full version posted later. Lectures will not be recorded or livestreamed.

**Labs: Fridays 8-10am (L01), 10am-12pm (L02), 12-2pm (L03), 2-4pm (L04) and Thursdays 8-10am (L05) in UCH 110**

Students must attend their specific lab time. If a student will be absent, they must contact the current course instructor and the teaching assistant for their lab section as soon as possible (ideally before the lab takes place) in order to be excused. See *Missed Activity Policy* below for information about the consequences of an unexcused absence.

**Course Description**

Current methods in exercise science will be demonstrated via modules presented by faculty in their areas of specialization including electrophysiological techniques and methods of assessing blood-flow, respiratory capacity, and muscle function. Formerly offered as HMKN 312. Credit will be granted for only one of HES 321 or HMKN 312. [2-3-0].

***Prerequisite:*** One of HES 305, HMKN 310.

## Course Overview and Learning Objectives

This course focuses on a number of techniques used to assess human physiology, specifically in the context of health and exercise. Select methods used in respiratory, cardiovascular, cerebrovascular, neuromuscular, and sensory motor physiology research will be covered throughout the term. Upon successful completion of this course, you will be expected to do the following:

1. Define and describe the basic technical principles of the methodologies introduced within this course (techniques covered within lectures and labs).
2. Identify strengths and limitations of each technique discussed within this course.
3. Describe appropriate conclusions (using physiological information) that can be drawn from each technique.
4. Analyze and interpret respiratory, cardiovascular and neuromuscular data (from Excel and figures) in order to comment about the underlying physiological mechanisms and/or methodological concerns pertaining to the technique(s).

## Textbooks and Readings

This course does not have a required textbook. Instead, original research and review articles (both required and optional readings) will be posted to Canvas as the term progresses.

## Assessments of Learning

As per HES UG Policy, to pass the course, you must pass both the lab and lecture components.

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|--|-----|
| • Post-lab quizzes (3 × 3%; Feb 11, Mar 4, and Apr 1)                                  | 9%  |
| • Lab assignments (4 × 4%; anticipated due dates of Jan 27, Feb 3, Mar 17, and Mar 24) | 16% |
| • Lab reports (2 × 10%; anticipated due dates of Feb 24 and Apr 7)                     | 20% |
| • Group presentation (throughout the term)   | 20% |
| • Group presentation quizzes (throughout the term)                                     | 5%  |
| • Final exam (sometime between April 11-16)  | 30% |

### **LAB COMPONENT (45%)**

- **Post-lab quizzes:** For three of the labs, a brief multiple-choice quiz will be given at the beginning of the next lecture. The quiz will be based on lab outcomes as well as material from the lab manual and the associated lecture. If a quiz will be missed due to unexpected event (e.g., illness), the [HES Self Declaration Form](#) must be completed. A known absence (e.g., a varsity sporting event) should be brought to the attention of the instructor as soon as the student is aware of the conflict. If an absence is excused, the weighting of the quiz will be split between the other two quizzes. An unexcused absence will result in a grade of zero.
- **Lab assignments:** Assignments will involve performing data or statistical analysis, short answer questions related to data interpretation, and/or writing exercises. Answers are to be typed in Word using the same format as the lab reports (see below) and any figures are to be prepared using Excel rather than drawn by hand. Assignments are due one week after the data are shared by the instructor.
- **Lab reports:** Formal lab reports are to be typed in 12-point font (Arial or Times Roman) with 1” margins and double spacing. Excluding the title page and references, the report is limited to a maximum of 8 pages. More details will be provided in the Introduction to the Lab Manual. Reports are due two weeks after the data are shared by the instructor (three weeks when Reading Week is involved).

## LECTURE COMPONENT (55%)

- **Group presentation:** In groups of 6-8 (dependent on class size), students will research a topic assigned by the instructor to prepare and deliver a lecture of 20-30 minutes. The presentation will be followed by a question period. Groups will be formed by the instructor with the random number generator function in Excel. Presentations will take place throughout the term. To ensure all groups have equal preparation time, the topic will be assigned three weeks prior to the presentation (four weeks when Reading Week is involved). A student's grade will incorporate assessments by the instructor and other members of the group.
- **Group presentation quizzes:** After each presentation, there will be a brief multiple-choice quiz.
- **Final exam:** The exam will be a combination of multiple-choice as well as short and long answer questions (including calculations and figures) based on material from throughout the term. The exam will take place during the exam period and, except for cases of an [examination hardship / clash or academic concession](#), must be written at the scheduled time. Hence, wait until you know your exam schedule before booking any travel.

## Tentative Course Schedule (*subject to change*)

Week	Dates		Lecture	Lab #	Lab	Assessment
1	Jan 6-10	Tue	Introduction		<b>No labs</b>	
		Thu	Ventilation & pulmonary function			
2	Jan 13-17	Tue	Respiratory gases & mechanics	1	Spirometry (ventilation during exercise)	<i>Assignment</i>
		Thu	Excel and PowerPoint tutorial			
3	Jan 20-24	Tue	Chemoreflex assessment	2	CO <sub>2</sub> rebreath	<i>Assignment</i>
		Thu	Blood pressure			
4	Jan 27-31	Tue	Cardiovascular stress testing	3	Handgrip exercise	<i>Report (complete by Feb 24 @ midnight)</i>
		Thu	<b>No lecture</b>			
5	Feb 3-7	Tue	Hemodynamics	4	Pulse-wave velocity	<i>Quiz</i>
		Thu	Group presentations			
6	Feb 10-14	Tue	<b>Post-lab quiz #1</b> / Group presentations	5	<b>No lab</b>	
		Thu	<b>No lecture</b>			
7	Feb 17-21	Tue	<b>No lectures or labs (Reading Break)</b>			
		Thu				
8	Feb 24-28	Tue	Force & electromyography (EMG)	6	Force & EMG	<i>Quiz</i>
		Thu	<b>No lecture</b>			
9	Mar 3-7	Tue	<b>Post-lab quiz #2</b> / Isokinetic/isotonic dynamometry	7	Isokinetic/isotonic dynamometry	<i>Assignment</i>
		Thu	Group presentations			
10	Mar 10-14	Tue	Transcranial magnetic stimulation	8	Transcranial magnetic stimulation	<i>Assignment</i>
		Thu	Group presentations			
11	Mar 17-21	Tue	Transcutaneous electric stimulation	9	Transcutaneous electric stimulation	<i>Report (complete by Apr 7 @ midnight)</i>
		Thu	Group presentations			
12	Mar 24-28	Tue	Sensorimotor & cognitive function	10	Sensorimotor & cognitive function	<i>Quiz</i>
		Thu	Group presentations			
13	Mar 31 - Apr 4	Tue	<b>Post-lab quiz #3</b> / Group presentations		<b>No labs</b>	
		Thu	<b>No lecture</b>			
14	Apr 7-8	Tue	Review for final exam		<b>No labs</b>	

## **© Copyright Statement**

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.

## **Course Policies**

### **Late Submission Policy:**

Deadlines exist to support your learning and growth. However, we recognize that unforeseen circumstances may preclude your ability to meet a deadline. If such circumstances arise, consult the *Academic Concessions* section of the *HES UG Policies* document on Canvas, and, if need be, contact your instructor to seek approval for an extension. If a deadline is missed without a valid reason, assignments and reports will be subject to a late penalty of 20% within the first 24 hours and 50% between 24-48 hours. Assignments submitted after 48 hours of the original deadline will be given a grade of zero.

### **Grade Appeal Policy:**

- The teaching assistants (TAs) do the marking for the course. If you have a question/concern about the grade on an assignment or report, your first step is to contact the TA who marked your work to make an appointment. This step must be taken within one week of receiving the grade for an assignment or report, but the meeting can occur after this deadline. If the matter cannot be resolved with the TA, email the instructor to make an appointment. Please note, if the instructor regrades the assignment, it is possible that the grade can increase, decrease, or remain unchanged.
- The final grade of every student will reflect their actual performance during the term. That is, there will be no rounding of grades (e.g. from 49% to 50% or 79% to 80%). To hand out extra marks here and there or offer additional assignments to select students would be unfair to your classmates and, in the grand scheme of things, would undermine the degree that you are all working toward.

### **Missed Activity Policy:**

Participation is critical during practical laboratory sessions, where you will work together to conduct experiments to promote learning as well as collect data that will be used for your assignments and reports. **There is a 10% deduction from the cumulative lab component grade for each unexcused absence to a lab session.** If you are sick or have another unforeseen issue arise, please contact your TA and Instructor as soon as possible so that other accommodations may be made.

### **Instructor Communication Policy:**

If you do not understand a topic or concept, you are strongly encouraged to ask questions at the time material is presented during a lecture or lab. Should a question arise after the fact, please send an email to your lab TA or the instructor responsible for the content. Simple answers will be provided by email; however, if a question requires a lengthy answer or explanation, the TA/instructor will either recommend an in-person appointment or answer the question during the next lab/lecture. Emails sent during the week will be answered within 24 hours, whereas emails sent on Friday or Saturday will be answered on Monday. Given these response timelines, ensure you do not wait until the last minute to ask questions related to any course assessments.

### **Technology Use Policy:**

When in class, phones must be put away and **muted**. Computers may only be used for course purposes during class time – non-course related computer use creates a distraction for all students in the vicinity. Students misusing electronics during class or lab time may be asked to leave.

### *Additional UBC Okanagan Policies*

#### **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](mailto:drc.questions@ubc.ca)

Web: <https://students.ok.ubc.ca/academic-success/disability-resources/>

### **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](mailto:equity.ubco@ubc.ca)

Web: <https://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](mailto:ombuds.office.ok@ubc.ca)

Web: <https://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](mailto:learning.hub@ubc.ca)

Web: <https://students.ok.ubc.ca/academic-success/learning-hub/>

### **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.okangan@ubc.ca](mailto:svpro.okangan@ubc.ca)

Web: <https://svpro.ok.ubc.ca>

**Student Wellness:**

Good student health is foundational to student health and wellbeing, which relates directly to curricular and co-curricular education, learning and development, and to students' progression towards educational achievement. The Student Wellness team works together and with our campus and community partners to provide excellence in student health care. Various theories inform the work that we do; these include best practices in nursing, counselling, medicine, campus development, community models, and population health. Our commitment to the promotion of healthy living and mental health is empowered through the [Okanagan Charter](#).

**UNC 337** 250.807.9270

Email: [healthwellness.okanagan@ubc.ca](mailto:healthwellness.okanagan@ubc.ca)

Web: <https://students.ok.ubc.ca/health-wellness/>

**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](mailto: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: <https://operations.ok.ubc.ca/security-and-emergencies/safewalk/>