

FACULTY OF HEALTH

SCHOOL OF KINESIOLOGY AND HEALTH SCIENCE

Course: HH/KINE 4443 3.0 - **Living and Performing at high altitude: The physiology of human adaptation to environmental hypoxia**

Course Webpage: eClass (login with your passport YorkU)

Term: **WINTER 2023**

Prerequisite / Co-requisite: KINE 2011, KINE 3012

By enrolling in KINE 4443 you have the responsibility to read the present course outline.

Acknowledgement of Indigenous Peoples and Traditional Territories: “York University recognizes that many Indigenous Nations have longstanding relationships with the territories upon which York University campuses are located that precede the establishment of York University. York University acknowledges its presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, and the Huron-Wendat. It is now home to many First Nation, Inuit and Métis communities. We acknowledge the current treaty holders, the Mississaugas of the Credit First Nation. This territory is subject of the Dish with One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region”.

I. Teaching team

Course Director **Dr. Olivier BIROT**, Associate Professor, PhD
School of Kinesiology and Health Science
Email: birot@yorku.ca
Faculty profile: <https://health.yorku.ca/health-profiles/index.php?dept=&mid=700794>

Teaching assistant **Brian LAM**, PhD candidate, MSc.
School of Kinesiology and Health Science
Email: brianl@yorku.ca

II. Course Description

KINE 4443 will provides an in-depth analysis of the human physiological responses to altitude hypoxia including the acclimatization of the lowlander visiting altitude to the genetic adaptation of populations living at high altitude. These responses are analyzed from the perspective of integrative physiology as well as cellular and molecular mechanisms. Addresses the impact of hypoxia on human performance within the context of exercising at high altitude and using hypoxia to improve sea-level performance.

III. Expanded Course Description

This course will explore some of the main physiological mechanisms adopted by the human body for surviving and exercising at high altitude. We will discuss how environmental stressors (for example altitude or thermal stress exposure) can challenge the body homeostasis and potentially impair exercise performance and eventually lead to injury or death without appropriate physiological adaptive responses.

Students will be exposed to the key concepts of human physiology including the cardiorespiratory system, thermoregulation, muscle physiology, neuroendocrinology. Integrative physiology responses as well as in-depth cellular and molecular mechanisms will be discussed.

Examples of topics covered: The exact content and order of the material covered in class can be modified by the course director.

1. Altitude and altitude hypoxia (from physics laws to WHO data on populations), history of altitude physiology and medicine.
2. Human adaptation to acute altitude hypoxia exposure. The main physiological responses of the lowlander acutely exposed to altitude hypoxia.
3. Human adaptation to prolonged (chronic) altitude hypoxia exposure. The main physiological responses of the lowlander exposed chronically to altitude hypoxia.
4. Additional environmental stressors present during altitude hypoxia (cold, wind, solar radiations)
5. Genetic adaptation to altitude hypoxia and high altitude populations (Tibetans vs. Andeans).
6. Altitude hypoxia and sport performance. Climbing the Mount Everest (history, physiological aspects). Altitude training as a strategy to improve sea-level performance. International recommendations and strategies for exercising at altitude.
7. Age and sex-specific considerations: Children, women, the elderly and altitude hypoxia.
8. Altitude hypoxia exposure and clinical populations (diabetes, asthma, heart disease).
9. Acute mountain sickness (AMS).
10. AMS complications: HACE and HAPE.

IV. Course Learning Objectives and Outcomes

Course Learning Objectives

1. Introduce the student to the scientific knowledge of human adaptation to altitude hypoxia with a translational approach from integrative physiology concepts to in-depth cellular and molecular mechanisms.
2. Promote the development of critical thinking skills related to the field of altitude physiology.
3. Expose the student to the skill of reading and critically appraising the relevant scientific literature.
4. Expose students to the practice of communication in the context of altitude physiology with sharing their knowledge with diverse audiences.

Course Learning Outcomes

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

1. Explain key physiology and biology concepts, from integrative physiology to cellular and molecular biology, relating to the human adaptation to altitude hypoxia.
2. Critically analyze and discuss results from the scientific literature relating to the field of altitude physiology.
3. Demonstrate communication skills in order to share their knowledge. In particular, they will be able to describe and explain the mechanisms of human adaptation to altitude hypoxia to various audiences, from scientists to general public (knowledge translation).
4. Evaluate the characteristics of an altitude exposure situation (environmental context, population involved) in order to make recommendations for an optimal adaptation (health, performance, acclimation, identification of risks/pathologies).

V. Course Organization

1. Lectures: days, time, and location

KINE 4443 will be delivered **in-person** on the **Keele campus at York University** unless special circumstances (weather conditions, illness in the teaching team. In that case, an online recording could be provided to keep up with the course timing).

- Tuesdays, 08:30AM - 10:00AM, Accolade West (ACW) **204**, Keele campus
- Thursdays, 08:30AM - 10:00AM, Accolade West (ACW) **204**, Keele campus

2. Course material

The course material tested during the different course evaluations is the material **delivered in class** by the teaching team. This is an **in-person course**, and it is the student's responsibility to

attend to the lectures. The eClass slides represent an aid to the course only, and do not reflect all the testable material. Some in-Class slides have additional information. Any additional information, verbal or written/drawn is also considered as part of the testable material.

3. Audio and video recordings

The teaching team will do its best to provide an audio-recording of the lectures on eClass, but this is not guaranteed. Students are welcome to do their own audio-recording. Videorecording is not permitted.

4. Office hours and email correspondence

Office hours should be requested by email to the teaching team (birot@yorku.ca, brianl@yorku.ca). After receiving the email, the teaching team will arrange a meeting (in-person or Zoom, online meeting being preferred).

IMPORTANT: Your message should contain: **(1)** your last name, **(2)** your first name, **(3)** your student number. Emails that do not follow these requirements (1+2+3) will be considered as "**not received**". **This applies to email submission of assignment and might result in missing a deadline.**

VI. Course Evaluation

1. General and important information

- The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York
- A graded feedback worth at least **15% of the final grade** will be received by students prior to the final withdrawal date from a course without receiving a grade. See the Registrar website (or calendar in the present document) for dates.
- Students enrolled in KINE 4443 should be familiar with the **YorkU Code of Student Rights & Responsibilities** (<https://oscr.students.yorku.ca/csrr>).

2. KINE 4443 Evaluation

Evaluation in KINE 4443 has **5 components**: 3 in-class tests, 1 in-class presentation, and 1 reflective activity.

2.1. In-class tests (80%)

These in-class tests consist of **booklet exams** that could combine short-answer questions, multiple choice questions, graphs and figures interpretation/drawing. Tests are **60 to 75 minutes long** and are scheduled during regular class time. Refer to the calendar at the end of the course

outline. Tests are **cumulative**.

- TEST-1** Thursday **JAN. 26** at 08:30AM.
Duration: **60-75 minutes** (will be indicated on the day of the test).
Weight (% of the final grade): **10%**
- TEST-2** Thursday **FEB. 16** at 08:30AM.
Duration: **60-75 minutes** (will be indicated on the day of the test).
Weight (% of the final grade): **35%**
- TEST-3** Thursday **MAR. 23** at 08:30AM.
Duration: **60-75 minutes** (will be indicated on the day of the test).
Weight (% of the final grade): **35%**

Alternate Exam Center and test accommodation

Students with accommodation must arrange their own booking with the alternate examination center. The teaching team does **not** provide any accommodation during regular in-class tests.

Question: I have accommodation, but I did not book a room on time for my test. Can I still write in the regular room?

Answer: Yes, but understand there will be no accommodation provided since we administer the regular test (format, duration) only. You can also try to arrange for another date/time with the alternate center. It is your decision and responsibility.

Missed Tests

- Missing an in-class test: What should you do? We do **NOT** require any documentation for missing a scheduled test (illness, religious observance, travel, etc.). However, **you MUST email the teaching team within a week after the missed test** to request an approval for writing a deferred test.
- **IMPORTANT:** You cannot miss **more than two tests**. Students who missed **all three tests on their original scheduled dates** will **not** be eligible to write a deferred test and will receive a **F** final grade in the course.
- We have two **deferred/back-up test sessions** in the calendar of the present course outline. The deferred exam date is scheduled on **APRIL 04**. *However, in case the course agenda would need a shift (university closure, etc.), a back-up date is APRIL 06.* If you miss one or two tests, and if you notify the teaching team within a week for each of the missed test, you will write **one single (cumulative) deferred test on APRIL 04**. Its weight (% of the final grade in the course) will reflect the weight of the missed test(s).
- There is **no** "deferred-deferred test": Missing the deferred test will result in 0% to the test, and further extensions or accommodation will require students to submit a formal petition to the Faculty of Health.

2.2. In-Class presentation (15%)

- Students will work in groups of usually 2-3 students. The number of students per group will be decided by the course director based on the number of students enrolled.
- Two sessions are scheduled (see calendar in the course outline) and groups will be assigned to a session later in the term.
- This oral examination represents for many students a new form of examination. It is a great experience to prepare for future interviews (job, professional schools, PhD/Postdoc positions, etc.). It is also a group activity to develop teamwork skills.
- Students will be given some topics later during the term by the teaching team. Each group will choose one topic (the same topic can be chosen by several groups as long as these groups present on the same day). Students will give a 15 min presentation of the topic using Microsoft PowerPoint, MacOS Keynote, Prezi, or any other software. This will be followed by a short period of questions.
- Grading will be based on the accuracy of the information, clarity and quality of the presentation (talk and slides), appropriateness of the presentation accordingly to the audience (knowledge translation to non-expert public, research scientists, general practitioners... this will be specified when selecting a topic), handling of the question period.
All students from the same group receive the same grade (teamwork). If one group member is missing, presentation will be deferred (likely on APRIL 06).

2.3. Reflective activity (5%)

This assignment should be submitted **no later than APR. 06** (see calendar). **It can be submitted earlier.** The reflective activity is very subjective and personal. It gives students the opportunity to step back and to reflect on the course they have completed.

Students will have to address the following questions:

- Q1. What was(were) the most valuable part(s) or topic(s) of the course? Why?
- Q2. What was(were) the least valuable part(s) or topic(s) of the course? Why?
- Q3. What would you change, remove, or add in this course and why?
- Q4. What was your overall experience with the oral examination process? Explain.
- Q4. Do you think that what you have learnt in KINE 4443 (material, skills, etc.) could be useful in the future in your professional or personal environment? How/why?
- Q5. Would you say that the course met, exceed, or did not meet your initial expectation? Why?

The format of the document is **PDF only** (no Word). The text format should be in **Times New Roman, size 12**. Minimum: **200 words**. Maximum: **500 words**. **Penalty for not following the formatting of the document (PDF, Times New Roman size 12, word limits) is 1% out of the 5%.**

Proper academic performance depends on students doing their work not only well, but on time.

Late submission will be penalized (1% out of the 5%). **The deadline is APR. 06 (see calendar) at 11:59PM with no exception. Pay attention to paragraph V.4. regarding proper email communication with the Teaching team.**

2.4. Summary of KINE 4443 Evaluation

| Evaluation component | % Final Grade | Date / Deadline |
|-----------------------|---------------|--|
| In-class TEST-1 | 10% | Thursday JAN. 26 |
| In-class TEST-2 | 35% | Thursday FEB. 16 |
| In-class TEST-3 | 35% | Thursday MAR. 23 |
| In-class presentation | 15% | MAR. 28-30 (to be specified later in the term) |
| Reflective activity | 5% | Thursday APR. 06 |

VI. FREQUENTLY ASKED QUESTION

Q1. Is there any required textbook in KINE 4443?

R1. No.

Q2. Is there an online version of KINE 4443?

R2. No. KINE 4443 is an in-person course delivered on Keele campus.

Q3. Is class attendance monitored?

R3. No. It is the student's responsibility to attend to classes, and for the best chances of success in the course students are strongly encouraged to attend to classes. Only enrolled students can attend to classes.

Q4. Why do slides posted on eClass and presented in class differ?

R4. Slides posted on eClass represent a support tool for students. They do not reflect the entire course content presented in class on "Lecture slides" (additional material on slides, additional slides, etc.).

Q5. Are slides always posted on eClass before class?

R5. Not necessarily.

Q6. What is the grading system used in KINE 4443?

R6. We use the YorkU grading system in place at the university and in the Kinesiology and Health Science department.

| Grade | Grade Point | Percent |
|-------|-------------|------------------------|
| A+ | 9 | 90-100 |
| A | 8 | 80-89 |
| B+ | 7 | 75-79 |
| B | 6 | 70-74 |
| C+ | 5 | 65-69 |
| C | 4 | 60-64 |
| D+ | 3 | 55-59 |
| D | 2 | 50-54 |
| E | 1 | (Marginally below 50%) |
| F | 0 | (Below 50%) |

Q7. My grade is borderline between two letter grades. For example, I have a final grade of 79.45%. Can I ask the course director to round it to an A (80%)?

R7. No. The course director enters each grade component (tests, reflective activity, presentation) directly into an Excel template provided by the Kinesiology and Health Science undergraduate office. It is the Excel formula that will automatically "round the final grade" and determine the letter grade. Usually, in the given example, a grade ≤ 79.50 would be a B+ and a grade ≥ 79.51 would be an A. Before asking the course director or the teaching team for "bumping/boosting" a mark (which will not happen) students are strongly encouraged to read the **YorkU Code of Student Rights & Responsibilities** (<https://oscr.students.yorku.ca/csrr>).

VII. Course policies and procedures

Copyright Information

The course material used in KINE 4443 is the intellectual property of the instructors unless otherwise stated. **Third party copyrighted materials (such as book chapters, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this material for**

distribution (e.g., uploading material to a commercial third-party website) may lead to a violation of Copyright law. The buying and selling of any course material (including lecture slides, evaluation items, etc.) may constitute an infringement of intellectual property rights and/or a breach of Academic Honesty.

KINE 4443 adopts a zero-tolerance policy regarding Breach of Academic Honesty. Refer to the *York University Senate Policy on Academic Honesty* and *York University Code of Students Rights & Responsibilities* for more information.

VIII. Course modifications

In the event of unpredictable situations (COVID-19, weather, etc.), the Course Director can decide to re-adjust the course organization (lectures, format, evaluation, dates, etc.). The number of lectures assigned to Parts I and II could also be revised accordingly to the progression of the course.

IX. Calendar

DROP Deadline: March 17th.

| Tuesday | | Thursday | |
|---------|---------------------------------|----------|---------------------------------|
| JAN. 10 | Lecture | JAN. 12 | Lecture |
| JAN. 17 | Lecture | JAN. 19 | Lecture |
| JAN. 24 | Lecture | JAN. 26 | Lecture + TEST-1 (10%) |
| JAN. 31 | Lecture | FEB. 02 | Lecture |
| FEB. 07 | Lecture | FEB. 09 | Lecture |
| FEB. 14 | Lecture | FEB. 16 | TEST-2 (35%) |
| FEB. 21 | Winter reading week | FEB. 23 | Winter reading week |
| FEB. 28 | Lecture | MAR. 02 | Lecture |
| MAR. 07 | Lecture | MAR. 09 | Lecture |
| MAR. 14 | Lecture | MAR. 16 | Lecture |
| MAR. 21 | Lecture | MAR. 23 | TEST-3 (35%) |
| MAR. 28 | Group presentation (15%) | MAR. 30 | Group presentation (15%) |
| APR. 04 | DEFERRED/BACK-UP session | APR. 06 | DEFERRED/BACK-UP session |