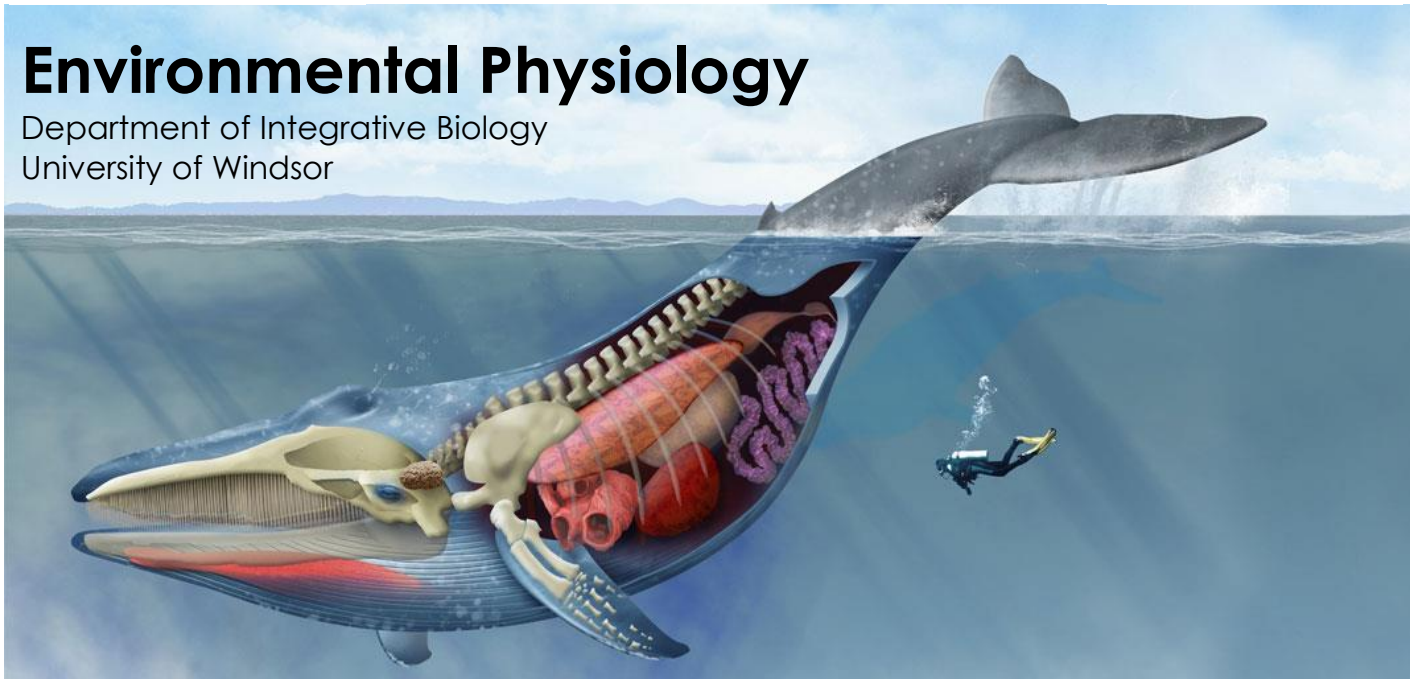
# Environmental Physiology

Department of Integrative Biology
University of Windsor



*Updated Sept. 3, 2021*

Monday/Wednesday | 10:00 – 11:20 AM EST | Online
**Instructor:** Dr. Christine Madliger | **GAs and TAs:** Megan Mickle; Samantha Butryn; Tina Dobos; Nikko Drkulec

## Our course within the context of the Covid-19 pandemic

This course has been redesigned to fit an entirely online format. Lectures (slides and video recordings), announcements, information regarding assignments, and all other materials will be posted to/linked from Blackboard.

Lecture attendance is not enforced in this class, but participation in all components of the course is encouraged to excel.

As we all navigate this learning environment together, please show patience and compassion. The instructor and GAs/TAs pledge to do the same for all students.

## Instructor Information

**Professor**: Dr. Christine Madliger
**Call me**: Dr./Prof. Madliger or Dr./Prof. M
[pronouns: she/her]
**Email**: madliger@uwindsor.ca
**Virtual office hours via Teams**: Wednesdays 11:30 – 1:00

Questions about course material and grades will only be discussed during office hours/virtual meetings, not over email.

**How do air-breathing marine mammals stay underwater for over 90% of their lives?**

**How do humans living in high altitudes cope with low oxygen?**

**How do polar animals thrive in temperatures as low as minus 40°C?**

**How do salmon handle moving between freshwater and marine environments?**

**The discipline of environmental physiology provides the answers!**

## Learning Objectives: what can you gain from this course?

- Acquire knowledge of how organisms cope with and flourish in environmental extremes and variability
- Develop an understanding of how human-induced environmental change will affect different organisms, and how studying physiology can aid conservation science
- Employ planning and literature research skills to develop a project on a topic of your interest
- Improve your ability to critically assess and summarize scientific research
- Gain skills in visual, oral, or written presentation of complex scientific information to a general audience

## Assessment: how will success be measured?

| | |
|---|---|
| **50%** | **Exams** |
| **20%** | **Group Assignment** |
| **20%** | **Independent Assignment** |
| **10%** | **Tutorial Participation** |

## Course Synopsis

This course is designed to introduce students to the diversity of adaptations possessed by organisms that enable them to successfully interact with the abiotic/biotic environment. Organisms require very basic things to survive and reproduce: adequate oxygen, water, heat, and food. We will explore how physiological systems have adapted to cope and even flourish in environments where these are limited or overly abundant. We start by reviewing the assumption that all physiological differences between species are adaptations to the environment, and describe current methods that researchers use to investigate physiological adaptations to the environment. We will then look at physiological systems in extreme environments. Finally, we will examine the adaptations and phenotypic flexibility required to respond to rapid, human-induced changes in our world, and ways the field of environmental physiology contributes to conservation science.

## GA/TA Contact Information

**Megan Mickle:** micklem@uwindsor.ca [she/her]

**Samantha Butryn:** butryn@uwindsor.ca [she/her]

**Tina Dobos:** dobos11@uwindsor.ca [she/her]

**Nikko Drkulec:** drkulec1@uwindsor.ca [he/him]

## Other Course Information

**Lectures:** Online synchronous on Teams; links to videos of lectures will be posted Blackboard

**Course content:** Available on Blackboard

**Online tutorials (Blackboard):** Mondays (section 51), Tuesdays (section 52), Wednesdays (section 53), Thursdays (section 54); 5:30-6:20 PM EST

**Midterm dates:** Oct 6 & Nov 8 (online during class)

**Final exam date:** Scheduled by the Registrar

**Final drop date for this course:** December 6, 2021

# Course Assessments and Activities

**1. Midterm Exams (30%):** Two non-cumulative midterm exams will be comprised of a mixture of multiple choice, short, and long answer questions. They will be administered online during class time. The first midterm (Oct. 6) covers lectures 1-5 and is worth 15% of the course mark. The second midterm (Nov. 8) covers lectures 6-11 and is worth 15% of the course mark.

**2. Final Exam (20%):** The final exam will be comprised of a mixture of multiple choice, short, and long answer questions. It is non-cumulative and will cover lectures 12-20.

**3. Group Assignment (20%):** Working in groups of 3, you will complete a semester-long project aimed at summarizing a topic in environmental physiology that interests you. You will have the opportunity to choose how to present your topic: 1) scientific (conference-style) poster; or 2) mini review paper (4-5 pages excluding references). Your final product should be geared toward a scientific audience. As components of your course mark, the assignment will require: i) a group contract (1%); ii) an outline (<0.5 pages) describing your topic, how you will present it, your target audience, and at least 3 scientific references (3%); iii) two feedback forms that include a self-reflection and goals for future improvement (1%); iv) final project (15%). Further details will be presented in class and during your first tutorial session.

**4. Independent Science Communication Project (20%):** To develop skills related to science communication, you will produce an outreach item and conduct and reflect on a conversation with a non-scientist. You will begin by choosing a scientific paper on a topic in environmental physiology that has been recently published (no earlier than 2018). You will then produce either a 1-panel infographic or a 200-word lay summary based on that article for a general (non-science) audience. Finally, you will engage in a discussion with a non-scientist of your choosing (e.g., family member, friend, work colleague) and produce a written (~500-word) reflection of that conversation aimed at assessing your effectiveness and improving your science communication skills in the future. The mark breakdown as components of the full course mark: i) choice of paper with 2-3 sentence description of why you chose it (1%); ii) infographic or lay summary (10%); iii) pre-conversation questionnaire (3%); iv) written reflection (6%). Further details will be presented in class and during your first tutorial session.

**5. Tutorial Participation (10%):** This component of the course mark will come from attending and participating in tutorial sessions. This includes coming prepared to show how your independent and group projects are developing, working productively with your group members, interacting collegially with your GAs, and asking questions to improve your projects' development. Participation in 5 tutorial sessions (weeks 2, 4, 6, 8, and 9 – see detailed schedule below) will each be worth 2% of the final course mark.

I understand the difficulty that pandemic-related anxiety and stress can cause for learning and productivity. If you **miss a tutorial or exam**, there is no documentation required. Please read my full policy on missed work and exams below.

## Lecture Schedule

| Lecture | Dates | Topic |
|---|---|---|
| 1-2 | Sept. 13/15 | Course Structure; Introduction to Environmental Physiology |
| 3-4 | Sept. 20/22 | Energetics, Metabolism; Metabolic Scaling I |
| 5-6 | Sept. 27/29 | Metabolic Scaling II; Extreme Cold I |
| 7 | Oct. 4 | Extreme Cold II; Exam Review |
| Midterm Exam | Oct. 6 | Midterm Exam (Lectures 1-5) |
| No Lectures | Oct. 11/13 | Fall Reading Week – No Lectures |
| 8-9 | Oct. 18/20 | Extreme Cold III; Heat |
| 10-11 | Oct. 25/27 | High Salinity; Guest Lecture |
| 12-13 | Nov. 1/3 | Freshwater Respiration; Aquatic Respiration; Exam Review |
| Midterm Exam | Nov. 8 | Midterm Exam (Lectures 6-11) |
| 14 | Nov. 10 | Terrestrial Respiration; Circulatory Systems |
| 15-16 | Nov. 15/17 | High Altitude; Deep Diving I |
| 17-18 | Nov. 22/24 | Deep Diving II; HIREC |
| 19-20 | Nov. 29/ Dec. 1 | Conservation Physiology; Exam Review |
| Final Exam | Dec. 11-21? | To be Announced by Registrar |

## Tutorial Schedule and Assignment Due Dates

| Week | Dates | Activity | Assignment Due |
|---|---|---|---|
| 1 | Sept. 20-23 | Introduction to GAs and Assignments | |
| 2 | Sept. 27-30 | Assignment Ideas Discussion with GAs and Group Members | **Group Contract** |
| 3 | Oct. 4-7 | No Tutorial Attendance | **1) Paper Choice 2) Group Outline** |
| | Oct. 11-14 | Fall Reading Week – No Tutorials | |
| 4 | Oct. 18-21 | Discussion of Outline Feedback and Paper Choice Feedback | |
| 5 | Oct. 25-28 | No Tutorial Attendance | |
| 6 | Nov. 1-4 | Progress Update on Independent and Group Assignments | **Group Feedback Form** |
| 7 | Nov. 8-11 | No Tutorial Attendance | **Infographic/Lay Summary** |
| 8 | Nov. 15-18 | Progress Update on Group Assignment | |
| 9 | Nov. 22-25 | Final Feedback on Group Assignment | **Conversation Reflection (with questionnaire)** |
| 10 | Nov. 29-Dec. 2 | No Tutorial Attendance | **1) Group Project 2) Group Feedback Form** |

# Policy on Missed Assessments

**Tutorials:** To earn full participation marks, you must attend all the tutorial sessions and participate with your group and GA/TAs. Contact your instructor if you miss a tutorial due to illness or other reasons. To maintain a good working relationship with your project group, please try to attend all tutorial sessions.

**Exams:** Students who miss a midterm or final exam will have the opportunity to write a make-up on a date and time set by the course instructor. Make-up examinations will occur within 1 week of the original assessment date.

**Assignments:** The due dates for this course have been chosen to best accomplish our learning objectives and to allow for timely feedback by your instructor and GAs. You are welcome to hand assignments in early. All assignments are due by 5:30 PM EST (at the beginning of assigned tutorial time) on their due dates. Given ongoing uncertainty, I will not penalize any assignments that are submitted within 48 hours of their due date. Following this 2-day extension, assignments will receive a penalty of 10% every 24 hours. However, if there are extenuating circumstances, please contact the instructor to discuss the possibility of a further extension.

## Course Expectation: Respect for Diversity

Students from all backgrounds should feel welcome and safe in this course. The diversity that students bring to the class will be viewed as a benefit and strength. My intention is that all materials and activities included in this course are respectful of all forms of diversity including gender, gender identity, sexuality, age, socioeconomic status, ethnicity, race, culture, and ability. Please let me know: 1) your preferred name and/or set of pronouns; 2) if a religious holiday you observe conflicts with a course deliverable; 3) If anything has been said in class or lab that makes you feel uncomfortable; 4) if you require any accommodations.

Historically, much of the science of physiology has been built on a small subset of privileged voices. I acknowledge that there may be overt or covert biases in the course materials due to the lens in which they were written. I am optimistic that the world of physiology, and the sciences in general, are currently being strengthened by a more diverse set of experiences and voices. Comments, questions, and/or suggestions for diverse resources that can be incorporated into future versions of this course are always welcome.

## Other Expectations

**Academic Integrity:** Students in this course are expected to follow all university guidelines with respect to academic integrity. Plagiarism, copying, and all other forms of academic dishonesty will be reported and not tolerated. http://www.uwindsor.ca/academic-integrity/358/avoiding-plagiarism

**Online Etiquette:** You are expected to represent yourself honestly and to interact with the instructor, classmates, and GAs in a polite and professional manner. Use respectful language in discussions and in online chats, and use the "raise hand' tool. Any behaviour that is disruptive to other learners will not be tolerated. To maintain privacy, students are not required to have their cameras on at any time.

# Resources

**COVID Wellbeing Portal:** The university has created a dedicated online space that focuses on managing aspects of wellbeing and mental health related to the COVID-19 pandemic. It can be accessed here: https://www.uwindsor.ca/coronavirus/377/wellbeing-portal.

**Wellness Services:** The University of Windsor Wellness Outreach Office offers a list of resources and services offered on campus and in the community for students. These include peer support, counseling, physical and mental health, academic, and other services. Find the full list here: https://www.uwindsor.ca/studentexperience/sites/uwindsor.ca.studentexperience/files/wellness_resource_sheet.pdf.

**24 Hour Support is Available:** My Student Support Program (MySSP) is an immediate and fully confidential 24/7 mental health support that can be accessed for free through chat, online, and telephone. This service is available to all University of Windsor students and offered in over 30 languages. Call: 1-844-451-9700, visit https://keepmesafe.myissp.com/ or download the My SSP app on the Apple App Store/Google Play.

**Student Accessibility Services:** Student Accessibility Services provides a variety of services and supports to students with documented disabilities (including: learning disabilities, attention deficit/hyperactivity disorder, acquired brain injuries, vision, hearing and mobility impairments, chronic medical conditions, and psychiatric issues). If you have, or think you may have a disability, you may wish to visit Student Accessibility Services to learn how best to meet your academic goals. Students with disabilities who require academic accommodations in this course must contact an Advisor in Student Accessibility Services (lower level of Dillon Hall, (519) 253-3000 ext. 6172 or online at http://www.uwindsor.ca/studentaccessibility/) to complete Student Accessibility Services Registration and receive the necessary Letters of Accommodation. After registering with Student Accessibility Services, you must present your Letter of Accommodation and discuss your needs with the instructor as early in the term as possible.

**University Policy on Sexual Misconduct:** https://www.uwindsor.ca/sexual-assault/ The University of Windsor values dignity, respect and equality for all individuals and strives to foster an atmosphere of healthy attitudes and behaviours towards sexuality, sex, and gender. The University is committed to maintaining a healthy and safe learning, living, social, recreational, and working environment. All forms of sexual misconduct (included, but not limited to: verbal harassment, non-consensual sexual contact; online harassment; non-consensual sharing of images, etc.) jeopardize the mental, physical and emotional welfare of our students and employees, as well as the safety of the campus community and the reputation of the University. Anyone who has experienced sexual misconduct deserves support. Regardless of whether the incident occurred recently or many years ago, you deserve support now. If you wish to speak confidentially about an incident of sexual misconduct, please contact the Sexual Misconduct Response and Prevention Office at svsupport@uwindsor.ca. Please note, you do not have to formally report your experience in order to receive support, resources, and guidance. If you would like to consider filing a formal complaint with the University, or have questions about policies and procedures regarding sexual misconduct, the Office can also provide this information and assist with the process.

**Information Technology Services:** You can find help and information from IT Services if you have technical problems: https://www.uwindsor.ca/itservices/support.

**Land Acknowledgement:** The University of Windsor sits on the traditional territory of the Three Fires Confederacy of First Nations, which includes the Ojibwa, the Odawa, and the Potawatomie. I respect the longstanding relationships with First Nations people in this place in the 100-mile Windsor-Essex peninsula and the straits – les détroits – of Detroit.