



REN R 463

BIOLOGICAL ADAPTATION TO NORTHERN ENVIRONMENTS

In Fall 2026, REN R 463, Biological Adaptation to Northern Environments, is being offered at Yukon University as part of the Northern Environmental and Conservation Sciences, B.Sc. Program. All students registered in REN R 463 must adhere to the requirements outlined in this course syllabus. University of Alberta students must also be aware of, and adhere to, the University's Code of Student Behaviour, referenced in the outline.

INSTRUCTOR: Kathryn (Katie) Aitken, Ph.D.
Adjunct Professor, Dept. of Renewable Resources, U of Alberta, and
Associate Professor and Coordinator, Northern Environmental and
Conservation Sciences Program, Yukon University

OFFICE HOURS: Wednesdays, 11:00 – 12:00 pm, or by appointment

OFFICE LOCATION: A2509

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CLASS DAYS & TIMES: Tuesdays and Thursdays, 10:30 – 11:50 am

CLASS LOCATION: A2319

COURSE DESCRIPTION

This course will provide an overview of the study of evolutionary processes, with a focus on examples from northern environments. Topics from evolutionary biology, such as natural selection and adaptation, will be applied to species living in boreal, arctic, and tundra environments. The course will cover the unique challenges faced by animals and plants in

these environments, the ways in which they have adapted to deal with these conditions, and the potential effects of climate change on northern species.

COURSE REQUIREMENTS

Prerequisite(s): Registration in Yukon University/University of Alberta B.Sc. in Environmental and Conservation Sciences degree program, and successful completion of UAlberta BIOL 208, YukonU BIOL 220 or an equivalent second-year ecology course, or permission of the instructor.

LEARNING OUTCOMES

Upon successful completion of this course students will:

- Understand the mechanisms of evolution, at a variety of scales.
- Be familiar with the application of concepts and models in evolutionary biology to conservation and management in northern environments.
- Be able to use evolutionary concepts such as natural selection and adaptation to explain the ways in which northern plants and animals may be affected by climate change.

COURSE FORMAT

Delivery format

The course consists of two 1.5-hour in-person lectures per week. Lecture slides, reading, videos, and supplementary material will be posted on the class site on YukonU's Moodle system.

Weekly breakdown of instructional hours

There will be three hours of in-person lectures per week, delivered as two 1.5-hour sessions. Additional reading and other supplementary material will be posted on the class site on Moodle. Students should expect to spend a minimum of 1-1.5 hours outside of class for every 1 hour of lecture time. Therefore, this course will require approximately 3-5 hours per week of homework, review, and additional reading, outside of class time, for a total of about 6-8 hours per week for the course. The time required will vary by individual.

EVALUATION

The course grade will be determined as follows:

	Percent
Midterm #1 (1 Oct)	20%
Midterm #2 (12 Nov)	20%
Assignment #1 – short review paper (27 Oct)	15%
Assignment #2 – presentation (in class, 24 Nov)	15%
Take-home final (due 17 Dec)	30%
Total	100%

Assignments

Assignment 1 - Short review paper - paper summary and synthesis

Students will prepare a short (about 2-3 pages) summary of a primary peer-reviewed research paper on a topic from class. Details will be distributed in class. Reports will be due on Oct. 27.

Assignment 2 - Species account presentation

Students will present a short species account describing the adaptations of a species (or group of species) to life in northern environments. Students can choose how they present their species account – it could be an oral presentation in class with PowerPoint (10-15 minutes), a short video posted to the class site or YouTube (15 minutes maximum), a research-style poster (pdf uploaded to class site on Moodle or printed and shown in class), a brochure, or other options. Please discuss your ideas with the instructor. In-person oral presentations (if this option is chosen) will be scheduled during class time on Nov. 24.

Students must adhere to the citation style used by the Council of Science Editors in all written assignments (<https://guides.library.ualberta.ca/citing/cse>).

Exams

There will be two midterm exams during class time on Oct. 1 and Nov. 12. There will also be a take-home final examination, which will be distributed on Dec. 3 and will be due on Dec. 17.

Due Dates and Late Assignments

Unless otherwise specified, assignments are due by 11:59 pm local time on the date that

they are due. Late assignments will lose 5% of their mark per day that they are late.

Assignment of grades

The total numerical score will be converted to a grade on the following letter grading system:

Letter grade	Percentage
A+	95-100
A	90-94
A-	85-89
B+	79-84
B	75-78
B-	71-74
C+	67-70
C	64-66
C-	60-63
D+	55-59
D	50-54
F	0-49

COURSE WITHDRAWAL INFORMATION

Students should refer to the UAlberta calendar for important dates (calendar.ualberta.ca).

TEXTBOOKS AND LEARNING MATERIALS

All required readings will be posted on the class site on YukonU's Moodle system.

There is no required textbook for this course. However, a good resource is:

Futuyma DJ, Kirkpatrick M. 2023. Evolution, 5th ed. Sinauer Associates, Inc. ISBN 9780197619629. The 3rd and 4th editions of this book are also good. The 5th edition is also available as an ebook at <https://www.vitalsource.com/en-ca/products/>.

All students must have a valid Yukon University student computing account. Information is available here: <https://www.yukonu.ca/student-life/technical-resources> (scroll down to the section "Accessing your Office 365 & Moodle account"). Note that YukonU students can download for free the full suite of Microsoft Office applications (Word, Excel, PowerPoint,

OneNote, Outlook) and other internet-based services (OneDrive, Sway, etc). See information at the YukonU Technical Resources web page linked above.

COURSE WEBSITE

Material for the course will be available on the REN R 463 class site on Yukon University's Moodle system (moodle.yukonu.ca). Lecture slides, announcements, reading, and other material will be available there for download or viewing.

ACADEMIC INTEGRITY

Yukon University Academic Standards and Regulations

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to YukonU Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities.

University of Alberta Academic Integrity and Code of Student Behaviour

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.governance.ualberta.ca) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students at the University of Alberta are subject to the Code of Student Behaviour, as outlined at:

<http://www.governance.ualberta.ca/en/CodesofConductandResidenceCommunityStandards/CodeofStudentBehaviour.aspx> Please familiarize yourself with it and ensure that you do not participate in any inappropriate behavior as defined by the Code. Key components of

the code include the following statements.

30.3.2(1) No Student shall submit the words, ideas, images or data of another person as the Student's own in any academic writing, essay, thesis, project, assignment, presentation or poster in a course or program of study.

30.3.2(2) c. No Student shall represent another's substantial editorial or compositional assistance on an assignment as the Student's own work.

USE OF AI SOFTWARE

While ChatGPT and similar artificial intelligence applications can be useful tools and provide a starting point in your writing, they are not an appropriate substitution for learning to write and think critically on your own. Copying the output from Chat GPT or other AI applications and submitting this output as your own work will be considered plagiarism. Furthermore, appropriate referencing is expected in submitted work. References to primary, peer-reviewed scientific sources must be included in your work, as appropriate.

PROFESSIONALISM AND CLASSROOM RULES OF ENGAGEMENT

Students are expected to attend all lectures, be engaged and courteous in all course activities, and to be on time for class. Please do not use cellular phones during class. Laptops are permitted for note taking and in-class work; however, please do not use laptops in class for non-class-related activities.

RECORDING OF LECTURES, LABS, ETC.

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Please note that some classes in the B.Sc. Northern ENCS Program may be recorded using web conferencing software, and links to recordings may be posted on the class website.

ACCESSIBILITY AND ACADEMIC ACCOMMODATION

Yukon University is committed to providing a positive, supportive, and barrier-free academic environment for all its students. Students experiencing barriers to full participation due to a visible or hidden disability (including hearing, vision, mobility, learning disability, mental health, chronic or temporary medical condition), should contact [Accessibility Services](https://www.yukonu.ca/student-life/learning-matters/accessibility-services) (<https://www.yukonu.ca/student-life/learning-matters/accessibility-services>) for resources or to arrange academic accommodations: access@yukonu.ca.

TOPICS

- What is evolution?
- Patterns of evolution; adaptive radiation
- History of life on Earth
- Geography of evolution
- Genetic and phenotypic variation
- Natural selection
- Evolution of life histories
- Sexual selection
- Species and speciation
- Coevolution
- Plant adaptations in the north
- Animal adaptations in the north
- Climate change and adaptation