



## REN R 463

### BIOLOGICAL ADAPTATION TO NORTHERN ENVIRONMENTS

In Fall 2021, 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.

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**INSTRUCTOR:** Kathryn Aitken, Ph.D.  
Adjunct Professor, Dept. of Renewable Resources, U of Alberta,  
and  
Instructor/Coordinator, Northern Environmental and  
Conservation Sciences Program, Yukon University

**OFFICE HOURS:** Thursdays, 1:00-2:00 pm

**OFFICE LOCATION:** A2509

**TELEPHONE/EMAIL:** 867-668-8866 / kaitken@yukonu.ca

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**CLASS DAYS & TIMES:** Tuesdays and Thursdays, 10:30-11:50 am Yukon time

**CLASS LOCATION:** A2605

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### 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 PREREQUISITES AND/OR CO-REQUISITES**

Registration in University of Alberta/Yukon University 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**

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.

## **EVALUATION**

The course grade will be determined as follows:

	<b>Percent</b>
Midterm #1 (5 Oct)	20%
Midterm #2 (2 Nov)	20%
Species account paper (2 Dec)	15%
Species account presentation (7 Dec)	15%
Final exam (date TBD; during YukonU final exam period)	30%
Total	100%

## **Assignments**

Students will write a short species account describing the adaptations of a species (or group of species) to life in northern environments and present these results to the class. Students can choose how they present their species account – it could be an oral

presentation in class with PowerPoint (10 minutes maximum), a short video posted to the class site or YouTube (10 minutes maximum), a research-style poster (pdf uploaded to class site on Moodle or printed and shown in class), a brochure, Wiki, or other options. Please discuss your ideas with the instructor. The written account will be due on Dec. 2, and in-person oral presentations (if this option is chosen) will be conducted on Dec. 7. Detailed instructions on length and format for the written report will be given in class.

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 and one comprehensive final exam. The midterm exams will be scheduled during class time on Oct. 5 and Nov. 2. The final examination will be held at the end of term, during the scheduled Yukon University exam period.

## **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:

<b>Letter grade</b>	<b>Percentage</b>
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](http://calendar.ualberta.ca)).

## **TEXTBOOKS AND LEARNING MATERIALS**

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

Not required but a good resource:

Futuyma DJ, Kirkpatrick M. 2017. Evolution, 4th ed. Sinauer Associates, Inc. ISBN 978-1-60535-605-1. The 3rd edition of this book is also good. 4th edition is also available as an ebook at <https://www.vitalsource.com/en-ca/products/evolution-douglas-j-futuyma-v9781605357003?term=futuyma>. There will be one copy of this text on reserve in the YukonU library (48 hrs loan).

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](http://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](http://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.

### **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 cell 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.

## **ACADEMIC ACCOMMODATION**

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website). It is the student's responsibility to seek these accommodations by contacting the Learning Assistance Centre (LAC): [LearningAssistanceCentre@yukonu.ca](mailto:LearningAssistanceCentre@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