School of Science

BIOL 220
Ecology

Fall 2026

3 Credits

Course Outline

INSTRUCTOR: Scott Gilbert, BSc., Ph.D.

E-MAIL: sgilbert@yukonu.ca **OFFICE:** unknown
OFFICE HOURS: Tues / Thurs 10:30-11:30 am or by email appointment

LECTURE: Tues / Thurs 9:00-10:25 **Room**: A2605 **Dates:** Sept. 1 – Dec. 3
LAB: Thursday 2:30 – 5:30 **Room:** A2406 **Dates:** Sept. 3 – Dec. 3

COURSE DESCRIPTION

Biology 220 introduces the science of ecology by focusing on the interrelations between individual organisms, their populations and communities. The course begins by reviewing the factors that limit distributions and then considers population demography, life tables, regulation of natural populations and managing harvested populations. We briefly review some of the mathematical models to explain interspecific competition and predation. The course continues with an overview of community ecology and considers selected topics: succession, species diversity gradients, energy flow, biogeochemistry, and the role of predation, competition and disturbance in structuring communities. Finally, we conclude by considering the prospects for global change and the ecological processes that may shape these changes.

COURSE REQUIREMENTS

Prerequisite(s): BIOL 101 and 102 or equivalent; COMM 193 or COMM 204 recommended.

EQUIVALENCY OR TRANSFERABILITY

UBC	BIOL 230 (3)	TRU	BIOL 2170 (3)
UBCO	BIOL 201 (3)	UVIC	BIOL 215 (1.5)
SFU	BISC 204 (3)		

See https://bctransferguide.ca/ for an up-to-date list of transfers within BC. Further information and assistance with transfers may be available from the School of Science.

LEARNING OUTCOMES

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

- describe the ecological factors that affect the distribution and abundance of organisms;
- understand the interplay between evolution and ecology;
- construct simple life tables and interpret simple models of population growth, interspecific competition and predator-prey interactions;
- propose testable hypotheses along with experimental tests to resolve ecological questions.

COURSE FORMAT

Lectures: Three hours per week (2 classes of 1.5 hours, face-to-face). This is a fast-paced course and students are strongly encouraged to attend lectures so they can ask questions and participate in class discussions.

Labs: Three hours per week, face to face. The 11 activities will include 4 tutorials focused on numerical problem sets, 2 field data collection exercises with formal lab reports and 5 seminars that will focus on critiquing papers or discussing ideas in ecology. Several of the lab exercises involve collecting data or making observations and this would make it difficult or impossible for students who miss the lab to complete the lab assignment. There is a strong correlation between regular attendance and academic performance.

EVALUATION:

Short in-class quizzes	5%
Take home readings & questions	10%
Field / lab exercises (need 50% to pass)	30%
Midterm exams (2 @15% each)	30%
Final Exam	25%
Total	100%

Assignments

There will be weekly short take-home reading assignments and there will be a written assignment with each week's lab activity. Students must pass the field/lab portion of the course to receive a passing grade for the overall course.

Tests

Rather than a single mid-term examination we will have two shorter quizzes. The final 3-hour will be comprehensive and cover all topics taken up during the term. The date is currently scheduled for Dec. 10 from 9:00 – noon.

COURSE WITHDRAWAL INFORMATION

The last date to withdraw without academic penalty is Nov. 5, 2026 Refer to the YukonU website for other important dates https://www.yukonu.ca/admissions/important-dates

TEXTBOOKS & LEARNING MATERIALS

Manuel C. Molles, Andrew Laursen. 2020. *Ecology: Concepts and Applications* 5th Canadian Ed.

ACADEMIC INTEGRITY

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 Academic Regulations & Procedures for further details about academic standing and

student rights and responsibilities. https://www.yukonu.ca/policies/academic-regulations

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 for resources or to arrange academic accommodations: access@yukonu.ca.

Lecture Topic Outline and Schedule – *August 26 update*

Date	Topic	Concepts	Chapter
Sept. 1	Introduction, Hypothesis testing (*Lecture #1)*	def'n ecology, levels of organization, hypothesis testing, theme of temporal and spatial heterogeneity, proximate vs. ultimate explanations	Chapter 1
Sept. 3	Land and Water (*Lecture #2)*	Biomes, water & temperature as master limiting factors, soil horizons, hydrological cycle, flux, turnover time, oceanic zonation (horizontal and vertical), still waters, zonation, lake turnover, isothermal, limits to distributions, abiotic and biotic factors, allelopathy	Chap 2 (skip pp 27-36), Chap 3 (skip 48-52, 57-63)
Sept. 8	Natural selection and evolution (*Lecture #3)*	Evolution, genetic drift, natural selection, adaptation, fitness, , phenotype, genotype, ecotypes, common garden expts., stabilizing selection, disruptive selection, directional selection	Chap 4
Sept. 10	Coevolution and speciation *(Lecture #4)*	Coevolution, Mullerian and Batesian mimicry, Mayr's biological species concept,2 types of reproductive isolation – pre- and postzygotic isolating mechanisms, 3 types of speciation,	con'd
Sept. 15	Temperature relations *(Lecture #5)*	How do organisms respond to temperature? range of tolerance, heart budgets, ectotherms, endotherms, thermal neutral zone, 8 strategies for extreme conditions	Chap 5
Sept 17	Nutrient & energy relations *(Lecture #6)*	Energy sources, trophic classifications, light (PAR), 3 photosynthesis pathways by name, C:N ratios and challenges to herbivore diets, principle of allocation	Chap 7 (delay 151-155)
Sept 22	Behavioural ecology + optimal foraging *(Lecture #7)- in the field so lecture may be on Moodle)*	Kin selection, inclusive fitness, costs & benefits of group living, trade-offs. Foraging decisions, numerical & functional responses, optimal foraging theory and assumptions, diet width mode & predictions, 3 types of functional responses, Fundamental & realized niche	Chap 7 - read 151-155, Chap 8
Sept 24	Life History Patterns (Lecture #8)	Life history classifications, r & K selection, principle of allocation, Grimes approach to plant life histories, disturbance, stress tolerance, Winemiller & Rose – 3 factors to classify life histories, climate change	Chap 9 up to page 202
Sept 29	Intro to Populations & Estimating density *(Lecture #9)*	see also Sept 3 notes where we introduced limits to dist'n; what is an individual: unitary, modular organisms, genet, ramet; patterns of dist'n: random, regular clumped, def'n of pop'n, metapopulation, relative and absolute abundance	Chap 10
Oct. 1	Population Structure *(Lecture #10)*	Intro to life tables; mortality, static and cohort life tables, n_x, l_x, d_x, q_x, 3 types of survivorship curves	Chapter 11
Oct. 6	Pop'n structure (continued) *(Lecture #11)*	Review midterm; fecundity schedules, net reproductive rate; Generation time, T, actual or realized *r,* dispersal, jump dispersal, sex	Chapter 11

		ratios & frequency dependent selection	
Oct. 8	*Population Growth* *(Lecture 12)*	Density dependent and independent birth and death rates, lambda - geometric rate of increase, exponential growth using dN/dt = *r*N, eq'n for logistic pop'n growth, assumptions of models, realized *r* vs r_{max}	Chapter 12
Oct 12-16	Thanksgiving Holiday Monday + Reading Week – no classes		
Oct. 20	Population Growth (continued) *(Lecture #13)*	Finish Chapter 12 and start competition	Chapter 12
Oct. 22	Competition – Intraspecific & Interspecific *(Lecture #14)*	Types of spp interactions, exploitation or resource competition, interference competition, impacts of competition on growth, survival and reproduction, Lotka-Volterra model of interspecific comp. and how to interpret LV graphs, comp. coefficients	Chap 9 – p 203-205; Chap 13
Oct. 27	Competition – continued *Lecture #15)*	LV competition model	Chapter 13
Oct. 29	Intro to Herbivory & Predation *(Lecture #16)*	Finish competition; Types of predation, impacts of exploitation on individuals and populations, invasive spp and enemy release hypothesis, Huffaker's case history showing role of prey refuges, other ways to escape predators, LV Predator-prey model; apparent competition	Chapter 14
Nov 3	Mutualism & Parasitism *(Lecture #17)*	Parasites can affect behaviour; winter ticks and moose, flour beetles and competition affected by parasites. Plant-ant protection mutualisms	Chapter 15
Nov. 5	Community structure and function *(Lecture #18)*	Intro to community ecology, emergent properties of communities, dominance, relative abundance, spp richness, evenness & diversity	Chapter 16
Nov. 10	Food webs & keystone species *(Lecture #19)*	Food webs. Why are food chains short (2 hypotheses), Keystone species vs dominant spp, ecosystem engineers	Chapter 16 + 17
Nov 12	Exploitation, Predation and Harvesting populations *(Lecture #20)*	Recruitment curves, role of intraspecific comp in determining shape of curve, maximum sustainable yield, fixed quotas harvests, managing harvest effort	
Nov. 17	Disturbance & Community Equilibrium *(Lecture #21))*	Review 2nd midterm; Disturbance & stability, comparison of community properties at equilibrium and non-equilibrium, resilience, resistance, alternative stable states	Chapter 18
Nov. 19	Succession succession *(Lecture #22)*	Primary & secondary succession, climax, patterns in succession	Chapter 18
Nov. 24	Community succession *(Lecture #23)*	Connell & Slatyer model of succession. Facilitation, inhibition & tolerance; Succession finale – models of succession, Park Grass expt. Start Chapter 19 – Energy flow: Primary production, GPP, NPP	Chapter 18
Ov. 26	Energy Flow & nutrients *(Lecture #24)*	Limits to NPP in terrestrial and aquatic systems, Chapter 20: Biogeochemistry, compartments, flux, pool or reservoir, residence time, phosphorus cycle, nitrogen cycle, carbon cycle.	Chapter 19 + 20
Dec. 1	*(Lecture #25)*	*Lecture topics may fall behind and will fill this slot - TBD*	
Dec. 3	Course review & highlights *(Lecture #26)*		

Biology 220 Laboratory Schedule - *August 4 updated version*

Sept. 3	#1 Lab Exercise: Hypothesis Testing in Ecology	Due Sept 10
Sept. 10	#2 Tutorial: Decomposition and Forest Soil CO_2 Emissions	Stage 2 due _____
Sept. 17	#3 Seminar: Natural Selection question	Due before lab
Sept. 24	#4 Seminar: Human Impacts on Ecosystems[1]	Due before lab
Oct. 1	**Quiz #1**	
Oct. 8	#5 Tutorial: Life Table	TBD
Oct. 15	*Reading Week – no lab*	
Oct. 22	#6 Seminar: Critique of a scientific paper (snakes, loons or turtles)[2]	Due before lab
Oct. 29	#7 Lab Exercise: Population estimate using mark recapture	TBD… in Nov
Nov. 5	#8 Seminar: Critique of paper	Due before lab
Nov. 12	**Quiz #2** date to be confirmed **–** Jolly-Seber estimates will be run after quiz on software I will bring to class	
Nov. 19	#9 Tutorial: Harvesting Populations[3]	Due Tues after lab
Nov. 26	#10 Seminar: Trophic Cascades	Due Tues after lab
Dec. 3	#11 Seminar: Critique of paper	Due before lab

[1] Read 3 papers: Stokstad, E. 2014. The empty forest. (Vanishing Fauna/ Special Section). Science (345) 6195: 396-400;
Redford, K.H. 1992. The empty forest. BioScience (42) 6: 412- 422; and Dirzo, R., H.S.Young, M. Galetti, G.Ceballos, N.J.B. Isaac, B. Collen. 2014. Defaunation in the Anthropocene. Science (345) 6195: 401-406. Informal discussion of how to critique a paper using Marcogliese , Lucian A., Casselman, John M. and Hodson , Peter V. 1997. Dramatic declines in recruitment of American Eel (Anguilla rostrata) entering Lake Ontario -- Long-term trends, causes and effects. Plenary presentation at the 3rd National EMAN Meeting, Saskatoon, Saskatchewan, 22 January 1997

[2] Choice of 3 papers: Diaz, Franciso R. and Blouin-Demers, Gabriel 2017. Northern snakes appear much more abundant in old fields than in forests. Canadian-Field Naturalist 131: 228-234 plus supplement; Dickson, Lynne 1992. The Red-throated Loon as an indicator of environmental quality. Canadian Wildlife Service, Occasional Publication No. 73; and Seburn, D.C., and H. McCurdy-Adams. 2019. Do turtle warning signs reduce roadkill? Canadian Field-Naturalist 133(3): 216–220.

[3] Readings from Pauly, D. V. Christensen, S. Guénette T.J. Pitcher, U.R. Sumaila, C.J. Walters, R. Watson and D. Zeller**.** 2002. Toward sustainability in world fisheries. Nature 418: 689-695; Worm, B. 2025. A catch in ocean conservation. Science 389: 352-353