ENVIRONMENTAL STUDIES 240
Ecological Processes (1.5 units)

Online and Asynchronous May 1-22 2026

Instructor: Dr. John Volpe **TA:** Name
Textbook: No Text **Lecture Location:** BrightSpace Page
Office Hours: Live online periodically through course (watch BrightSpace page)
Office hours Zoom links for JPV & Brighid are on Brightspace > Course Information

NOTE: For email questions on course content, **TA** name is your first point of contact

Drop dates by

May 3: 100% Fee Reduction
(enrollment past May 3 constitutes acceptance of the terms and conditions below)
May 8: 50% Fee Reduction
May 15: Academic Drop (last day to drop class)
https://www.uvic.ca/registrar/assets/docs/curriculum-calendar/non-standard-dates/non-standard-summer.pdf

Teaching Objectives

Students are introduced to

i) fundamental concepts of ecology and "sustainability"
ii) ecological processes with emphasis on systems concepts and conservation contexts
iii) introduction to quantitative analysis and techniques

Students successfully completing this course will gain understanding of

- the nature of scientific evidence
- experimental design and statistical power
- basic techniques of data collection and analysis
- basic working knowledge of summary statistics
- critical functions of (and human impacts on) basic ecological processes
- intro to interactions among social, political and ecological systems
- factors limiting species abundance and distribution
- basic understanding of network theory, panarchy, and ecological complexity
- factors regulating population growth
- linkages among individual, population, community and ecosystem dynamics
- appreciation of the role of energy as the currency of all life

****WARNING**** This is a three-month, full semester course delivered in three weeks. The pace is ***fast and uncompromising***. Only disciplined students with good time management are likely to excel.

Course Structure

Student grades will be determined by performance on five quizzes and one final exam. All will be accessed via the Brightspace page. Each quiz will be available to write anytime you have completed the relevant course material. **NOTE** quizzes begin to close after the first week of the

course and will not be reopened (i.e., Quiz 1 closes May 9, see below). It is your responsibility to be aware of the closing dates.

Once you begin writing a quiz, it must be finished within one hour – you cannot stop and return at a later time. Therefore, be sure you have an uninterrupted period to write the quiz, a stable internet connection and do not wait until the last hours to start the quiz as this allows no recourse if something goes wrong (power outage etc.). Answers will be released once the quiz closes. **Note:** again, once a quiz closes and answers are released, that quiz **cannot be reopened if missed – for whatever reason – and there are no make-ups**.

The Brightspace page is organized by lecture. For each lecture you will find:
- the lecture in MP3 format
- annotated lecture slides in pdf format
- self-study questions which should be reviewed *before* viewing the lecture
- associated readings (pdf or url) or viewings (url)

Quizzes - The open-book quizzes are focussed on understanding course material not memorization. The majority of quiz questions are multiple choice therefore a 15-question quiz should be completed in ~15 minutes if you have properly prepared. The time allotted to complete each quiz is 60 minutes. This increase (4x) eliminates time as a factor in determining performance thus no CAS time accommodations are required or accepted for this course.

Course Materials - No textbook is required for this class. All class material (readings, lecture slides etc.) will be made available through the course Brightspace page. Materials and due dates may be updated during the course – information on the Brightspace page will be updated as necessary.

Evaluation

Five Lecture / Reading Quizzes (15% each)	75%
Final Exam	25%

Quizzes and Final Exam are "open book"

Quiz and Exam Dates** (All quizzes open at the start of the class and close at 11:59pm on the dates indicated below). Do not wait until the closing day to write a quiz - students should be completing quizzes well ahead of the closing dates (note especially the closing dates of Q4 and Q5).

Quiz 1 Covering all lectures and readings from "What is Ecology?", "Primary Production", and "Secondary Production" and "Competition" (**Closes May 9**)

Quiz 2 Covering all lectures and readings on "Predation", "Population Dynamics", and "Logic, Reason & Power." (**Closes May 12**)

Quiz 3 Covering all lectures and readings from "Variance and Power", "Rockfish-Power-CIs", "Diversity" (**Closes May 15**)

Quiz 4 Covering lectures and readings for "Stability", "Cane Toads", "Community Development", "Systems Ecology" (**Closes May 19)**

Quiz 5 Covering all lectures and readings from "Metabolic Ecology", "Self-Organization", "Collapse", and "Overview"
(**Closes May 21**)

Evaluation by question type: each question is worth one mark. *Matching* questions are graded as equal weight (e.g., four matches are worth 0.25 each). *Multiple-select* questions (where more than one answer can be chosen) are graded as correct answers minus incorrect answers. Some quiz questions require a written answer, those questions will not be marked until after the quiz closes. The mark you receive when you submit the quiz **does not** include credit for written answer questions. Your quiz mark will be updated when written answer questions are manually marked after the quiz closes.

Final Exam format is multiple choice and long answers. Exam is set to be completed in 1.5 hours; you will be given 5 hours to complete it. **(Opens 12:01am May 21 | Closes 11:59pm May 22)**

There are no make-ups or deferments. It is the student's responsibility to be aware of quiz and exam deadlines. You should be completing quizzes well in advance of closing dates.

Lecture Schedule

All lecture materials are on the Brightspace page. Use the list of topics below as a guide. At the end of each lecture, you should be able to define terms and have a working knowledge of concepts.

1 Class Introduction
- introductions of ES240 team
- learning objectives
- expectations
- marking scheme and exam dates
- Brightspace
- Readings, Self-Study Qs, Quizzes
- office hours, locations etc.

2 What is ecology?
- ecological hierarchy from DNA to biome
- trophic functional groups, auto/heterotrophs,
- nature of evidence
- natural history vs. ecology
- scientific method
- sampling, repetition
- paradigm shifts - Lewontin
- punctuated equilibrium - Kuhn, Gould
- case study - sea lice & salmon

3 Ecosystem metabolism I – Primary Production
- photosynthesis
- inorganic vs. organic energy
- carbon, nitrogen-phosphorus, water cycles
- gross and net 1^o productivity
- productivity differences by habitat
- eutrophication
- case study - Ancient Rome (urban footprint / human appropriation of 1^0 production)

4 Ecosystem metabolism II – Secondary Production
- secondary production
- trophic web
- metabolism (body mass ~ metabolism)
- Lindeman efficiency
- Eltonian pyramids
- bottom up vs. top down control
- case study - emergent properties of additive effects

5 Competition
- exponential growth, Malthus
- Darwin's "struggle for existence"
- niche, fundamental and realized
- Eltonian niche and Hutchinsonian niche theories
- niche space / niche volume / hyperdimensional niche
- mate competition / secondary sexual characteristics
- exploitative, pre-emptive and interference competition

6 & 7 Predation *(this topic requires two class periods when F2F, it is a single video file on Brightspace)*
- producers vs. consumers
- functional classes of consumers (herbivore, frugivore, carnivore etc.)
- evolution of adaptations
- Red Queen Hypothesis
- cooperative vs. solitary foragers
- optimal foraging theory
    - time and energy optimizers
    - diet and patch models
- case study - human directed evolution (commercial fisheries / silversides)

8 Population Ecology
- immigration and emigration
- Malthus revisited
- develop the exponential growth equation (N, dN, B, D, r)
- explore intrinsic rate of increase *r*
- predicting future population size $N_t=N_oe^{rt}$
- develop the logistic growth equation
- differences between what is going on vs. being able to see it, monitor it, and predict
- r and K strategists; survivorship curves
- experimental design
- randomization and independence

9 Logic, Reason and Central Tendency
How do you know what you know?
Separating patterns (correlations) from cause and effect
Science as a way of knowing
Sample & populations, variables & parameters
The Golden Rule of sampling
Continuous, Discrete, and Categorical variables
Median, Mean and Mode
R^2 and variation

10 Variance and Power
Variation and the power of inference

Range, Variance, Standard deviation, Standard error of the mean, 95% Confidence intervals
Statistical power
Power curve
Sir Ronald Fisher
p-value
Type I and Type II errors

11 Power and Confidence
Experimental examples illustrating the elements of the previous two lectures

12 Diversity
- taxonomic / (bio)diversity
- global and continental distribution of biodiversity
- genetic - species - ecosystem levels of diversity
- alpha, beta, gamma diversity
- diversity through (prehistoric) time
- intermediate disturbance hypothesis
- diversity vs. efficiency (why are there so many species?)
- statistical significance

13 Stability
- stability ~ diversity debate
- MacArthur, May, Yodzis
- food webs / secondary effects and relationships
- network theory / Milgram / Erdös
- small world networks
- strong and weak links, Granovetter
- dominant vs. keystone species

14 Invasion Ecology - Cane Toads (view independent of lecture)
- the multiple dimensions and sometimes bizarre perspectives of a now classic invasion story

15 Community Development
- succession - Primary and Secondary
- Clement's superorganism vs. Gleason's individualistic development
- intermediate disturbance hypothesis (yes, again)
- assembly rules
- ecological networks

16 Systems ecology
- Newton vs. Hooke
- Descartes, Hobbs
- Laplace
- Darwin and Malthus
- Adam Smith
- Newtonian systems / reductionism
- complexity and non-Newtonian systems
- properties of complex systems vs those of complicated systems
- Lewontin and Kuhn revisited

17 Metabolic Ecology
- catalysis, autocatalysis

- knits together production, competition, predation, material cycles in the context of the overarching systemic imperative: intro to entropy (the physical imperative) and its competition with the biological imperative (resisting entropy at all costs).

18 Self Organization
- entropy
- laws of thermodynamics
- deterministic vs. complex systems
- energy flow in ecological systems
- Schrodinger; *Order from Order* and *Order from Chaos*
- principles of Most and Least Action
- self organized complexity / Bénard cells

19 Collapse
- the limits of growth
- self-organized criticality
- Panarchy
- recasting network ideas in the context of finite growth
- ecological restoration
- the dual edge nature of efficiency as applied to conservation

20 Overview
- applied lessons from the course
- the role of ecology in public discourse
- conservation biology studies the manifestation of underlying social/economic drivers
- overview of course material

General Class Notes

GenAI not allowed

Please be advised that in this course you are not authorized to use any form of generative AI. Students should not make any use of generative AI tools such as ChatGPT, Grammarly, among others that use AI for content generation and editing. As per the University of Victoria Academic Integrity Policy "*Academic integrity requires commitment to the values of honesty, trust, fairness, respect, and responsibility.*" The only permissible use of AI in this course is as a graphic design aid in your Gastronomy Magazine Article, however, no content of your article can be a product of generative AI.

Grading

The table below is the official UVic grading system used by instructors in arriving at final assessments of student performance.

Grade	Grade Point Value	Percentage*	Description
A+	9	90 - 100	An A+, A, or A- is earned by work which is technically superior, shows mastery of the subject matter, and in the case of an A+ offers original insight and/or goes beyond course expectations. Normally achieved by a minority of students.
A	8	85 - 89	
A-	7	80 - 84	
B+	6	77 - 79	A B+, B, or B- is earned by work that indicates a good comprehension of the course material, a good command of the skills needed to work with the course material, and the student's full engagement with the course

Grade	Grade Point Value	Percentage*	Description
B	5	73 - 76	requirements and activities. A B+ represents a more complex understanding and/or application of the course material.
B-	4	70 - 72	
C+	3	65 - 69	A C+ or C is earned by work that indicates an adequate comprehension of the course material and the skills needed to work with the course material and that indicates the student has met the basic requirements for completing assigned work and/or participating in class activities.
C	2	60 - 64	
D	1	50 - 59	A D is earned by work that indicates minimal command of the course materials and/or minimal participation in class activities that is worthy of course credit toward the degree.
COM	N/A	N/A	Complete (pass). Used only for 0-unit courses and those credit courses designated by the Senate. Such courses are identified in the course listings.
CTN	Excluded Grade	N/A	Continuing. Denotes the first half of a full-year course.
F	0	0 - 49	F is earned by work, which after the completion of course requirements, is inadequate and unworthy of course credit towards the degree.
N	0	0 - 49	Did not write examination or complete course requirements by the end of term or session; no supplemental. This grade may only be assigned by the Associate Dean, Academic and Student Relations.
DEF	N/A	N/A	**Deferred status granted.** Used only when deferred status has been granted because of illness, an accident or family affliction. See Deferred Status. This grade may only be assigned by the Associate Dean, Academic and Student Relations.
WE	N/A	N/A	**Withdrawal under extenuating circumstances.** The WE registration status will replace a course registration or grade when approved by the Dean following a request for academic concession from a student. This registration status is excluded from the calculation of all grade point averages; it will appear on the official transcript. This grade may only be assigned by the Associate Dean, Academic *and Student Relations.*

Academic Integrity

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.

Faculty and University Regulations and Policies

Students should review all regulations and policies contained in the University of Victoria Calendar. Students must comply with all applicable university and Faculty policies and regulations. In particular, please note the following important regulations and policies:

- Accessibility

- Accommodation of Religious Observance
- Discrimination and Harassment Policy
- Diversity / EDI
- Equity statement
- General University Policies
- Non-academic Student Misconduct
- Sexualized Violence Prevention and Support
- Student Conduct
- University Calendar and section on "Information for all students"

Resources and Supports

There are a variety of resources that are available to students that can support your academic success and wellness.

- Centre for Academic Communication
- Indigenous Academic & Community Engagement (Student Resources)
- Indigenous student services
- Student Wellness
- Support Connect for 24/7 support
- Office of Student Life resources for Student Conduct and Non-Academic Misconduct
- Ombudsperson
- UVic Campus & Community Resource List
- UVic Learn Anywhere, the primary learning resource for students that offers many learning workshops and resources to help students with academics and learning strategies.
- UVic Libraries