School of Science

ENVS 100

Introduction to Environmental Science

Fall 2023

3 Credits

Course Outline

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

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OFFICE HOURS: Tues / Thurs 9:20 -10:20 or by arrangement via email.

LECTURE: Mon / Wed 9:00 -10:30 **Room**: A2402 **Dates:** Sept. 6 – Dec. 5
LAB: Mon 2:30-5:30 **Room:** A2605 **Dates:** Sept. 11 – Dec 5

COURSE DESCRIPTION

Environmental Science 100 is specifically designed for students who are not pursuing a science program but who wish to learn more about the physical and biological processes that shape our environment. Our planet, and its living and non-living parts, makes up the biosphere, which itself is a complex web of interactions. We investigate these interrelationships by studying the underlying processes in terms of their biology and chemistry.

The course has two goals. First to explain some of the basic concepts in ecology and chemistry and secondly to show how these concepts can help understand four or five of the critical problems facing our world: the size and growth rate of the world's population, atmospheric problems (global warming, thinning of the ozone layer and acid precipitation) and sustainability of the world's agricultural and forestry industry.

COURSE REQUIREMENTS

Prerequisite(s): Admission to an academic program within the School of Science or School of Liberal Arts.

EQUIVALENCY OR TRANSFERABILITY

UBC	Geog (3)	SFU	BISC 1xx (3)
UAF	Nsci Elec (n) (3)	UAS	Physical Geog Elec (3)
UR	Geog 100L (3) or Esci 200L (Educ. Students)		
UNBC	Envs 1xx (3) or with ENVS 101 = Envs 100 (3) & Envs 1xx (3)		
UVIC	Es 100L (1.5)		

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

Students that successfully complete this course will be able to:

- Describe the basic processes and interrelationships that govern our biosphere.
- Be able to research environmental topics and prepare verbal and written arguments.
- Outline the range of environmental problems confronting the world and identify potential solutions at a variety of levels (as individuals, locally and globally.)

COURSE FORMAT

Lectures: Three hours per week (2 classes of 1.5 hours, face to face). Efforts will be made to record and post a video of the lecture online after class but students should participate in each class rather than relying on the video archive.

Labs: Three hours per week, face to face, with physical distancing as required. There will be a total of eight or nine activities during the term and two lab periods will be used for midterms.

ASSESSMENTS:

Attendance & Participation

Students are expected to attend both lectures and the scheduled activities (including field activities). 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.

Assignments

There will be short, weekly take-home assignments and the field/lab activities involve written assignments. 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 exam, scheduled for Dec. 8 from 1-4 PM, will be comprehensive and cover all topics taken up during the term.

EVALUATION:

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

COURSE WITHDRAWAL INFORMATION

The Last date to withdraw without academic penalty is Nov. 2nd, 2023. Refer to the YukonU website for other important dates https://www.yukonu.ca/admissions/important-dates

REQUIRED TEXTBOOKS AND MATERIAL

Freedman, Bill 2018. *Environmental Science: A Canadian Perspective*. 6th Edition The text is available as a free download in various formats under a Creative Commons licence. See: https://digitaleditions.library.dal.ca/environmentalscience/ A course manual will be distributed during the first lab session and additional readings will be available on the course web site.

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

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.

Lecture Topic Outline and Schedule - July 6 Version

Date	Topic	Readings
Sept. 6	Introduction: environmental science, ecology, sustainable development, ecological footprint, I=PAT, worldviews.	Chapter 1
Sept. 11	Scientific method and hypothesis testing. Succession	Chapter 2. Dearden & Mitchell 2016 Chapter 3 on Succession
Sept. 13	Physical world: hydrosphere & atmosphere. Introduction to key ecological concepts	Chapter 3 pp 49-56
Sept. 18+20	Energy flow through ecosystems: ecosystem structure, photosynthesis, consumers, decomposers. Nutrient flows.	Chapter 4 pp 60, 62, 64-66, 69-76
Sept. 25+27	Questions of abundance: Animal populations – density, mortality and birth rates. Human populations – historical view of Malthus	pp. 15-18, 39-52, 120-
Oct. 2 + 9	2 holiday Mondays in a row – no lectures or labs	
Oct. 4	Human populations - population growth and sustainability. *** On Zoom**	Chapter 2, pp 39-55
Oct. 11	Human populations – Demographic transition	

Oct. 16	Chemistry #1: What is chemistry? Basic def'ns – matter, elements and compounds, mixtures. Simple model of atomic structure – nucleus, protons, neutrons, electrons, atomic number, periodic table, isotopes. Intro to carbon cycle & GHGs	Timberlake & Timberlake - Chap 3
Oct. 18	Chemistry #2: Orbitals and electron configuration, ions, octet rule, balancing chemical formulae, law of conservation of mass. Setting goals for GHG reductions - friction between developed & developing countries	Timberlake & Timberlake - Chap 4
Oct 23	Chemistry #3, Molecular mass, photosynthesis eq'n, mole, Avogadro's #r. Electronegativity, covalent bonds. Intro to acid precipitation & acid mine drainage	
Oct 25	Chemistry #4: Acid base reactions, proton donors and proton acceptors, pH, indicators, buffers. Molarity, solvent solute. Acid precipitation – impacts on terrestrial & aquatic ecosystems	pp. 450-452
Oct. 30	Chemistry #5: Acid precipitation -solutions. Intro to the problem of ozone loss in the stratosphere, Montreal Protocol	
Nov. 1	Chemistry #7: Black Carbon. How to reduce unwanted emissions. Review.	pp. 85-86 (carbon cycle), Chapter 17
Nov. 6	Guest lecture: Dr. Guillaume Nielsen – lecture on chemistry & Yukon mine remediation; building a small-scale bioreactor.	Chapter 16
Nov. 8	**Quiz 2 -** Chemistry	pp 471-485
Nov. 13	**Holiday** – no classes - *Remembrance Day*	
Nov. 15	Guest lecture: Mary Gamberg - Contaminants in northern ecosystems	To be confirmed
Nov. 20	Agriculture: historical survey of trends. Impacts of agriculture: nutrient cycles, deforestation, energy consumption	Chapter 24
Nov 22	Agriculture conclusion	Chapter 24
Nov. 27	Survey of forestry practices - Carbon budgets and agricultural and forestry practices	
Nov. 29	Pesticides in agriculture and forestry: What are they? Why do we use them? What are the disadvantages?	Chapter 23
Dec. 4	Alternatives to pesticides - Integrated Pest Management (IPM), bio control, changes in land culture practices	Chapter 22
Dec 5.	Make up lecture – Course summary [*Classes run on a Monday schedule to make up* for holidays.]	

ENVS 100 – Lab Activity Schedule

Please read over the background information and directions for each activity before class. Experience shows that students who forget to prepare for the lab ahead of time, by doing the readings, get confused and frustrated. Take the time to prepare so you can get the most out of these activities.

Date	Activity
Sept. 11	McIntyre Creek Vegetation field survey - meet in A2801
Sept. 18	Library Tour at 2:30 PM - Meet Aline Goncalves at the front of the library
Sept. 25	Exponential Population Growth tutorial
Oct. 2	***Holiday –*** *no classes National Day for Truth and Reconciliation*
Oct. 9	***Holiday –*** *no classes - Thanksgiving*
Oct. 16	Quiz 1
Oct. 23	Tragedy of the Commons workshop
Oct. 30	Chemistry #6: Ozone – High & low. Intro to air pollution in the troposphere - 7 criteria chemicals – SO_2, NO_x, $PM_{2.5}$, VOCs, CO, NH_3, , photochemical smog & ozone
Nov 6	Chemistry Lab 1 : Starting a bioreactor (Dr. Guillaume Nielsen & Inderjeet Kaur)– YRC lab – To be confirmed
Nov. 13	**Holiday** – no classes - *Remembrance Day*
Nov 20	Contaminants exercise with Mary Gamberg (to be confirmed)
Nov. 27	Chemistry Lab 2: Assessing the bioreactors (Dr. Guillaume Nielsen & & Inderjeet Kaur) – YRC lab – To be confirmed
Dec. 4	IPM conclusion lecture during lab period – 60 minutes
Dec. 5	No lab – review for final on Dec. 8