School of Science

ENVS 101

Introduction to Environmental Science 2

Winter 2024

3 Credits

Course Outline

INSTRUCTOR: Scott Gilbert, BSc., Ph.D.; Kailey Wright

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OFFICE HOURS: by arrangement

LECTURE: Mon / Wed 10:30-noon **Room**: A2206 **Dates:** Jan. 3 – April 10
LAB: Thursday 1:00-4:00 **Room:** A2803 **Dates:** Jan. 4 – April 11

COURSE DESCRIPTION

Environmental Science 101 is a companion course to ENVS 100; it is designed for students who are not pursuing a science program but who wish to learn more about the effects of human activities on the environment. Students will be able to apply the basic concepts that were presented in ENVS 100 to investigate a variety of environmental problems at both the local and global level.

There will be four major units in this course. Firstly, energy supply options and the relative impacts of these options on the environment. With changing global energy economies, considering options for reducing dependence on certain energy types in order to lessen additions to global climate feedbacks is an increasingly integral challenge to northern lifestyles. Secondly, an introduction to basic concepts of organic chemistry and how contaminants such as DDT and PCB's have impacted northern ecosystems. Thirdly, the importance of the water cycle and groundwater, as well as problems of water pollution from domestic agriculture and industrial sources. And lastly, the practical aspects of environmental protection and an introduction to conservation biology and environmental regulation.

PREREQUISITES

Admission to an academic program within the School of Science or School of Liberal Arts.

EQUIVALENCY OR TRANSFERABILITY

SFU	SFU GEOG 1XX (3), Physical A
TRU	TRU BIOL 1XXX (3)
UAS	Physical Geog Elec (3)
UBC	UBC GEOG 1st (3). Not for credit in Science
UR	Geog 200 (3)
UVIC	UVIC ES 1XX (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

Upon successful completion of the course, students will be able to:

- Use library resources to research and critically assess an environmental topic.
- Write a basic scientific report to describe the outcome of a field or laboratory study using a standard format of Introduction, Methods, Results and Discussion.
- Name simple organic molecules, describe the combustion reaction of alkanes, recognize functional groups and isomers, and understand the structural aspects of PCB's that influence their toxicity.
- Develop a simple cost-benefit analysis of energy-conservation related proposal including a matrix that lists relevant externalities.
- Summarize the range of issues surrounding an environmental question including ethical perspectives, questions of sustainability and underlying biological and chemical factors.

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 are expected to participate in each class rather than relying on the video archive.

Labs: Three hours per week, face to face. Activities vary and will include chemistry lab demonstrations, tutorials on problem sets, guest lectures and class presentations.

ASSESSMENTS:

Attendance & Participation

Students are expected to attend both lectures and the scheduled activities during the lab period. 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 weekly short class quizzes and take home assignments and most lab activities will require submission of written assignments. Students must pass the lab portion of the course if they wish to receive a passing grade for the overall course.

Tests

Rather than a mid-term examination we will have a short test at the end of three of the modules. The final exam, scheduled for Friday April 12 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	30%

Quiz (3 modules @ 8, 8, 9%)	25%
Final Exam	25%
Total	100%

COURSE WITHDRAWAL INFORMATION

The last date to withdraw without academic penalty is March 7, 2024. 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/

Flowers,P., Theopold, K., Lanley, R. & Robinson, W. 2019 – *Chemistry.* Chapter 20 will be provided on our course website. Full text is also available: https://openstax.org/details/books/chemistry

Weekly lab activities 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 – Dec. 6 *Draft Version*

ENVS 101 - Lecture Topics & Readings[1]

Date M/W	Lect	Topic
		Module I - Environmental Protection
Jan. 3	1	Term overview. Environmental Health & Toxicology **Readings:** pp 576-587
Jan. 8	2	Intro to systems analysis & feedback loops in natural systems
Jan. 10	3	Intro to Cost-Benefit Analysis & Externalities
Jan. 15	4	Sustainability: do we need more regulations – Jurisdictions & RRM **Readings:** Chapter 18
Jan. 17	5	Island biogeography and preserving biodiversity **Readings:** Chapter 7
Jan. 22	6	Habitat fragmentation
Jan. 24	7	? Tools to encourage compliance with environmental regulations
Module II -Water		
Jan. 29	8	Intro - Overview of threats to surface and ground water, quantity and quality; Chemical properties of water Chapter 1[2] in *Northern Waters*,
Jan. 31	9	Groundwater resources and threats
Feb. 5	10	Intro to hydrology & impacts of hydro dams **Readings**: pp 503-516
Feb. 7	11	Water pollution & eutrophication **Readings:** Chapter 20
Feb. 12	12	Northern Water Quality Issues – **Readings:** Chapter 7 in *Northern Waters*
Feb. 14	13	Contaminants in northern waters
Feb. 19 -22		Reading Week - Feb 19-22 includes Friday holiday for Heritage Day on Feb 23
Feb 26	14	Chemistry review: ionic and covalent bonds. Why is there such diversity of carbon compounds?
Module III – Contaminants & Organic Chemistry		
Feb. 28	15	Introduction to alkanes, alkenes, alkynes, cycloalkanes
March 4	16	Combustion of alkanes & balancing equations Readings: pp 602-603
March 6	17	Isomers

[1] Freedman, Bill. 2018. *Environmental Science: A Canadian Perspective*. 6th Ed.

2 Readings from *Northern Waters: A Guide to Designing and Conducting Water Quality Monitoring in Northern Canada*. 2005. EMAN-North

March 11	18	Benzene, functional groups
March 13	19	PCB's - structure and toxicity; chiral compounds and stereochemistry
March 18	20	Chemistry conclusion
Module IV - Energy		
March 20	21	Intro to Energy Module: What is energy? Units of measurement Readings: Chap 13
March 25	22	Energy Choices: Lovins – soft & hard path. Template for energy choices – diesel Readings: pp 75-77; 314-315; 464-465; 609-610
March 27	23	Wind Energy & Nuclear Energy – Small Modular Reactors
April 1		Holiday Monday
April 3	24	Geothermal, DSM, Carbon Capture Sequestration & Geoengineering
April 8	25	Energy Wrap Up
April 10	26	Final Summary Lecture

Schedule of Lab Activities

Thursdays	**Topic**
Jan. 4	Heat Loss of Winter Footwear Energy
Jan. 11	Tutorial on cost-benefit calculations
Jan. 18	Island biogeography workshop
Jan. 25	Snow depth tutorial
Feb. 1	***Quiz**: Environmental Protection*
Feb. 8	Water Quality Lab visit (to be confirmed)
Feb. 15	Arsenic trioxide in Yellowknife Video: *Shadow of A Giant* https://vimeo.com/100450687
Feb 22	Reading Week Break
Feb 29	***Quiz**: Water* - 45 minutes // Organic Chemistry Tutorial I
March 7	Organic Chemistry Tutorial II
March 14	Organic Chemistry Tutorial III + Solubility demonstration in Chemistry Lab
March 21	***Quiz**: Organic Chemistry*
March 28	Workshop – energy alternatives
April 4	Energy conservation tutorial
April 11	No lab – final exam is next day