DURHAM COLLEGE
SUCCESS MATTERS

Sch of Science & Engineer Tech

Environmental Science

2017-18 Academic Year

Program	Year	Semester
SET-Environmental Technology Advanced Diploma	1	1

Course Code:	ENVI 2131	**Course Equiv. Code(s):**	SCIE 1302
Course Hours:	56	**Course GPA Weighting:**	4
Prerequisite:	N/A		
Corequisite:	N/A		
Laptop Course:	**Yes** [ ] **No** [X]		
Delivery Mode(s):	**In class** [X] **Online** [ ] **Hybrid** [ ] **Correspondence** [ ]		
Authorized by (Dean or Director):	Susan Todd	**Date:**	July 2017

Prepared by		
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Course Description:

This one semester course (two hours lecture, two hours lab) introduces the fundamental principles of ecology and environmental science. It emphasizes an ecosystem approach to studying the environment. The interactions between abiotic and biotic are examined to gain an understanding of how a dynamic balance is achieved in natural ecosystems. This course also examines the effect of human intervention on ecosystems and biomes through an investigation of the five categories of pollution as well as the major trends in resource consumption and use. This is done to gain a better understanding of how the environment is altered by human action and why these actions may have significant effects on an ecosystem and its sustainability. The laboratory exercises are an integral part of this course. They are designed to both reinforce concepts developed during lectures as well as introduce new concepts. An emphasis is placed on terrestrial and aquatic ecosystems both through field and in class lab work.

Subject Eligibility for Prior Learning Assessment & Recognition (PLAR):

Prior Learning Assessment and Recognition (PLAR) is a process a student can use to gain college credit(s) for learning and skills acquired through previous life and work experiences. Candidates who successfully meet the course learning outcomes of a specific course may be granted credit based on the successful assessment of their prior learning. The type of assessment method (s) used will be determined by subject matter experts. Grades received for the PLAR challenge will be included in the calculation of a student's grade point average.

The PLAR application process is outlined in http://www.durhamcollege.ca/plar. Full-time and part-time students must adhere to all deadline dates. Please email: PLAR@durhamcollege.ca for details.

PLAR Eligibility

Yes [X] **No** [ ]

PLAR Assessment (if eligible):

- [X] Assignment
- [X] Exam
- [ ] Portfolio
- [ ] Other

Course Learning Outcomes

Course Learning Outcomes contribute to the achievement of Program Learning Outcomes for courses that lead to a credential (e.g. diploma). A complete list of Vocational/Program Learning Outcomes and Essential Employability Skill Outcomes are located in each Program Guide.

Course Specific Learning Outcomes (CLO)

Student receiving a credit for this course will have reliably demonstrated their ability to:

CLO1 Relate biological, chemical and physical sciences to environmental work.

CLO2 Characterize abiotic and biotic relationships for the purpose of analyzing ecosystems.

CLO3 Relate knowledge of biogeochemical cycles of various elements to ecosystem functioning and maintenance.

CLO4 Describe energy conservation measures, energy generation and alternative energy in terms of environmental impacts.

CLO5 Recognize the interrelationships among technology, politics, social issues and the economy.

CLO6 Differentiate natural and anthropogenic influences on ecosystem stability and development.

CLO7 Recognize the impact of environmentally damaging activities on ecosystems, renewable and non-renewable resources.

CLO8 Identify the pressures and challenges of sustainable development.

CLO9 Conduct field tests and investigations according to prescribed procedures, processes and standards.

CLO10 Prepare, interpret and analyze data using appropriate methods.

Essential Employability Skill Outcomes (ESSO)

This course will contribute to the achievement of the following Essential Employability Skills:

- [X] EES 1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
- [ ] EES 2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
- [X] EES 3. Execute mathematical operations accurately.
- [ ] EES 4. Apply a systematic approach to solve problems.
- [X] EES 5. Use a variety of thinking skills to anticipate and solve problems.
- [ ] EES 6. Locate, select, organize, and document information using appropriate technology and information systems.
- [X] EES 7. Analyze, evaluate, and apply relevant information from a variety of sources.
- [X] EES 8. Show respect for the diverse opinions, values, belief systems, and contribution of others.
- [X] EES 9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
- [X] EES 10. Manage the use of time and other resources to complete projects.
- [ ] EES 11. Take responsibility for one's own actions, decisions, and consequences.

Evaluation Criteria:

The Course Learning Outcomes and Essential Employability Skills Outcomes are evaluated by the following evaluation criterion.

Evaluation Description	Course Learning Outcomes	EESOs	Weighting
In-Process Activities and Homework (10 @ 1%)	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6, CLO7, CLO8	EES5, EES7	10
Laboratory Assignments (Labs 1-5 included in midterm mark)	CLO1, CLO2, CLO3, CLO5, CLO6, CLO9, CLO10	EES3, EES5, EES7, EES9	30
Term Test One (included in the midterm mark)	CLO1, CLO2, CLO3, CLO5, CLO6	EES1, EES8, EES10	15
Term Test Two	CLO1, CLO4, CLO6, CLO7, CLO8	EES1, EES10	15
Final Exam	CLO1, CLO2, CLO3, CLO4, CLO5, CLO6, CLO7, CLO8	EES1, EES5, EES8, EES10	30
Total			**100%**

Notes:

1. The relative timing of the term tests are included in the section "Sequence of Instruction". The exact dates will be determined during the semester but students will have at least one week notice prior to the test date. The format for tests will be discussed in class when test dates are announced.
2. Content and concepts learned in the labs will be incorporated into the term tests.
3. All term tests and the final examination will be closed book.
4. In circumstances where a student has been (or anticipates being) absent from a lecture/lab due to illness or injury they may request special consideration.

   Missed Evaluation:
   Students who unavoidably miss a class where a test, quiz or other form of evaluation occurs, must notify the professor via email prior to the scheduled class time where possible or within 24 hours of the missed class. If this is not possible students must connect with their professor or student advisor immediately upon their return to school.

   For academic consideration, which will consist of the weight of the test being added to the final exam, appropriate verifiable documentation must be presented to the student advisor (Room H140 in Oshawa) and dated within 5 calendar days of your return to school.

   (15% term test will be added to the 30% final exam = 45% Final Exam)

   Missed Lab:
   Students who unavoidably miss a lab must notify the professor via email prior to the scheduled lab time where possible or within 24 hours of missing the scheduled lab. There may be a maximum number of labs that may be excused with appropriate documentation beyond which a grade of zero will be entered and/or successful completion of the laboratory component may be in jeopardy.

   For academic consideration appropriate verifiable documentation must be presented to the student advisor and dated within 5 calendar days of your return to school.
5. If more than 20% of the required work is missed, the student will receive a mark of zero for missed work regardless of whether documentation is provided or not.
6. The final examination will be comprehensive (students will be evaluated on all material from the beginning to the end of the semester).
7. Assignments will only be accepted up to 5 days after the due date. For each day the assignment is late, 15% will be deducted. Weekends are included in the day count.

8. Any work that has been plagiarized will receive a mark of zero and an academic alert will be filed.
9. This course qualifies for the Missed Final Examination Policy for Week 15 ONLY. The date for the final examination is determined by the Durham College timetabling office.

Required Text(s) and Supplies:

1. Smith, T. M. (2014). Elements of Ecology, First Canadian Edition, 1st Edition. Toronto. Pearson Canada Inc.

Recommended Resources (purchase is optional):

1. This course contains labs that will require you to be outdoors. Appropriate clothing and footwear is recommended.

Policies and Expectations for the Learning Environment:

General Policies and Expectations:

General College policies related to	General policies related to
+ Acceptable Use of Information Technology + Academic Policies + Academic Honesty + Student Code of Conduct + Students' Rights and Responsibilities can be found on-line at http://www.durhamcollege.ca/academicpolicies	+ attendance + absence related to tests or assignment due dates + excused absences + writing tests and assignments + classroom management can be found in the Program Guide (full time programs only) in MyCampus http://www.durhamcollege.ca/mycampus/

Course Specific Policies and Expectations:

Science Laboratory Policies and Expectations

1. Online Safety Modules
Before starting work in the labs, all students must complete the safety training as provided online through Durham Connect (D2L). This includes a quiz where students are required to achieve a grade of 80% (multiple attempts are permitted) and a survey. Any special health conditions may be noted here. Completion of this training confirms the student understands and agrees to the safety regulations put forth. Students not completing this requirement will be denied access to the labs and will receive a mark of zero for the missed lab periods.

2. Laboratory Attendance
Laboratory attendance is compulsory; there will be no makeup laboratories
Students must attend in their scheduled lab section unless otherwise approved by both laboratory instructors.
All laboratory periods begin at 10 minutes after the hour. There will be no late entry to labs.
Students must have their lab workbook data signed off by the instructor where appropriate, before leaving the laboratory.
Students must be present and complete the laboratory in order for a report to be accepted for grading.

3. Missed Laboratories
In order to avoid a zero mark grade, students must provide appropriate and verifiable documentation within a timely manner for a maximum of 2 lab periods. If any additional lab periods are missed, a grade of zero will be entered for each. This policy is in place to ensure all practical learning outcomes are achievable.

4. Laboratory Housekeeping
Students must work cooperatively, respectfully, and safely. Should a student not adhere to lab safety policies and procedures, the lab instructor will issue a Student Academic Alert for Behavior /Conduct. Penalties will be commensurate with the nature of the offence.

Back packs, cellphones, headphones and ear buds are not permitted in the laboratories. Please inform your laboratory instructor if you are required to wear medical devices. WHITBY 11-06, these items may be brought into the lab but MUST be placed in the cubbies at the front of the room.

5. Communication
Working safely and efficiently in a laboratory environment requires clear communication with other students and the instructor. For this reason, the common language used in the laboratories will be English.

Laboratory Safety Regulations

1. Supervision is required in all labs. Exceptions to this may be permitted in certain labs with professor approval.

2. Eating, drinking and horseplay in the lab are not permitted.

3. Personnel Protective Equipment (PPE):

Lab coats and safety glasses are required in A120, A209, A213, A240, I210, 11-06 (Whitby) at all times. Designated lab coats are required in A206 at all times.

Students must wear shoes that adequately cover the whole foot including the top; low-heeled shoes with non-slip soles are preferable.
Do not wear sandals, open-toed shoes, open-backed shoes, or high-heeled footwear in the laboratory.

Students must wear long pants or skirts that completely cover their legs. Students should not wear shirts exposing the torso, shorts, or short skirts.

Laboratory coats and other PPE are not to be worn outside of the laboratory areas as they may be a source of contamination. Microbiology lab coats are not to be worn outside of the Microbiology lab, A206.

Do not write on or dye your lab coat. Lab coats are white to enable wearers and coworkers to quickly see if a chemical or solution has been spilled on the coat.

Adhere to the following procedure when handling acids and bases greater than 1 Molar/1 Normal/1%
- Always visually inspect Personal Protective Equipment (PPE) prior to use and ensure proper fit
- Gloves must cover the hands and wrists where skin may be exposed
- Acids/Bases at this concentration level must be opened and dispensed only in the fume hood
- Ensure the fume hood sash is set at the appropriate level

- Once finished, remove gloves as instructed
- Clean, inspect, and return gloves to their storage locations.

4. Read the safety warning on reagent containers. Become familiar with the Safety Data Sheets.

5. Use the fume hood for all chemicals/reactions producing offensive odours/or toxic fumes.

6. Report all spills, accidents or injuries to the professor immediately.
If chemical enters the eye, immediately use eye wash and flush for a minimum of 5 minutes.
If chemical is spilled on skin, immediately wash with plenty of water.
The Lab professor and student must jointly complete an online incident report form and forward as directed. The supervisor should be noted as maureen.calhoun@durhamcollege.ca to ensure a copy of the report is sent to the office for appropriate follow up.
http://www.durhamcollege.ca/forms/accidentinjury/

7. Use proper lab techniques and practices at all times:

Care must be taken when using pipettes since they are very fragile and expensive.
Use appropriate pipetting devices as shown by your instructor.
Mouth pipetting of any substance is prohibited.

Do not use your mouth to propel any liquid out of burettes, pipettes or any glassware

Waft fumes to nose rather than smelling directly.

Carry all strong acids and bases in an approved rubber container.

Pour acid slowly into water. NEVER WATER INTO CONCENTRATED ACID.

Point test tube away from yourself and others when carrying out reaction.

When inserting anything glass into a rubber stopper, lubricate with water or glycerol; wrap hand in towel; apply gentle pressure with twisting motion, never use force.

Larger volumetric flasks should never be held or carried by the neck, especially when filled. Support these large items with two hands.

Discard cracked or chipped glassware in the "broken glassware" box located in each lab.

Flammable liquids should never be used with an open flame in the lab.

Extremely corrosive materials should be handled only while wearing gloves.

Pour or take only quantities of solvents as required for the experiment.
Cap all solvent bottles after use.
Use solvents in the fume hoods.

Label each container of material as you remove it from a reagent bottle according to SDS (WHMIS).

Do not put extra removed material back into reagent bottles.

Synthetic finger nails are not recommended in the laboratory; they are made of extremely flammable polymers which can burn to completion and are not easily extinguished.

8. Pour or scoop out only quantities of reagents or chemicals as required by the experiment.
Weigh quantities directly from containers and do not transfer excessive amounts to large weigh boats.
Never use hands to transfer materials
Return lids to all containers immediately after use.

9. Clean up spills immediately using appropriate method
For acids use sodium bicarbonate or the acid spill kit
For bases use water or the base spill kit
For organics use absorbent or the organic spill kit.
(Spill kits are in the balance room - A211) Inform your instructor when there is a spill.

10. Clean up balance immediately after use. Brushes are at each balance for this purpose.

11. Disposal of chemicals: When in doubt consult your lab instructor. Never mix chemicals unless specifically instructed to do so.

Organic Compounds: In general, all liquid is to be placed in "Halogenated" or "Non-halogenated" waste cans as appropriate. Non-toxic organic solids may, on advice of the instructor, be placed in the garbage.

Inorganic Compounds: Follow specific instructions. In general, if water soluble, dissolve in water and flush down drain with lots of water. Insoluble materials may be placed in garbage.

Acids and Bases: Neutralize strong acids and bases prior to disposal. Pour slowly into the sink in the fume hood, while water is running. Keep water running for a few minutes after. Never dispose of acids and bases together.

12. Any sample that needs to be stored must be clearly labeled, dated and stored in an appropriate container and designated laboratory cabinet. Samples stored in laboratory glassware such as a volumetric, will be disposed of.

13. At end of your lab period, your work station should be left clean with all glassware cleaned and returned to the appropriate location. NO BEAKERS ARE TO BE LEFT IN THE FUME HOODS. Wash your hands before leaving the lab.

14. Special rules will apply to A206 for Microbiology and will be detailed by professor as needed. No material or equipment is to be removed from A206 without professor's permission.

15. Students are not to remove any chemicals, solvents, equipment or supplies from any laboratory without permission. If a student does, he/she may be asked to withdraw from the program.

16. Familiarize yourself with the location of fire extinguishers, fire blankets, emergency showers, eyewash stations, emergency gas shut off and evacuation routes in all your labs.

General Course Outline Notes:

1. Students should use the course outline as a learning tool to guide their achievement of the learning outcomes for this course. Specific questions should be directed to their individual professor.
2. The college considers the electronic communication methods (i.e. DC Mail or DC Connect) as the primary channel of communication. Students should check the sources regularly for current course information.
3. Professors are responsible for following this outline and facilitating the learning as detailed in this outline.
4. Course outlines should be retained for future needs (i.e. university credits, transfer of credits etc.)
5. A full description of the Academic Appeals Process can be found at http://durhamcollege.ca/gradeappeal.
6. Faculty are committed to ensuring accessible learning for all students. Students who would like assistance with academic access and accommodations in accordance with the Ontario Human Rights Code should register with the Access and Support Centre (ASC). ASC is located in room SW116, Oshawa Campus and in room 180 at the Whitby Campus. Contact ASC at 905-721-3123 for more information.
7. Durham College is committed to the fundamental values of preserving academic integrity. Durham College and faculty members reserve the right to use electronic means to detect and help prevent plagiarism. Students agree that by taking this course all assignments could be subject to submission either by themselves or by the faculty member for a review of textual similarity to Turnitin.com. Further information about Turnitin can be found on the Turnitin.com Web site.

Learning Plan

The Learning Plan is a planning guideline. Actual delivery of content may vary with circumstances.

Students will be notified in writing of changes that involve the addition or deletion of learning outcomes or evaluations, prior to changes being implemented, as specified in the Course Outline Policy and Procedure at Durham College.

Wk.	**Hours:** 2 **Delivery:** In Class
1	**Intended Learning Objectives** UNIT 1 - INTRODUCTION After completing this unit, students will be able to: - distinguish between environmental science and ecology; - describe the basic assumptions underlying the anthropocentric, biocentric and ecocentric world views; - define sustainability and sustainable development and state the principles behind sustainability; - discuss how both science and value judgements are involved in the application of environmental science; - discuss the relationship between species and ecosystems - discuss the difference between resources and conditions
	Intended Learning Activities Ice Breaker Discussion and development of class learning environment PP/lecture/discussion
	Resources and References Lecture Notes posted on DC Connect Reading - Textbook Chapter 1
	Evaluation
Wk.	**Hours:** 2 **Delivery:** Lab
1	**Intended Learning Objectives** Lab Orientation
	Intended Learning Activities Discussion of upcoming labs, appropriate dress, required supplies
	Resources and References N/A
	Evaluation

Wk.	Hours: 2 Delivery: In Class	
2	**Intended Learning Objectives** UNIT 2 - ECOSYSTEMS - STRUCTURE AND FUNCTION After completing this unit, students will be able to: - discuss abiotic and biotic factors and their dynamic interaction with organisms; - apply the law of thermodynamics in terms of energy flow through an ecosystem; - use diagrams to show the movement of energy through an ecosystem and relate this movement to decreasing biomass at higher trophic levels.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapter 2 pg 21 and 22 and Chapter 20 pg 428	
	Evaluation In-Process/Homework	**Weighting** 1
Wk.	**Hours:** 2 **Delivery:** Lab	
2	**Intended Learning Objectives** Lab One: Structure of Ecosystems - Abiotic Factors	
	Intended Learning Activities Conduct a qualitative examination of the characteristics of three ecosystems, with special emphasis on the abiotic components.	
	Resources and References Lab document provided by professor Dress to be outside	
	Evaluation	

Wk.	Hours: 2	Delivery: In Class	
3	**Intended Learning Objectives** UNIT 2 - ECOSYSTEMS - STRUCTURE AND FUNCTION - CONTINUED After completing this unit, students will be able to: - discuss abiotic and biotic factors and their dynamic interaction with organisms; - apply the law of thermodynamics in terms of energy flow through an ecosystem; - use diagrams to show the movement of energy through an ecosystem and relate this movement to decreasing biomass at higher trophic levels.		
	Intended Learning Activities PP/lecture/discussion		
	Resources and References Notes posted on DC Connect		
	Evaluation In-Process/Homework		**Weighting** 1
Wk.	**Hours:** 2	**Delivery:** Lab	
3	**Intended Learning Objectives** Lab Two: Structure of Ecosystems - Biotic Factors		
	Intended Learning Activities Identify and catalogue local plant species, with a special focus on deciduous trees and herbaceous plants. The information gathered during this lab with be utilized in the Ecology course next semester.		
	Resources and References Lab document provided by professor. Dress to be outside. Bring a device with good quality camera to capture images of the plants.		
	Evaluation Lab One: Structure of Ecosystems - Abiotic Factors		**Weighting** 3

Wk.	Hours: 2 Delivery: In Class	
4	**Intended Learning Objectives** UNIT 3 - ECOSYSTEMS - STABILITY AND CHANGE After completing this unit, students will be able to: - explain the concept of a 'dynamic balance' in an ecosystem; - define and give examples of the factors involved in biotic potential and environmental resistance; - explain the principles of population growth and regulation (carrying capacity); - name, draw a graph of, and describe the causes and consequences of two fundamental population curves, and relate these curves to the human impact on natural ecosystems; - explain the role of biodiversity in balanced ecosystems; - explain natural selection and evolution at the ecosystem level; and - Explain the forces that limit natural selection and the consequences of species diversity.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapter 17 pg 363 to 367 and Chapter 10	
	Evaluation In-Process/Homework	**Weighting** 1
Wk.	**Hours:** 2 **Delivery:** Lab	
4	**Intended Learning Objectives** Lab Three: Ecosystem Diagram	
	Intended Learning Activities Select an ecosystem and graphically show all of the inputs and outputs that are associated with it.	
	Resources and References Lab document provided by professor Bring equipment to draw with (pencil crayons, markers, rulers). Large paper will be supplied.	
	Evaluation Lab Two: Structure of Ecosystems - Biotic Factors @ 3% Lab Three: Ecosystem Diagram @ 1.75%	**Weighting** 4.75

Wk.	Hours: 2	Delivery: In Class	
5	**Intended Learning Objectives** UNIT 4 - HUMAN POPULATIONS After completing this unit, students will be able to: - contrast current population growth rates in developing countries with those in developed countries; - describe the impact that humans have on the environment and how that impact will vary with population size; - list and describe the consequences of population growth in developing countries; - give specific examples showing how affluence intensifies negative environmental impacts (P = PAT); - describe and contrast population profiles, fertility rates, and future population projections for developed and developing countries; and - List the factors that are most specifically related to declines in fertility rates and discuss how they are mutually interdependent.		
	Intended Learning Activities PP/lecture/discussion		
	Resources and References Notes posted on DC Connect Textbook Chapter 10		
	Evaluation In-Process/Homework		**Weighting** 1
Wk.	**Hours:** 2	**Delivery:** Lab	
5	**Intended Learning Objectives** Lab Four: Environmental Values		
	Intended Learning Activities Review the film "The 11th Hour"- in which a variety of world experts explore how humanity has arrived at the current convergence of environmental crises while exploring steps that people can take to avert global disaster.		
	Resources and References Lab document provided by professor		
	Evaluation Lab Four: Environmental Values		**Weighting** 2
Wk.	**Hours:** 2	**Delivery:** In Class	
6	**Intended Learning Objectives** REVIEW - UNITS 1 - 4		
	Intended Learning Activities Review		
	Resources and References N/A		
	Evaluation Term Test One		**Weighting** 15

Wk.	Hours: 2 Delivery: Lab
6	**Intended Learning Objectives** Lab Five: Aquatic Ecosystems
	Intended Learning Activities Field trip to the west side of the campus to conduct environmental tests on the west branch of the Oshawa Creek.
	Resources and References Lab document provided by professor Dress for the weather and to be in the creek. It is very likely that you will get wet and muddy during this class.
	Evaluation

Wk.	Hours: 2 Delivery: In Class
7	**Intended Learning Objectives** UNIT 5 - RENEWABLE AND NONRENEWABLE RESOURCES After completing this unit, students will be able to: - outline the differences between renewable and nonrenewable resources; - List the major classes of renewable resources and outline the character of each; - identify the ways in which renewable resources can be degraded by excessive harvesting or inappropriate management; - explain the Tragedy of the Commons and give examples of how it operates today; - discuss how appropriate management can increase the potential harvest of biological resources; - describe case studies of the degradation of potentially renewable resources and provide reasons for those damages; - describe how the major sources of energy used in the industrial countries have changed from 1800 to present; - describe the global and Canadian production of non-renewable natural resources; - discuss the reliance of industrialized economies on non renewable resources, and predict whether these essential sources of material and energy will be available into the foreseeable future; - outline five alternative energy sources available for use and the potential role of these in a sustainable economy; and - explain why a national sustainable energy policy is an environmental necessity.
	Intended Learning Activities PP/lecture/discussion
	Resources and References Notes posted on DC Connect Textbook Chapter 26
	Evaluation **Weighting** In-Process/Homework 1

Wk.	Hours: 2 Delivery: Lab	
7	**Intended Learning Objectives** Lab Six: Effects Of Environmental Pressure On Species Distribution And Population Size	
	Intended Learning Activities Compare environmental factors influencing the status of Great Lakes fish.	
	Resources and References Lab document provided by professor	
	Evaluation Lab Five: Aquatic Ecosystems @ 3.25% Lab Six: Effects Of Environmental Pressure On Species Distribution And Population Size @ 2%	**Weighting** 5.25
Wk.	**Hours:** 2 **Delivery:** In Class	
8	**Intended Learning Objectives** UNIT 6 - WATER POLLUTION - EUTROPHICATION AND HAZARDOUS CHEMICALS After completing this unit, students will be able to: - define pollution and pollutants; - describe the four (4) major zones of life in a lake; - distinguish between an oligotrophic and eutophic lake; - explain eutrophication, giving all the steps in the change from an oligotrophic to a fully eutrophic condition; - contrast eutrophication in a body of water such as Lake Ontario with that occurring shallow ponds and lakes; - describe how soil sediments affect aquatic ecosystems; - identify the major sources of nutrients leading to eutrophication and discuss control strategies for each; - describe the effect of seasons on thermal stratification and oxygen concentration in northern temperate lakes; - describe wetlands and how they are destroyed and the natural values lost as the destruction takes place; - list and describe the four categories of pollutants in raw sewage; - describe the processes of primary, secondary and tertiary treatment of sewage; - describe the impediments to using sewage waste as a resource; - list and define four categories of hazardous chemicals; - define and contrast point source pollution verses non-point source pollution; - define bioaccumulation and biomagnification and describe how they pertain to the toxic risk of some hazardous chemicals; and - Discuss current and future trends in the management and disposal of hazardous chemical wastes.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapter 25	
	Evaluation In-Process/Homework	**Weighting** 1

Wk.	Hours: 2 Delivery: Lab
8	**Intended Learning Objectives** Lab Seven: Waste Audit And Waste Reduction
	Intended Learning Activities Develop a Waste Audit summary and a Waste Reduction Work Plan for the school
	Resources and References Lab document provided by professor
	Evaluation

Wk.	Hours: 2 Delivery: In Class
9	**Intended Learning Objectives** UNIT 6 - WATER POLLUTION - EUTROPHICATION AND HAZARDOUS CHEMICALS - CONTINUED After completing this unit, students will be able to: - define pollution and pollutants; - describe the four (4) major zones of life in a lake; - distinguish between an oligotrophic and eutophic lake; - explain eutrophication, giving all the steps in the change from an oligotrophic to a fully eutrophic condition; - contrast eutrophication in a body of water such as Lake Ontario with that occurring shallow ponds and lakes; - describe how soil sediments affect aquatic ecosystems; - identify the major sources of nutrients leading to eutrophication and discuss control strategies for each; - describe the effect of seasons on thermal stratification and oxygen concentration in northern temperate lakes; - describe wetlands and how they are destroyed and the natural values lost as the destruction takes place; - list and describe the four categories of pollutants in raw sewage; - describe the processes of primary, secondary and tertiary treatment of sewage; - describe the impediments to using sewage waste as a resource; - list and define four categories of hazardous chemicals; - define and contrast point source pollution verses non-point source pollution; - define bioaccumulation and biomagnification and describe how they pertain to the toxic risk of some hazardous chemicals; and - Discuss current and future trends in the management and disposal of hazardous chemical wastes.
	Intended Learning Activities PP/lecture/discussion
	Resources and References Notes posted on DC Connect Textbook Chapter 25
	Evaluation — **Weighting** In-Process/Homework — 1

Wk.	Hours: 2 Delivery: Lab	
9	**Intended Learning Objectives** Lab Eight: Drinking Water Testing	
	Intended Learning Activities Conduct tests on drinking water for chlorine (free and total), and turbidity. Prepare a chain of custody and appropriate sample label for further analysis.	
	Resources and References Lab document provided by professor Lab coat and safety glasses	
	Evaluation Lab Seven: Waste Audit And Waste Reduction @ 3% Lab Eight: Drinking Water Testing @ 1.5%	**Weighting** 4.5%
Wk.	**Hours:** 2 **Delivery:** In Class	
10	**Intended Learning Objectives** UNIT 7 - AIR POLLUTION AND MAJOR ATMOSPHERIC CHANGES After completing this unit, students will be able to: - describe the natural cleansing processes that take place in air; - outline the major sources of emission of air pollutants associated with sulphur, nitrogen, particulate and hydrocarbons; - discuss steps that could be taken to improve air quality from both primary and secondary pollutants; - discuss the importance of air pollutants to human health; - describe the ecological damage from air pollution near Sudbury, ON; - discuss the two major acidic pollutants and describe the effects of acid deposition on aquatic and terrestrial ecosystems; - list the major strategies for controlling acid emissions and evaluate their effectiveness; - describe how the greenhouse gases maintain heat in the atmosphere; - list the greenhouse gases and evaluate their contribution to present and future global warming; - describe the most significant possible impacts of future global warming; - describe the stratospheric ozone shield, including how it is formed and broken down; and - Evaluate the political and economic steps being taken to protect the ozone shield.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapter 28	
	Evaluation In-Process/Homework	**Weighting** 1

Wk.	Hours: 2	Delivery: Lab
10	**Intended Learning Objectives** Lab Nine: Air Quality And Automobiles	
	Intended Learning Activities Estimate the area impact of vehicles used by our college community and the contribution of vehicle based pollution from your region, province and country.	
	Resources and References Lab document provided by professor Dress for the weather. Some data collection will occur outside.	
	Evaluation	

Wk.	Hours: 2	Delivery: In Class
11	**Intended Learning Objectives** REVIEW - Units 5-7	
	Intended Learning Activities Review	
	Resources and References N/A	
	Evaluation Term Test Two	**Weighting** 15

Wk.	Hours: 2	Delivery: Lab
11	**Intended Learning Objectives** Lab Ten: Ecological Footprint	
	Intended Learning Activities See how your "footprint" relates to sustainability.	
	Resources and References Lab document provided by professor	
	Evaluation Lab Nine: Air Quality And Automobiles	**Weighting** 3

Wk.	Hours: 2	Delivery: In Class
12	**Intended Learning Objectives** UNIT 8 - PRESERVATION OF SPECIES AND ECOSYSTEM MANAGEMENT After completing this unit, students will be able to: - describe the ecological risks and economic benefits of pesticides; - outline the concept of integrated pest management and discuss whether it is applicable to all pest management problems; - describe how clear-cutting affects biodiversity; - analyze the ways in which habitat conversion, fragmentation and simplification affect biodiversity; - identify the most important environmental effects of agriculture and describe the damage caused; - list the major kinds of urban pollution and describe their causes and the recent trends in Canadian cities; - compare the management of solid waste and sewage in Canadian cities; - discuss the essential elements of urban planning and how it has affected land use in Canada; - document the extent of biodiversity losses, both known and estimated; - explain how loss of habitat, pollution and species exploitation affect biodiversity; - understand how pollution control costs are generated and the magnitude of those costs; - trace the origins of cost-benefit analysis and explain how cost-benefit analysis addresses internal and external cost of pollution; - understand the most important benefits of environmental regulations; and - Outline the process of an environmental impact assessment by using recent Canadian examples.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapters as assigned	
	Evaluation In-Process/Homework	**Weighting** 1
Wk.	**Hours:** 2	**Delivery:** Lab
12	**Intended Learning Objectives** Lab Eleven: Life Cycle Assessment	
	Intended Learning Activities Create a poster showing the full life cycle of a common consumer product, including inputs and outputs.	
	Resources and References Lab document provided by professor An object to evaluate (this will be explained in class)	
	Evaluation Lab Ten: Ecological Footprint	**Weighting** 3

Wk.	Hours: 2	Delivery: In Class
13	**Intended Learning Objectives** UNIT 8 - PRESERVATION OF SPECIES AND ECOSYSTEM MANAGEMENT - CONTINUED After completing this unit, students will be able to: - describe the ecological risks and economic benefits of pesticides; - outline the concept of integrated pest management and discuss whether it is applicable to all pest management problems; - describe how clear-cutting affects biodiversity; - analyze the ways in which habitat conversion, fragmentation and simplification affect biodiversity; - identify the most important environmental effects of agriculture and describe the damage caused; - list the major kinds of urban pollution and describe their causes and the recent trends in Canadian cities; - compare the management of solid waste and sewage in Canadian cities; - discuss the essential elements of urban planning and how it has affected land use in Canada; - document the extent of biodiversity losses, both known and estimated; - explain how loss of habitat, pollution and species exploitation affect biodiversity; - understand how pollution control costs are generated and the magnitude of those costs; - trace the origins of cost-benefit analysis and explain how cost-benefit analysis addresses internal and external cost of pollution; - understand the most important benefits of environmental regulations; and - Outline the process of an environmental impact assessment by using recent Canadian examples.	
	Intended Learning Activities PP/lecture/discussion	
	Resources and References Notes posted on DC Connect Textbook Chapters as assigned	
	Evaluation In-Process/Homework	**Weighting** 1
Wk.	**Hours:** 2	**Delivery:** Lab
13	**Intended Learning Objectives** Lab Twelve: Public Awareness And Silent Spring	
	Intended Learning Activities Review a documentary on Rachel Carson and her book, Silent Spring.	
	Resources and References Lab document provided by professor	
	Evaluation Lab Eleven: Life Cycle Assessment @ 3% Lab Twelve: Public Awareness And Silent Spring @ 1.5%	**Weighting** 4.5%

Wk.	Hours: 2	Delivery: In Class
14	**Intended Learning Objectives** REVIEW - Units 1 - 8	
	Intended Learning Activities Review	
	Resources and References N/A	
	Evaluation	
Wk.	**Hours:** 2	**Delivery:** Lab
14	**Intended Learning Objectives** Lab Clean Up	
	Intended Learning Activities Lab Clean Up	
	Resources and References N/A	
	Evaluation	
Wk.	**Hours:** 2	**Delivery:** Final Exam
15	**Intended Learning Objectives** Final Exam	
	Intended Learning Activities Final Exam	
	Resources and References N/A	
	Evaluation	**Weighting** 30