COURSE OUTLINE: ESA206 - AIR & WATER QUALITY

Prepared: Lou Corbett
Approved: Carolyn Hepburn, Dean, Indigenous Studies, Academic Upgrading, Natural Environment, and Media and Design

Course Code: Title	ESA206: AIR AND WATER QUALITY
Program Number: Name	5255: ENV. SUSTAINABILITY
Department:	NATURAL RESOURCES PRG
Academic Year:	2023-2024
Course Description:	This course provides students with the opportunity to understand and analyze the principles of air and water quality assessment to ensure regulatory compliance. From the Canadian perspective, the role of government and non-governmental organizations in air and water quality monitoring and management will be discussed. Students will participate in the latest methods of air and water quality monitoring and analyze results. Water quality monitoring will be conducted in freshwater resources. Students will prepare Standard Technical Reports for indicators assessed, and will present their data, analysis and conclusions to a public audience.
Total Credits:	3
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**5255 - ENV. SUSTAINABILITY** VLO 1 Develop scientific reports to communicate data, analysis and conclusions to community stake holders. VLO 2 Design sampling and analysis of environmental data to implement resource surveys. VLO 3 Implement environmental audit standards, including the Environmental Assessment (EA) process to meet legal requirements across municipal, provincial and federal jurisdictions. VLO 4 Examine field samples using air, water and soil quality testing equipment to evaluate environmental conditions. VLO 5 Apply appropriate air and water pollution testing and abatement processes and technologies according to different segments of industrial and/or residential sectors. VLO 6 Interpret the effects of various environmental and climate impacts on plant, animal and human health. VLO 7 Develop and implement a model to Build community engagement and capacity to achieve the desired organizational outcomes. VLO 8 Apply principles of project management and leadership to complete projects on time and within scope. VLO 9 Develop and implement an interdisciplinary perspective to evaluate goals, objectives, and strategies for approaching environmental problems. VLO 10 Apply principles and practices of community and industry development to increase

	resiliency, innovation and transformation toward greater sustainability.
Essential Employability Skills (EES) addressed in this course:	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. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. 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. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	Academic success is directly linked to attendance. Missing more than 1/3 of the course hours in a semester shall result in an `F` grade for the course.

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Course Outcome 1: Understand regulatory processes governing environmental monitoring practices related to air and water quality.	1.1 Discuss governmental, private and public agencies committed to environmental monitoring of air and water quality. 1.2 Understand the role of science communication in governmental and non-governmental programs for public awareness. 1.3 Describe the role of citizen science and volunteer monitoring programs in data collection and engagement. 1.4 Understand the role of indicators in environmental monitoring in preparing site reports. 1.5 Prepare site reports for various environmental indicators and communicate data, analysis and conclusions to community stakeholders in a clear and concise manner.
Course Outcome 2	**Learning Objectives for Course Outcome 2**
Course Outcome 2: Discuss and analyze physical,	2.1 Describe and discuss Key Hydrological Features (KHF) of freshwater resources such as Lakes, Wetlands, Permanent

chemical, nutrient, and biological indicators that affect water quality.	Streams/Intermittent Streams, Seepage Areas and Springs. 2.2 Understand the effect of Thermal Stratification by season and its relation to water quality monitoring. 2.3 Understand physical indicators of water quality such as clarity, temperature, transparency, suspended and dissolved solids and turbidity. 2.4 Analyze the effect of chemical indicators such as alkalinity, dissolved oxygen, heavy metals, pesticides and pH on water quality. 2.5 Describe eutrophication and its implications for water quality. Identify related nutrient indicators phosphorous and nitrogen. 2.6 Understand the role of benthos monitoring, and other biological monitoring for E. coli and coliform bacteria as indicators. 2.7 Describe bioacculumation and biomagnification and connect to indicators such as heavy metals (mercury), Polychlorinated Biphenyls (PCBs) and pesticides. 2.8 Discuss how water quality is affected by various indicators and possible methods of remediation.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
Course Outcome 3: Preform environmental monitoring standards related to water quality and analyze results.	3.1 Follow standard procedures to assist in the collection and analysis of water quality data using appropriate equipment and materials. 3.2 Collect samples of benthic macroinvertebrates based on the Environment Canada and Canadian Aquatic Biomonitoring Network protocols. 3.3 Analyze and interpret water quality data by completing a Standard Technical Report. 3.4 Critically evaluate collected data to identify potential threats to water quality. 3.5 Compare data collected with available datasets to identify possible trends, abatement methods and general effects on plant, animal, and human health.
Course Outcome 4	**Learning Objectives for Course Outcome 4**
Course Outcome 4: Discuss and analyze indicators of air quality.	4.1 Understand current legislation related to pollution, roles and responsibilities of compliance across municipal, provincial and federal jurisdictions. 4.2 Understand various anthropogenic sources of air pollution

		along with natural phenomena such as climate change and forest fires. 4.3 Analyze and discuss the role of the following key indicators: Fine particulate matter (PM2.5), ground-level ozone (O3), nitrogen dioxide (NO2), sulphur dioxide (SO2) and volatile organic compounds (VOCs). 4.4 Describe different types of air pollutants such as gases, inorganic and organic particulates, and biological molecules. 4.5 Discuss how air quality is affected by various indicators and methods of remediation.
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	Course Outcome 5: Preform environmental monitoring standards related to air quality indicators and analyze results.	5.1 Follow standard procedures to assist in the collection and analysis of air quality data using appropriate equipment and materials. 5.2 Analyze and interpret air quality data by completing a Standard Technical Report. 5.3 Critically evaluate collected data to identify potential threats to air quality. 5.4 Compare data collected with available datasets to identify possible trends, abatement methods, environmental effects on plant, animal, and human health.
	Course Outcome 6	**Learning Objectives for Course Outcome 6**
	Course Outcome 6: Present indicator data to community stakeholders.	6.1 Analyze and interpret water and air quality data collected in-field or from an existing dataset 6.2 Describe the environment impact of selected indicator, how it is assessed, possible remediation methods, and relate data finding to locally specific targets, methods and environmental organizations 6.3 Prepare a presentation to effectively communicate the impact of selected indicator on water or air quality to a public audience

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments and/or Technical Reports	30%
Discussions	10%
Group Presentation/Report	20%
Tests	40%

Date: December 20, 2023

Addendum:	Please refer to the course outline addendum on the Learning Management System for further information.