

ENVIRONMENTAL TECHNOLOGY

Program Outline

Major:	ENVR
Length:	3 Years
Delivery:	6 Semesters, plus 3 work terms
Credential:	Ontario College Advanced Diploma, Co-op
Effective:	2014-2015
Location:	Barrie
Start:	Fall (Barrie)

Description

Environmental Technology graduates have advanced skills in the use of environmental sampling, monitoring and testing equipment; data analysis; and information technology tools. They are familiar with applying the principles of ecosystem-based management for sustainability and have the ability to manage environmental projects from planning through to implementation and maintenance. They have applied knowledge of health, safety and environmental requirements and can contribute to risk assessment and environmental systems management. This program provides an opportunity for students to apply their skills through partnerships in the community and stresses the need for designing and implementing systems to prevent, control and clean-up environmental contamination.

Career Opportunities

The field of environmental technology is diverse and rapidly evolving to meet increasingly stringent regulatory requirements. Given the diversity in program skills and knowledge, a number of career options can be pursued upon graduation. Traditionally, graduates have found employment in the environmental field working for small and large corporations. Potential employers include environmental consulting firms, government agencies (municipal, provincial, federal), and environmental services departments in a variety of organizations.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- collect representative environmental samples, perform routine and specialized tests and interpret results, using current and relevant tools;
- identify, select and use scientific concepts and models in the prevention, control, and elimination of environmental hazards and in the remediation of contaminated sites;
- analyze water/soil/air samples in a manner that contributes to the resolution of environmental problems through the selection and application of relevant scientific and engineering principles;
- participate in the planning, design, implementation and maintenance of environmental projects, following standard procedures;
- promote and maintain sustainable practices by applying the elements of ecosystem-based management;
- carry out work responsibilities adhering to standards of professional conduct and principles of professional ethics;
- suggest strategies aimed at ensuring all tasks are completed in adherence to occupational health and safety standards and applicable legislative requirements;
- contribute to the development, implementation and maintenance of environmental management systems;
- provide ongoing support for project management;
- communicate technical information accurately and effectively in oral, written, visual and electronic forms;
- develop and present strategies for ongoing personal and professional development to enhance performance as an environmental technologist;
- use various information technology tools to assemble, analyze and present environmental data effectively.

Practical Experience:

Co-operative Education is a mandatory component of all Co-op programs at Georgian College; it has been designed as a process by which students integrate their academic education with work experience related to their program of study. This integration affects much more than simply earning a salary, including the adjustment to the work environment and the development of professionalism. It also reinforces skills and theory learned during academic semesters, develops professional contacts, job knowledge and career path, improves human relations and communication skills and promotes personal maturity and financial independence.

Students are requested to register, attend and participate in their scheduled co-operative education classes. These classes are scheduled for all first year students and are expected to be completed in order to proceed successfully to their first co-op work experience. To ensure students are eligible to proceed onto any co-op work experience students should refer to Promotional Status and Eligibility for Co-op as outlined in the College Calendar.

Co-op policies and procedures can be located on our website:
www.georgianc.on.ca/careers/for-students/

Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for the program specific graduate profile and curriculum as set out by the Ministry of Training, Colleges and Universities.

The Program Progression:

Fall Intake - Barrie

Sem 1		Sem 2		Work Term 1		Sem 3		Sem 4		Work Term 2

Fall		Winter		Summer		Fall		Winter		Summer
2014		2015		2015		2015		2016		2016
Work Term 3 Sem 5 Sem 6										

Fall			Winter		Summer					
2016			2017		2017					

Admission Requirements:

You must meet ONE of the following requirements to be eligible for admission to these programs:

Secondary school applicants:

- OSS Curriculum: OSSD or equivalent with Grade 12 English (C) or (U) (ENG4C, ENG4U); plus any Grade 12 College Mathematics (MAP4C or MCT4C), or any Grade 12 U University Mathematics. Also recommended: Grade 12 College or Grade 11 or 12 University Physics (SPH4C, SPH4U, SPH3U) or Grade 12 College or Grade 11 or 12 University Chemistry (SCH4C, SCH4U, SCH3U) or Grade 11 C Biology or Grade 11 or 12 U Biology (SBI3C, SBI3U, SBI4U).

Non-Secondary school applicants (19 years or older):

- Any credit Communication course and most credit mathematics courses taken at Georgian College
- College preparatory programs including those taken at Georgian College: Technology Foundation and Technology Fundamentals*
- Equivalent courses in English and mathematics taken through secondary school or Independent Learning Centres (at the general, advanced, college or university level)
- Academic and Career Entrance Certificate (ACE) program with communications and business, apprentice or technical mathematics*

- Mature student testing in English and mathematics that meets the minimum standards for admission (available through most testing services)*
- Ontario High School Equivalency Certificate (GED)
- English, Literature or Communication credit courses and most mathematics credit courses from accredited colleges/universities

Home school applicants:

- Applicants can write the mature student testing in English and mathematics that meets the minimum standards for admission (available through testing services)*

* available from Georgian College. For a complete listing please contact the Office of the Registrar.

Non-secondary school applicants who are 19 years of age or over by the first day of classes, and who lack the academic entrance qualifications, may be considered for entrance to an appropriate post-secondary diploma or certificate program as mature applicants. Mature applicants must meet all program specific prerequisites including all selection criteria; equivalencies are stated above. Applicants who are unsure whether they meet admission requirements should contact the Office of the Registrar. In addition, those applying as mature students and having no documentation of Grade 12 education must supply, if required, proof of age, such as a copy of an official birth certificate or driver's licence. Refer to Section 2.5 and 2.6 of the Academic Calendar for further details.

Credit transfer and course exemptions:

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may be eligible for credit transfer/course exemptions. Courses/experience must match at least 80% of the learning outcomes of a Georgian College course with a minimum grade of 60% or C achieved in previous coursework; some program exceptions apply (see program outline). For further information please visit the Credit Transfer Centre website: georgiancollege.ca/admissions/credit-transfer/

Graduation Requirements:

33 Mandatory Courses

- 1 Plus one of
- 2 Communications Courses
- 3 General Education Courses
- 3 Co-op Work Terms

Graduation Eligibility:

To graduate from this program, the passing weighted average for promotion through each semester, from year to year and to graduate is 60%. Additionally, a student must attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester.

Mandatory Courses

BIOL1008	Biological Systems
CHEM1003	Introduction to Applied Chemistry
CHEM2002	Applied Organic Chemistry
CHEM3002	Applied Environmental Chemistry
COMP1059	Computer Technology for Environmental Applications
ENVR1000	Environmental Science and Sustainability
ENVR1004	Geospatial Technology
ENVR1005	Workplace Safety and Employment Readiness
ENVR1006	Earth Science
ENVR1007	Water Treatment
ENVR2004	Waste Management Strategies
ENVR2012	Ecosystems and Environmental Sampling
ENVR2013	Limnology and Watershed Management
ENVR2014	Environmental Management Systems and Audits
ENVR2017	Soil Properties
ENVR2018	Environmental Assessment and Contaminants in the Environment
ENVR2019	Environmental CAD
ENVR2020	Wastewater Treatment
ENVR3000	Applied Hydrology and Hydrogeology
ENVR3002	Toxicology in Contaminants and Organisms
ENVR3009	Spill Response and Emergency Preparedness
ENVR3010	Advanced Environmental Sampling
ENVR3012	Advanced GIS
ENVR3013	Sustainable Technologies
ENVR3014	Applied Research and Entrepreneurship
ENVR3015	Stakeholder Engagement and Management
ENVR3016	Atmospheric Science
LAWS2010	Environmental Law and Policy
MATH1018	Introduction to Technical Mathematics
MENG3013	Fluids in the Environment
PHYS1004	Physical Systems in the Environment
STAT2006	Applied Statistics for Environmental Applications
SURV2002	Environmental Surveying

Plus one of

ENVR3011 Industrial Ecology
ENVR3017 Applied Research Project

Communications Courses

To be selected at time of registration from the College list, as determined by testing.

General Education Courses

To be selected from College list

Co-op Work Terms

COOP1023 Environmental Work Term 1
COOP2018 Environmental Work Term 2
COOP3010 Environmental Work Term 3

Course Descriptions:

BIOL1008 Biological Systems 42.0 Hours

This laboratory and theory course will introduce students to the complexities of living organisms including the structural and functional aspects of life. Emphasis will be placed on biological systems from the molecular level upwards and students will have an opportunity to apply their theoretical knowledge to hands on applications in the laboratory.

CHEM1003 Introduction to Applied Chemistry 70.0 Hours

This course covers the fundamentals of chemistry such as atomic structure, properties and nomenclature of compounds, chemical bonding and reactions, and stoichiometry concepts including mole concept, solutions and gases. Related laboratory experiments will be performed.

CHEM2002 Applied Organic Chemistry 42.0 Hours

This course will introduce students to basic organic chemistry. Topics will include structures, properties and nomenclature of classes of organic compounds as well as carbon bonding of compounds. Mechanisms of organic reactions will also be discussed and related laboratory experiments will be performed.

P- CHEM1003 Introduction to Applied Chemistry

CHEM3002 Applied Environmental Chemistry 70.0 Hours

This course will build on the student's knowledge of chemistry that has been developed in Introduction to Applied Chemistry, and Applied Organic Chemistry. Application of chemistry topics to environmental situations and testing will be examined. Students will have an opportunity to collect samples and conduct laboratory experiments to analyze

environmental parameters in soil, water and air. Routine and specialized tests will be performed.

P- CHEM2002 Applied Organic Chemistry

COMP1059 Computer Technology for Environmental Applications 42.0 Hours

Effective computer technology skills are essential for student success. This laboratory course provides students with hands-on application of the computer technology that is standard in the environmental industry.

COOP1023 Environmental Work Term 1 560.0 Hours

Co-operative Education will provide students with the skills to conduct a college directed and self-directed job search in their chosen field of study. Students will obtain a co-op work experience with an employer for a period of 14 weeks. All students are responsible to submit a work term report indicating achievement of specific learning outcomes during their 1st co-op work term. Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for each program.

COOP2018 Environmental Work Term 2 560.0 Hours

Building on previous Co-op experience, students will continue to gain valuable experience and develop knowledge and skills through the first of two back-to-back 4 month co-op terms that are relevant to the Environmental Technology sector. Students will gain experience with a variety of environmental functions in various workplaces. Upon completion of the Co-op work term students will be required to attend a debriefing session to review the requirements for completion of the Co-op work term.

P- COOP1023 Environmental Work Term 1

COOP3010 Environmental Work Term 3 560.0 Hours

Building on previous Co-op experience, students will continue to gain valuable experience and develop knowledge and skills through the second of two back-to-back 4 month co-op terms that are relevant to the Environmental Technology sector. Students will gain experience with a variety of environmental functions in various workplaces. Upon completion of the Co-op work term students will be required to attend a debriefing session to review the requirements for completion of the Co-op work term.

P- COOP2018 Environmental Work Term 2

ENVR1000 Environmental Science and Sustainability 42.0 Hours

This course focuses on ecological principles, population dynamics and energy resources in order to assess their impact on the environment. The major types of pollution are examined and their effects on the various components of the ecosphere analyzed. Strategies for pollution control and the conservation of the Earth's resources are examined in the context of economic considerations and sustainable development.

ENVR1004 Geospatial Technology 56.0 Hours

This hands-on laboratory course will provide students with an opportunity to utilize geospatial technology and complete assignments using Geographic Information Systems (GIS) software. Field application using Global Positioning Systems (GPS) will be incorporated and students will manipulate digital maps and various forms of spatial data including satellite imagery and aerial photographs for environmental applications.

P- COMP1059 Computer Technology for Environmental Applications

ENVR1005 Workplace Safety and Employment Readiness 42.0 Hours

Health and safety along with employment readiness is a necessity for all students entering the workforce. This course provides an overview of current legislation and standards pertaining to environmental health and safety and the process of preparing students for entry into the workplace. Historical perspective, health and safety management systems, hazardous materials management, WHMIS, biological, physical and chemical hazards, environmental monitoring devices, confined space entry, personal protective equipment, emergency response and personal workplace development will be examined.

ENVR1006 Earth Science 42.0 Hours

This course provides an introduction to geological concepts such as the composition and structure of the earth; plate tectonics; geological time scale; geological processes and the landforms they produce. Principles of soil science are investigated including soil formation, taxonomy, biological components, and the chemical and physical properties of soils.

ENVR1007 Water Treatment 42.0 Hours

This course provides an introduction to the study of water treatment processes and distribution. The physical, chemical and biological characteristics of source water will be examined along with current regulations, methods of treatment and issues surrounding the provision of potable water. Students will participate in the evaluation of common physical, chemical and bacteriological testing. The content of the Ontario Ministry of the Environment (MOE) Entry Level Drinking Water Operator course will be covered.

ENVR2004 Waste Management Strategies 42.0 Hours

This is course is a study of the complexities associated with waste management and environmental effects; relevant legislative requirements; integrated waste management strategies; disposal and diversion methods and site selection; site closure and post-operational uses. This course will have both a classroom component where solid waste management issues and practices will be learned and a non-classroom component where students will apply these practices in real-life situations.

ENVR2012 Ecosystems and Environmental Sampling 42.0 Hours

This course identifies the components of ecosystems and analyses the interrelationships of biotic and abiotic factors. Physical, chemical and biological parameters are measured

in order to assess the health of both terrestrial and aquatic ecosystems. Planning, sampling, collecting, measuring and evaluating various environmental parameters will be emphasized.

ENVR2013 Limnology and Watershed Management 42.0 Hours

This course provides students with practical applications relating to the natural workings of fresh water aquatic ecosystems. It incorporates physical limnology including characteristics such as secci depth and thermocline; chemical characteristics including nitrates, phosphates, dissolved oxygen and pH; and the biological characteristics that can be used to measure the health of aquatic ecosystems.

ENVR2014 Environmental Management Systems and Audits 28.0 Hours

This course is a study of the current practices and policies pertaining to the development, implementation and maintenance of environmental management systems (EMS) in an organization. ISO standards will be examined and case studies will be used to highlight the key factors involved with EMS implementation. The process of assessing environmental impacts and aspects and implementing continuous improvement measures will be addressed. Comparable health and safety management systems will be examined to reinforce management system concepts.

ENVR2017 Soil Properties 42.0 Hours

This experiential course builds on the foundational principles of soil science by introducing students to field sampling and the laboratory analysis of soils. Students learn sampling methodologies and descriptive techniques, sample preparation, analytical methods and instrumentation for various chemical, physical and biological soil parameters; as well as data analysis and reporting. Emphasis is placed on developing field, laboratory and technical communication skills.

P- ENVR1006 Earth Science

ENVR2018 Environmental Assessment and Contaminants in the Environment 56.0 Hours

This course examines the nature and behaviour of environmental contaminants and practices used in the protection and conservation of water and land. Students will review environmental assessment legislation and use case studies to illustrate ecological complexity to develop skills to assess and mitigate the impacts of various projects. Students will prepare environmental assessment reports based on field investigations. Site remediation techniques and Record of Site Condition requirements will be examined.

P- CHEM1003 Introduction to Applied Chemistry

ENVR2019 Environmental CAD 42.0 Hours

This course will introduce the student to reading and understanding engineering drawings and the use of the computer as a drafting tool. Students will prepare and interpret environmental land survey and civil engineering drawings. Emphasis will be

placed on contours, plan and profile, cross-section and earthwork quantities, topographical survey and structures as it relates to environmental engineering. Specific CAD techniques and procedures will be applied to the creation of these drawings.

P- COMP1059 Computer Technology for Environmental Applications

ENVR2020 Wastewater Treatment 42.0 Hours

This course provides theory related to the conceptual design and operation of a variety of wastewater treatment processes with an emphasis on fundamental principles. The course will cover physical, chemical, and biological processes as well as sludge processing. In addition, discussions of engineered and natural processes for wastewater treatment are examined. Students will also examine the testing required for performance evaluation of a variety of wastewater treatment processes.

ENVR3000 Applied Hydrology and Hydrogeology 42.0 Hours

This course will provide the student with an understanding of the basic techniques used in the computation of design flows from hydrologic events and the routing of flows through systems. It investigates ground water including construction and testing of water wells and emphasizes the challenges in quantifying hydrologic events in terms of spatial and temporal variability, particularly as related to land use changes.

P- MATH1018 Introduction to Technical Mathematics

ENVR3002 Toxicology in Contaminants and Organisms 28.0 Hours

An introduction to the science of toxicology with emphasis on how toxins can cause their effects on the human body and the major classifications of toxins. An overview of how toxins enter and affect the body will be provided as well as specific effects of certain key toxins. The professional areas in which toxicology is applied will be explored.

P- BIOL1008 Biological Systems

ENVR3009 Spill Response and Emergency Preparedness 42.0 Hours

This course focuses on how to conduct an investigation as an environmental officer and how to maintain good evidence. Students will have an opportunity to respond to a mock environmental spill and execute all of the necessary spill response requirements.

Emergency preparedness plans will be analyzed and students will develop emergency response plans in a real life scenario.

ENVR3010 Advanced Environmental Sampling 42.0 Hours

This course builds on the knowledge gained in Ecosystems and Environmental Sampling. Students will learn how to identify species of flora and fauna for Environmental Impact Assessment and will advance their field sampling techniques including chain of custody and legal considerations and sampling of soil, lakes, streams, groundwater, noise and air.

P- ENVR2012 Ecosystems and Environmental Sampling

ENVR3011 Industrial Ecology 42.0 Hours

This problem solving course focuses on industrial processes that have environmental impacts and strategies to implement Ecosystem-based Management for Sustainability. Students will learn how to critically analyze information and solve problems through site visits and case study analysis. Cost/benefit analysis; SWOT analysis; identification of problem components; life cycle costing; and contingency planning will be discussed.

ENVR3012 Advanced GIS 42.0 Hours

This hand-on laboratory course will provide students with the opportunity to examine core and advanced applications of GIS and utilize GIS software to design, develop and manage geodatabases and models. Spatial and attribute data will be analyzed to create informative maps and charts in order to solve applied geospatial problems.

P- ENVR1004 Geospatial Technology

ENVR3013 Sustainable Technologies 42.0 Hours

This course introduces students to sustainable technologies with an emphasis on the environment. Students will have an opportunity to build on their knowledge in the areas of carbon footprint analysis, life cycle analysis, and environmental science to develop a systems-based approach to sustainability. Measurement and analysis of performance and efficiencies are a key part of this course which presents new and emerging technologies and processes that will enable society to move toward a sustainable future.

ENVR3014 Applied Research and Entrepreneurship 42.0 Hours

Entrepreneurship skills have become an incredibly valuable asset in securing long term career opportunities through both employment and independent business development. Effectively using applied research to develop business opportunities is another key to company success, and in turn, employment security. Students will learn and practice the skills related to producing quality applied research that can be used to enhance or develop new business opportunities. The fundamentals of business and taking a new or improved product or process to the marketplace will also be studied.

ENVR3015 Stakeholder Engagement and Management 42.0 Hours

This course explores the important role stakeholders have in environmental policy development and resource management. Students will learn how to identify stakeholders relevant to a given issue, techniques for stakeholder engagement and management, and approaches to deal with conflicts. Case studies will be used to explore key topics and to illustrate how they are applied in current policies and programs. Students will also gain knowledge on best practices when working with stakeholder information and will have the opportunity to apply qualitative research and reporting skills.

ENVR3016 Atmospheric Science 42.0 Hours

This course complements Applied Environmental Chemistry and Advanced Ecosystem Sampling and introduces the student to the physical and chemical properties of our

atmosphere. The origin and evolution of the atmospheres composition are examined, including pollution from human activities. Chemical sources, transformations, and sinks are identified and examined in the context of global atmospheric circulation and dynamics. Methods of prevention and control of air pollution are considered in the context of sustainable development.

ENVR3017 Applied Research Project 42.0 Hours

In conjunction with a Faculty advisor and possibly other stakeholders, the student will undertake an applied research project. The technical content of the research project will be developed around a technical topic relevant to the student's program area. A suitable research project must be agreed upon prior to the start of this course. Students must have faculty and program coordinator approval to register in this course. Availability of this course will depend on the availability of suitable research projects. The final project output is determined by the Faculty advisor. Faculty and Program Coordinator approval is required.

LAWS2010 Environmental Law and Policy 42.0 Hours

The course is designed to develop working knowledge of statutory and common law practices that apply to the environment. Students will have an opportunity to apply this knowledge to case studies to illustrate how environmental law applies in real situations. The course incorporates on-line use of current Acts, Regulations and Guidelines and students will become familiar with Municipal, Provincial and Federal environmental law including duty, breach and liability.

MATH1018 Introduction to Technical Mathematics 42.0 Hours

This course provides a foundation in mathematics in engineering technology and related programs. Students will develop skill in mathematical thinking and problem solving, and appropriately apply technology in the solution of engineering related problems using algebra, geometry, right angle trigonometry, trigonometric functions of any angle, systems of linear equations, and exponential and logarithmic functions. Additional time to strengthen and reinforce mathematical competencies will be made available to those students who require it.

MENG3013 Fluids in the Environment 42.0 Hours

This course provides students with a basic understanding of fluid properties, fluid statics and dynamics, and fluid flow. The flow of incompressible fluids in pressure systems constitutes the major portion of this course. Fluid measurement is covered both in the lecture and the laboratory portion of the course.

P- PHYS1004 Physical Systems in the Environment

PHYS1004 Physical Systems in the Environment 42.0 Hours

This course is designed to introduce students to the basic concepts of physics including mechanical motion, energy and matter; wave motion and sound; heat and temperature; and electromagnetic waves, and light optics. Emphasis is placed on practical examples

to illustrate these principles in the environment. Laboratory experiments may be used to illustrate and investigate the principles involved.

STAT2006 Applied Statistics for Environmental Applications 42.0 Hours

Elementary statistical methods and applications to environmental problems; samples and populations; frequency distributions; probability theory; basic distributions; random sampling; point and interval estimation; hypothesis testing; and linear regression and correlation are studied.

P- MATH1018 Introduction to Technical Mathematics

SURV2002 Environmental Surveying 42.0 Hours

This course is an introduction to survey concepts, measurements, computations and automated surveying. It covers the required mathematical concepts, the theory and operation of survey instruments, the measurement of distances and angles, leveling and all associated calculations. Emphasis will be placed on field surveying where students will learn to capture electronic field data and utilize that information for environmental applications.

P- MATH1018 Introduction to Technical Mathematics

Course Description Legend

P = Prerequisite; C = Concurrent prerequisite; CO= Corequisite

Information contained in College documents respecting programs is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs. The college reserves the right to add or delete programs, options, courses, timetables or campus locations subject to sufficient enrolment, and the availability of courses.