



# Environmental Control Program Standard

The approved program standard for Environmental Control programs of instruction leading to an Ontario College Graduate Certificate delivered by Ontario Colleges of Applied Arts and Technology (MCU funding code 72700).

Ministry of Colleges and Universities  
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# Introduction

This document is the Program Standard for the Environmental Control programs of instruction leading to an Ontario College Graduate Certificate delivered by Ontario Colleges of Applied Arts and Technology (MCU funding code 72700).

## Development of system-wide program standards

In 1993, the Government of Ontario initiated program standards development with the objectives of bringing a greater degree of consistency to college programming offered across the province, broadening the focus of college programs to ensure graduates have the skills to be flexible and to continue to learn and adapt, and providing public accountability for the quality and relevance of college programs.

The Program Standards Unit of the Ministry of Colleges and Universities has responsibility for the development, review and approval of system-wide standards for programs of instruction at Ontario Colleges of Applied Arts and Technology.

## Program standards

Program standards apply to all similar programs of instruction offered by colleges across the province. Each program standard for a postsecondary program includes the following element:

- [Vocational standard](#) (the vocationally specific learning outcomes which apply to the program of instruction in question);
- **Essential employability skills** (the essential employability skills learning outcomes which apply to all programs of instruction); and
- **General education requirement** (the requirement for general education in postsecondary programs of instruction).

Collectively, these elements outline the essential skills and knowledge that a student must reliably demonstrate in order to graduate from the program.

Individual Colleges of Applied Arts and Technology offering the program of instruction determine the specific program structure, delivery methods and other curriculum

matters to be used in assisting students to achieve the outcomes articulated in the standard. Individual colleges also determine whether additional local learning outcomes will be required to reflect specific local needs and/or interests.

## **The expression of program standards as vocational learning outcomes**

Vocational learning outcomes represent culminating demonstrations of learning and achievement. They are not simply a listing of discrete skills, nor broad statements of knowledge and comprehension. In addition, vocational learning outcomes are interrelated and cannot be viewed in isolation from one another. As such, they should be viewed as a comprehensive whole. They describe performances that demonstrate that significant integrated learning by graduates of the program has been achieved and verified.

Expressing standards as vocational learning outcomes ensures consistency in the outcomes for program graduates, while leaving to the discretion of individual colleges, curriculum matters such as the specific program structure and delivery methods.

## **The presentation of the vocational learning outcomes**

The **vocational learning outcome** statements set out the culminating demonstration of learning and achievement that the student must reliably demonstrate before graduation.

The **elements of the performance** for each outcome define and clarify the level and quality of performance necessary to meet the requirements of the vocational learning outcome. However, it is the performance of the vocational learning outcome itself on which students are evaluated. The elements of performance are indicators of the means by which the student may proceed to satisfactory performance of the vocational learning outcome. The elements of performance do not stand alone but rather in reference to the vocational learning outcome of which they form a part.

## **The development of a program standard**

In establishing the standards development initiative, the Government determined that all postsecondary programs of instruction should include vocational skills coupled with a broader set of essential skills. This combination is considered critical to ensuring that

college graduates have the skills required to be successful both upon graduation from the college program and throughout their working and personal lives.

A program standard is developed through a broad consultation process involving a range of stakeholders with a direct interest in the program area, including employers, professional associations, universities, secondary schools and program graduates working in the field, in addition to students, faculty and administrators at the colleges themselves. It represents a consensus of participating stakeholders on the essential learning that all program graduates should have achieved.

## **Updating the program standard**

The Ministry of Colleges and Universities will undertake regular reviews of the vocational learning outcomes for this program to ensure that the Environmental Control Program Standard remains appropriate and relevant to the needs of students and employers across the Province of Ontario. To confirm that this document is the most up-to-date release, please contact the [Ministry of Colleges and Universities](#).

# Vocational standard

All graduates of Environmental Control programs have achieved the [nine vocational learning outcomes \(VLOs\)](#) in the following pages.

## Preamble

Environmental science is a rapidly evolving field which combines technology with science and engineering. This program standard development exercise recognizes that there are several issues that are of particular concern in what is currently a rapid evolution of the field. These include climate change, air and water pollution, biodiversity loss, and resource depletion. Other issues of importance in manufacturing or industrial settings, for example, are sustainability, corporate and social responsibility, and the health and well-being of people in the workplace.

As a result of rapid evolution of the field, the Ontario labour market is changing quickly as well, and environmental control is becoming increasingly important. There is a growing demand for professionals in environmental science and engineering, as businesses and organizations seek professionals who can help them meet their environmental goals. In addition, government investment in green initiatives, such as renewable energy and green infrastructure, is creating new job opportunities in the environmental sector. Furthermore, it is expected that the demand for professionals in environmental science and technology, particularly in environmental control, will continue to grow as the need for environmental protection and sustainability increases.

Graduates of the Environmental Control Ontario Graduate Certificate program will leverage their related education and/or work experience as well as their newly-acquired knowledge and skills developed in this program including a significant understanding of environmental science and its intersection with technology, to be successful in public and private sector leadership roles. They will have developed strong problem-solving and analytical skills, as well as the ability to work independently and in teams. In addition, their excellent communication, and interpersonal skills, as well as the ability to work with a variety of stakeholders will position them well for growing responsibility in the workplace. Finally, they will also be able to leverage their knowledge of environmental regulations and their ability to participate in the development and implementation of environmental management plans and other significant projects.

Note: The [Ontario Council on Articulation and Transfer](#) (ONCAT) maintains the provincial postsecondary credit transfer portal, [ONTransfer](#).



## Synopsis of the vocational learning outcomes Environmental Control (Ontario College Graduate Certificate)

The graduate has reliably demonstrated the ability to:

1. Communicate technical information accurately and clearly in a variety of written, oral, visual and electronic forms.
2. Plan and implement environmental projects by applying project management principles and techniques for their successful execution and completion.
3. Complete projects in accordance with health and safety requirements and environmental policy, legislation, and regulations.
4. Research historical and/or organizational records by evaluating the results of appropriate sampling and lab or field analysis to contribute to informed environmental decision-making.
5. Perform environmental audits or site assessments to evaluate environmental conditions and recommend appropriate improvements.
6. Evaluate environmental systems and processes to identify and recommend appropriate environmental control measures.
7. Evaluate waste management systems, processes, and procedures to minimize waste, resource consumption and cost, and to optimize **sustainability**.
8. Research, plan and implement initiatives to support **environmental management systems**.
9. Lead, manage, contribute and collaborate effectively in an interdisciplinary team setting to achieve desired results.

[See Glossary](#)

Note: The learning outcomes have been numbered as a point of reference; numbering does not imply prioritization, sequencing, nor weighting of significance.

## The vocational learning outcomes

1. The graduate has reliably demonstrated the ability to: communicate technical information accurately and clearly in a variety of written, oral, visual and electronic forms.

### Elements of the performance

- a. Identify and apply the elements of effective technical, workplace and interpersonal communication.
- b. Develop a logical structure for both presentations and reports that includes an introduction, body of development and conclusion.
- c. Select, design and use visual aids to enhance presentations and reports.
- d. Plan and write a properly formatted proposal and technical report.
- e. Deliver effective presentations according to audience needs.
- f. Establish goals for the communications/ public awareness program and ways to measure effectiveness of outcomes in attaining the goals.
- g. Demonstrate the key elements of an effective public relations campaign.
- h. Identify and implement the key components of successful media interactions.
- i. Design and assess the effectiveness of environmental training/awareness sessions.
- j. Prepare graphical representations of technical information.
- k. Present analytical data in tabular form.

[See Glossary](#)

2. The graduate has reliably demonstrated the ability to: plan and implement environmental projects by applying project management principles and techniques for their successful execution and completion.

## **Elements of the performance**

- a. Identify and apply the key steps in the project management cycle.
- b. Create a sampling project plan, including timelines for project activities, conduct the sampling, analyze results with respect to compliance and design appropriate remediation.
- c. Define project goals.
- d. Demonstrate the ability to work successfully with other project professionals.
- e. Use technological tools to complete projects.
- f. Assign and schedule project tasks.
- g. Prepare and present project results.
- h. Prepare project documentation including cost estimates and schedules.

[See Glossary](#)

3. The graduate has reliably demonstrated the ability to: complete projects in accordance with health and safety requirements and environmental policy, legislation, and regulations.

## **Elements of the performance**

- a. Interpret and apply federal and provincial environmental legislation regulations, standards and municipal by-laws, and assess their implications in specific applications and ensure compliance.
- b. Apply environmental laws and health and safety regulations in a practical setting.
- c. Provide technical advice to management, internal staff, regulatory bodies, interest groups and the public on matters related to disputes, compliance and other environmental issues, including processes for acquiring regulatory approval.
- d. Review existing and/or proposed environmental policies/legislation/ standards to assess implications to stakeholders including customers and suppliers.
- e. Evaluate environmental business management practices and policy changes to influence future changes in Canada's legislative framework.
- f. Develop the organization's environmental policies, based on stakeholders' input where appropriate, that can conform to legislation and technical standards/guidelines.

[See Glossary](#)

4. The graduate has reliably demonstrated the ability to: research historical and/or organizational records by evaluating the results of appropriate sampling and lab or field analysis to contribute to informed environmental decision-making.

## Elements of the performance

- a. Apply the standards and principles of study design to create a sampling plan for data collection.
- b. Identify hazards, opportunities and/or potential risks to human health, the **environment**, facility operation/financial loss, legal liability, social impact, public perception through such activities as collecting source data, reviewing literature, investigation illness/injuries, and obtaining feedback from workers or the public.
- c. Develop site-specific work plans, including **Quality Assurance/Quality Control (QA/QC)** methods, measuring/monitoring procedures and analytical equipment to be used for the specific application, (e.g., air, water, wastewater, soil, sediments, rock, **biota**).
- d. Interpret analytical data to identify trends, changes from historical patterns, deviations, or evidence of environmental stresses.
- e. Interpret the findings of an environmental assessment report and apply the CCME classification system to a local site.
- f. Demonstrate the relevance of **environmental management systems** and the associated components of historical mitigation strategies.
- g. Analyze the elements of municipal source separation programs or similar programs and their applications.
- h. Apply the elements involved in the collection and disposal of municipal solid waste.
- i. Determine the environmental aspects of the needs and requirements associated with the design and operation of the proposed facility, plant, or landfill.
- j. Use information systems to monitor and track regulatory compliance, environmental incidents, permits, waste streams and other environmental management systems requirements.
- k. Create a sampling project plan, conduct the sampling, analyze results with respect to compliance and design appropriate remediation.
- l. Identify concentrations in environmental media that exceed applicable standards.
- m. Provide recommendations for additional environmental sample collection to address gaps in existing data.

[See Glossary](#)

5. The graduate has reliably demonstrated the ability to: perform environmental audits or site assessments to evaluate environmental conditions and recommend appropriate improvements.

## **Elements of the performance**

- a. Interpret and apply Ontario Provincial Environmental Assessment Legislation and Canadian Federal Legislation.
- b. Identify and address the overlap of other legislation into the environmental assessment area, (i.e., Planning Act, Environmental Protection Act, etc.).
- c. Identify projects which fall under the Class EA process.
- d. Apply the process for Class EAs in Ontario.
- e. Apply strategies for lobbying legislators to develop and enforce appropriate environmental regulations, policy and standards, such as for Greenhouse Gas emissions.
- f. Conduct an effective energy, input, output, carbon footprint, water and/or EMS audit.
- g. Analyze existing and/or proposed environmental policies/legislations/standards, and the rationale supporting them, to assess implications to stakeholders.
- h. Interpret analytical data to identify trends, significant changes from historical patterns, deviations, or evidence of environmental stresses.
- i. Apply the Risk Assessment framework for both Ecological Risk Assessments and Human Health Risk Assessments.
- j. Identify and apply the key steps in the project management cycle.
- k. Design and implement an internship project.
- l. Develop and manage personnel in a Project Management environment and assign tasks.
- m. Complete a Solid Non-hazardous Waste Audit according to Regulation 102/94.
- n. Collect environmental samples according to accepted industry standards including the preparation of Chain-of-Custody documentation.
- o. Identify and apply appropriate criteria for the assessment of analytical data related to environmental samples.
- p. Collect and evaluate data for sub-surface characterization.

[See Glossary](#)

6. The graduate has reliably demonstrated the ability to: evaluate environmental systems and processes to identify and recommend appropriate environmental control measures.

## Elements of the performance

- a. Assess operations and processes for potential pollution problems which involves identifying contaminant sources, and determining their characteristics and the severity of the problems.
- b. Assess manufacturing processes in a cross-section of industries.
- c. Identify the environmental impact of the industry on the environment in terms of air and water pollution, and wastes from the process.
- d. Analyze and apply the principles of pollution prevention as compared to conventional principles of environmental management.
- e. Implement **source reduction** as a means of achieving pollution prevention.
- f. Develop a pollution management and **abatement** plan.
- g. Complete a preliminary pollution prevention program assessment.
- h. Complete a solid non-hazardous **waste audit** according to regulation 102/94.
- i. Conduct a feasibility analysis on a pollution prevention recommendation.
- j. Evaluate environmental systems for sustainability.
- k. Analyze the impact of climate change and the importance of **amelioration** on the development and implementation of environmental systems.
- l. Explain the importance of **Indigenous Ways of Knowing and Being** on the development and implementation of environmental systems and control measures.
- m. Complete a schematic design of a leachate collection system.
- n. Assess landfill gas migration and recommend remedial measures.

[See Glossary](#)

7. The graduate has reliably demonstrated the ability to: evaluate waste management systems, processes, and procedures to minimize waste, resource consumption and cost, and to optimize **sustainability**.

## **Elements of the performance**

- a. Demonstrate the importance and relevance of waste management and the associated components of historical/Indigenous disposal strategies.
- b. Analyze the elements of current municipal source separation programs and their applications.
- c. Apply the elements involved in the collection and disposal of municipal solid waste.
- d. Determine the environmental aspects of the needs and requirements associated with the design and operation of the proposed facility, plant, landfill, etc.
- e. Use information systems to monitor and track regulatory compliance, environmental incidents, permits, waste streams and other **Environmental Management Systems** requirements.
- f. Select an appropriate process and system for the treatment of hazardous waste (airborne, liquid, solid) to reduce negative environmental impacts.
- g. Establish an environmental management system to meet the needs of a specific situation using standard concepts and procedures.

[See Glossary](#)



8. The graduate has reliably demonstrated the ability to: search, plan and implement initiatives to support **environmental management systems**.

## Elements of the performance

- a. Apply environmental laws and regulations in a practical context.
- b. Provide technical advice to management, internal staff, regulatory bodies, interest groups and the public on matters related to disputes, compliance and other environmental issues, including processes for acquiring regulatory approval.
- c. Review existing and/or proposed environmental policies/legislation/ standards to assess implications to stakeholders including customers and suppliers.
- d. Evaluate environmental management practices and international policy changes to influence future changes in Canada's legislative framework.
- e. Develop the organization's environmental policies, based on stakeholders' input where appropriate, that can conform to legislation and technical standards/guidelines.
- f. Develop and implement the key components of **environmental management systems**.
- g. Identify the elements of corporate social responsibility and reporting.
- h. Analyze **Indigenous Ways of Knowing and Being** with respect to environmental stewardship.
- i. Design and implement a carbon management strategy.
- j. Establish an **environmental management system** to meet the needs of a specific situation using standard concepts and procedures.

[See Glossary](#)

9. The graduate has reliably demonstrated the ability to: lead, manage, contribute and collaborate effectively in an interdisciplinary team setting to achieve desired results.

## **Elements of the performance**

- a. Interpret and apply the Ontario provincial environmental assessment legislation and the Canadian federal legislation.
- b. Identify and apply the key steps in the project management cycle.
- c. Design and implement an internship project.
- d. Support, develop and manage personnel in a project management environment.
- e. Plan and execute a team project.
- f. Identify project tasks and assign to team members.
- g. Assess project progress using project plan.
- h. Collaboratively evaluate project success including performance by all team members including oneself.
- i. Demonstrate strong interpersonal and conflict-resolution skills.

[See Glossary](#)

# Glossary

**Abatement:** is the process of reducing or eliminating environmental pollution or hazards. It can involve a variety of methods, such as reducing emissions, improving waste management, and implementing conservation measures.

**Amelioration:** is the process of improving the environment by reducing pollution, conserving natural resources, and restoring habitats. It can also refer to the process of making an environment more hospitable to human life, such as by improving air and water quality.

**Biotic:** refers to living or once-living organisms, such as plants, animals, fungi, and microorganisms, as well as the non-living components of their environment, such as soil, water, and air. It is the opposite of abiotic, which refers to non-living components of the environment.

**Environment:** means the components of the Earth and includes: (a) air, land and water; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) any building, structure, machine or other device or thing made by humans; any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; and (e) the interacting natural systems that include components referred to in clauses (a) to (d). (Taken from the Ontario Environmental Protection Act, 1990)

**Environmental Management System (EMS):** is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. It is a systematic approach to managing the environmental aspects of an organization's operations, products, and services in order to meet its environmental objectives and comply with applicable environmental regulations. An EMS typically includes policies, procedures, and processes for identifying, measuring, monitoring, and controlling environmental impacts, as well as for setting and achieving environmental objectives.

**Indigenous Ways of Knowing and Being:** refer to the traditional knowledge, beliefs, and practices of Indigenous peoples that have been passed down through generations. These ways of knowing and being are based on a deep connection to the land, a respect for the environment, and a holistic view of the world. They include spiritual beliefs, cultural values, and traditional practices such as hunting, fishing, and gathering.

Indigenous Ways of Knowing and Being are often characterized by a strong sense of community and a deep respect for environmental stewardship.

**Quality Assurance (QA):** (1) is a process of ensuring that environmental standards are met to protect the environment and public health. It involves monitoring, testing, and evaluating environmental conditions to ensure that they meet established standards. QA also includes the implementation of corrective actions when necessary to ensure that environmental standards are maintained; or (2) refers to procedures to ensure data quality objectives are met with respect to accuracy and precision.

**Quality Control (QC):** (1) is the process of monitoring and managing the quality of the environment to ensure that it is safe and healthy for human use. This includes monitoring air and water quality, controlling pollution, and managing waste. It also involves the implementation of regulations and policies to protect the environment from further degradation; or (2) refers to procedures to ensure data quality objectives are met with respect to accuracy and precision.

**Source Reduction:** is a waste management strategy that seeks to reduce the amount of waste generated at its source, such as through product design, packaging, and manufacturing processes. It is a proactive approach to waste management that seeks to reduce the amount of waste created before it enters the waste stream. Source reduction can also refer to the reuse of materials, such as through recycling or composting.

**Sustainability:** is the ability to maintain a certain level of economic, environmental, and social well-being over time. It is the practice of using resources in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainability is a holistic approach to managing resources that considers the economic, environmental, and social impacts of decisions.

**Waste Audit:** is an assessment of the amount and type of waste generated by a business, organization, or individual. It is typically conducted by a professional waste management company and involves sorting through the waste to determine what materials are being thrown away and how much of each material is being discarded. The audit also looks at how the waste is being managed and disposed of, and can provide recommendations for improving waste management practices.

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