Construction Engineering Technology Program Standard

The approved program standard for Construction Engineering Technology program of instruction leading to an Ontario College Advanced Diploma delivered by Ontario Colleges of Applied Arts and Technology (MTCU funding code 68200)

Ministry of Advanced Education and Skills Development
July 2016

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Inquiries regarding specific Civil Engineering Technology programs offered by colleges of applied arts and technology in Ontario should be directed to the relevant college.

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I. Introduction

This document is the Program Standard for the Construction Engineering Technology program of instruction leading to an Ontario College Advanced Diploma delivered by Ontario colleges of applied arts and technology (MTCU funding code 68200).

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 and Evaluation Unit of the Ministry of Advanced Education and Skills Development have 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 elements:

- **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 of 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 Advanced Education and Skills Development will undertake regular reviews of the vocational learning outcomes for this program to ensure that the Construction Engineering Technology 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:

psu@ontario.ca

II. Vocational Standard

All graduates of Construction Engineering Technology programs have achieved the thirteen vocational learning outcomes (VLOs) listed in the following pages, in addition to achieving the essential employability outcomes and meeting the general education (GE) requirement.

Preamble

Graduates of the Construction Engineering Technology program carry out design and technical functions related to a broad range of construction projects within government and the residential and industrial, commercial and institutional (ICI) construction sectors.

As members of the multi-disciplinary team, graduates facilitate the interaction among a range of *project stakeholders** to contribute to the accomplishment of *construction project** goals in accordance with project plans, workplace health and safety practices, *sustainability practices** and all applicable laws, codes, industry standards and ethical practices.

Through the application of science and engineering concepts, *technical mathematics** and the integration of industry-specific technologies, graduates assist with the planning, designing and implementation and evaluation of *construction projects**. Graduates schedule, coordinate and monitor *construction projects**. Graduates coordinate the collection, processing and interpretation of *survey/geomatics, layout and technical information** and project documents to support *construction projects**. Graduates apply interpersonal and leadership skills to the role of the construction technologist and participate in quality management and supervision of *construction projects**.

Graduates of Construction Engineering Technology programs work in a range of employment settings including building developers, general contractors, materials suppliers, government building departments, engineering and construction offices.

Graduates are typically employed in entry-level positions in the field as cost design technologists, estimators, building and construction inspectors, quantity surveyors, quality control technologists, assistant construction managers and field supervisors.

Graduates of the Construction Engineering Technology program develop and use strategies to enhance professional growth and ongoing learning in the construction field.

There may be opportunities for graduates to pursue further educational and

occupational qualifications; through articulation agreements between the colleges, universities or professional organizations. Graduates may be granted credits towards a degree and certification. Students should contact individual colleges and professional associations, such as the Ontario Association of Certified Engineering Technicians and Technologists (OACETT).

*See Glossary

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

Synopsis of the Vocational Learning Outcomes

Construction Engineering Technology (Ontario College Advanced Diploma)

The graduate has reliably demonstrated the ability to

1. develop and use strategies to enhance professional growth and ongoing learning in the construction engineering field.
2. comply with workplace health and safety practices and procedures in accordance with current legislation and regulations.
3. complete duties and assist in monitoring that work is performed in compliance with contractual obligations, applicable laws, standards, bylaws, codes and ethical practices in the construction engineering field.
4. promote and carry out *sustainability practices** in accordance with contract documents, industry standards and environmental legislative requirements.
5. facilitate the collaboration and interaction among *project stakeholders** to support *construction engineering projects**.
6. collect, process, analyze and coordinate technical data to produce written and graphical project-related documents.
7. coordinate and facilitate the collecting, processing, interpreting and application of *survey/geomatics and layout information** to implement construction projects*.
8. select and use industry-specific electronic and digital technologies to support the design and construction of projects.
9. analyze and solve technical problems related to the design and implementation of *construction projects** by applying engineering concepts, *technical mathematics** and *building science**.
10. schedule, coordinate and monitor the progression of *construction projects** by applying principles of construction project management.
11. prepare estimates of time, cost, quality and quantity, tenders and bids.
12. perform, coordinate and facilitate *quality control** testing and monitoring of equipment, materials and methods involved in the implementation and completion of *construction projects**.
13. apply teamwork, leadership, supervision and interpersonal skills when working individually or within multidisciplinary teams to complete work on *construction projects**.

*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

   develop and use strategies to enhance professional growth and ongoing learning in the construction engineering field.

Elements of the Performance

- keep abreast of changes in the construction engineering field
- use appropriate self-management techniques (e.g., time management, stress management)
- identify the need for self-evaluation and explain the importance of lifelong learning
- seek out and act upon constructive feedback to enhance work performance
- seek assistance to resolve problems beyond own knowledge and skills
- identify the roles and benefits of professional organizations and certification, e.g., Ontario Association of Certified Engineering Technicians and Technologists (OACETT)
- develop a plan to keep pace with and adapt to changing workforce demands and trends, as well as technological advances in the construction engineering field
- identify training courses, workshops and mentoring opportunities to enhance employment in the construction engineering field
- identify strategies for building a professional network and for participating in professional associations and activities

2. The graduate has reliably demonstrated the ability to

comply with workplace health and safety practices and procedures in accordance with applicable legislation and regulations.

Elements of the Performance

- identify employee rights and responsibilities associated with health and safety practices
- conduct self in a safe manner and in accordance with the requirements of work situation
- participate in health and safety training
- analyze a workplace setting and initiate action to handle unsafe or hazardous situations or materials
- prepare and analyze accident reports and take immediate and appropriate action to prevent any reoccurrence
- ensure that worksite has appropriate health and safety signs
- inform site visitors and others related to health and safety practices
- carry out prescribed safety checks
- comply with all requirements of the current Ontario Health and Safety Act,1990
- adhere to and maintain all required health and safety training and certification such as First Aid, Workplace Hazardous Materials Information System (WHMIS), Working at Heights and Confined Space Safety training where appropriate
- review and implement a site or project-specific health and safety plan
- verify excavation work sites have utility locates and that the guidelines for excavation are followed
- encourage and support a culture of safety in the workplace

3. The graduate has reliably demonstrated the ability to

complete duties and assist in monitoring that work is performed in compliance with contractual obligations, applicable laws, standards, bylaws, codes and ethical practices in the construction engineering field.

Elements of the Performance

- identify relevant legislation and bylaws that apply in specific situations
- apply legal principles affecting the review and administration of contracts
- interpret types and elements of contracts, contract offers and acceptances
- read and interpret relevant building codes i.e., National and Ontario Building Codes
- obtain from agencies the approvals required for *construction projects** at the correct times as directed
- relate how and where to access the most current information regarding codes and standards
- apply current legislation, codes and standards and its regulations, occupational health and safety and labour laws
- ensure that equipment, materials and practices adhere to current relevant law, legislation, standards, codes and bylaws
- identify codes of ethics of the applicable provincial association, societies or workplaces
- apply ethical reasoning to social and contractual issues that evolve when implementing a construction project*
- identify and adhere to labour-management principles and practices
- interpret and work within various collective agreements

*See Glossary

4. The graduate has reliably demonstrated the ability to

promote and carry out *sustainability practices** in accordance with contract documents, industry standards and environmental legislative requirements.

Elements of the Performance

- identify legislative requirements for environmental compliance
- coordinate, monitor, interpret and report to appropriate authorities the results of impact studies and assessments
- apply the principles of sustainable development, combining environmental stewardship and economic performance in project work
- identify and attempt, where possible, to reduce the negative economic, social and environmental impacts of *construction projects**
- contribute to environmental site assessments and implement identified remediation strategies
- differentiate various types of contamination and compare different remediation techniques
- determine principal environmental risks, e.g., groundwater contamination, soil erosion, pollutants, noise pollution, etc.
- promote *sustainability practices** across the building lifecycle and rehabilitation/renewal practices
- use recycled materials when appropriate and alternative resources to reduce impact on environment and promote sustainability
- minimize waste and use appropriate waste management techniques
- Identify technologies with a lower carbon footprint, e.g., LEED processes
- ensure subcontractors conform to the environmental protection laws and regulations
- evaluate and recommend the implementation of engineering solutions to support *sustainability practices**
- coordinate the collection of relevant material for submissions for green certification

5. The graduate has reliably demonstrated the ability to

facilitate the collaboration and interaction among *project stakeholders** to support *construction projects**.

Elements of the Performance

- differentiate the contribution of architecture and surveying along with structural, mechanical, electrical and environmental engineering disciplines, to the planning, designing and implementation of *construction projects**
- participate as a member of a multi-disciplinary team to design, implement, complete and evaluate *construction projects**
- describe the role of the construction engineering technologist as a member of the project team
- identify the *project stakeholders** and obtain their input about construction projects*
- provide feedback to *project stakeholders**
- support the roles, rights and responsibilities of *project stakeholders**
- facilitate interaction among *project stakeholders** by using effective individual and group interpersonal skills
- obtain assistance and clarification from the appropriate specialist to resolve problems
- assist in the coordination regarding clearances, locations and interferences between architectural, structural, mechanical and electrical services
- review documents and drawings from other disciplines
- lead project-related meetings on-site and off-site
- report, in written, graphics, and oral formats, the results of project-related meetings
- use appropriate interpersonal skills and terminology suited to the situation and *project stakeholders**
- use communication technologies to facilitate clear and concise communication among project stakeholders e.g., email, file transfer etc.

*See Glossary

6. The graduate has reliably demonstrated the ability to

collect, process, analyze and coordinate technical data to produce written and graphical project-related documents.

Elements of the Performance

- collect, interpret and verify data by using systematic approaches in accordance with recognized standards and practices
- assemble and interpret information and data
- identify and clarify the information needs of the project stakeholders*
- coordinate and analyze construction documents including drawings, specifications, tenders and *survey/geomatics** data
- establish criteria; organize, coordinate and prepare documents according to industry standards e.g., Canadian Construction Documents Committee (CCDC)
- prepare and present sketches and drawings in accordance with industry standards, formats, symbols and reference systems
- produce plans, drawings, details and presentation graphics using computer-assisted design (CAD) software
- evaluate and record modifications to graphics to reflect as-built conditions
- apply industry standard formats to design and prepare project-related written reports, correspondence, estimates and other documents for presentation to a variety of *project stakeholders**
- prepare, coordinate and present project-related information in oral and written formats to a variety of *project stakeholders**
- keep ongoing, accurate project records, minutes and accounts of *construction projects** and meetings according to established formats, policies and procedures
- use collected and stored information accurately and effectively to assist in decision making, reporting and *quality control**
- apply principles of information management to project records
- keep current, clear and accurate project records, minutes, accounts and project-evaluation records
- use and share project data in accordance with relevant privacy legislation, guidelines and data sharing agreements

*See Glossary

7. The graduate has reliably demonstrated the ability to

coordinate and facilitate the collecting, processing, interpreting and application of *survey/geomatics and layout information** to implement *construction projects**.

Elements of the Performance

- develop and use appropriate strategies for the collection and coordination of *survey/geomatics and layout information**
- select and operate standard survey instruments and GIS and GPS software and hardware to layout a *construction project**
- ensure that field, *survey/geomatics and layout information** collected are within expected accuracy parameters
- select and implement a construction survey and layout, including line, site, elevation and grade controls
- use and interpret aerial photographs, satellite and digital images and Global Navigation Satellite System (GNSS) data
- visualize, manipulate, analyze and coordinate spatial data using a variety of data sources and technologies
- coordinate *survey/geomatics and layout information** to contribute to the development of project implementation strategies
- develop and use appropriate methods for the collection and storage of *survey/geomatics and layout information**
- recognize potential and actual relationships between *construction projects** and their surrounding environment
- use check surveys systematically to evaluate collected data identifying the need for geotechnical site research
- draw conclusions from geotechnical data from the site

*See Glossary

8. The graduate has reliably demonstrated the ability to

   select and use industry-specific electronic and digital technologies to support the design and construction of projects.

Elements of the Performance

- keep abreast of changes in technology that affect construction engineering (e.g., imaging, heavy equipment machine control systems, mobile integration, cloud accessibility and Drone technologies)
- analyze the implications of technology and technological change on the construction industry
- select and use industry-specific electronic and digital technologies for the design of construction projects (e.g., Auto-CAD, Civil 3D, 3D laser scanning technologies, etc.)
- select and use communications technologies to access and share information
- apply knowledge of computers and application software to coordinate building systems and processes and to solving construction problems
- select, retrieve, validate, organize and summarize data by using computerized techniques
- assist in the analysis of data by using systematic approaches to problem solving and decision making in accordance with recognized standards and practices
- establish and implement an appropriate system to store and retrieve graphical and digital information
- organize project-related data by using computers and appropriate software effectively

9. The graduate has reliably demonstrated the ability to

analyze and solve technical problems related to the design and implementation of *construction projects** by applying engineering concepts, *technical mathematics** and *building science**.

Elements of the Performance

- apply knowledge of engineering concepts to the design, layout and construction projects
- use systematic approaches to anticipate, resolve, or arrange for the resolution of technical problems in the project design, layout and construction
- apply mathematical, engineering and scientific concepts to the design, layout and construction of construction projects
- use mathematical and scientific terminology correctly in written and oral communication
- assist in establishing the technical criteria necessary to design and construct *construction projects**
- assist in the analysis and design of structures and document structural steel, timber and concrete
- apply knowledge of building materials, methods, building envelope and environmental controls to solve building construction problems
- seek assistance to resolve situations in the analysis, design, or *construction projects** that are beyond the scope of the technologists training, knowledge or legal authority

*See Glossary

10. The graduate has reliably demonstrated the ability to

schedule, coordinate and monitor the progression of *construction projects** by applying principles of construction project management.

Elements of the Performance

- participate as a member of the project team to establish the scope of the project in consultation with the *project stakeholders**
- contribute to establishing the phases of the project and their component activities
- provide technical information for the development a project schedule
- reviewing the criteria applicable to each phase of work
- monitor project schedules against the baseline to ensure timely execution for both schedule and cost
- identify and interpret required data using appropriate statistical data analysis tools
- observe, record, assess and report work activity
- identify and seek assistance to resolve problems related to materials, scheduling, resources and budgets in order to complete *construction projects**
- monitor the financial resources, human resources and time-lines of construction projects
- use organizational and time-management strategies to support *construction projects**
- develop a project schedule using project management tools and/or methods e.g., MS Project, Critical path, logic network or Gantt Chart
- coordinate and organize project-related reports and submissions using computers and appropriate software
- apply principles of cost control and accounting to do budget forecasts and project estimates
- identify schedule-adherence problems and make necessary adjustments
- monitor, report diligently and assist in the resolution of deficiencies and noncompliance with contract documents
- monitor, report diligently and assist in the resolution of cost, time and quality deviations
- develop project records including equipment and material inventories, time sheets, projected-related and actual-costs records and quality-assurance records
- ensure accuracy, clarity and timeliness of project-evaluation records
- prepare and present formal technical reports, budget forecasts and project estimates

- contribute to the identification of risks associated with *construction projects** and implement risk management strategies in collaboration with project manager

*See Glossary

11. The graduate has reliably demonstrated the ability to

prepare estimates of time, cost, quality and quantity, tenders and bids.

Elements of the Performance

- prepare accurate preliminary and detailed estimates
- calculate accurate updated cost estimates and actual costs
- analyze labour-production-time studies to produce accurate unit prices of construction activities
- apply principles of cost accounting to prepare cost plans, elemental estimates, budget forecasts and project estimates
- measure and categorize quantities by using accepted methods of measurement such as the Canadian Institute of Quantity Surveyors (CIQS) standard methods of measurement*
- seek competent expert advice and analysis where inexperience may hinder accuracy
- participate in the viability analysis and cost estimate, for green and alternate strategies, materials and processes

12. The graduate has reliably demonstrated the ability to

perform, coordinate and facilitate *quality control** testing and monitoring of equipment, materials and methods involved in the implementation and completion of *construction projects**.

Elements of the Performance

- review and analyze the specifications, limitations, use and safety aspects of equipment and construction materials
- perform and/or supervise *quality-control** sampling and testing; interpret results and make necessary corrective action
- ensure the proper handling and use of materials
- consider and report on the costs/benefits of methods employed
- create deficiency lists and recommend solutions
- monitor, report and correct deficiencies and non-compliance with project specifications
- monitor, report and resolve quality and cost deviations
- conduct and/or coordinate *quality control** sampling and testing
- evaluate reports, minutes, logs and relevant technical data
- review engineering failure analysis and reporting and make appropriate recommendations
- maintain industry certifications for *quality control** testing where relevant

*See Glossary

13. The graduate has reliably demonstrated the ability to

apply teamwork, leadership, supervision and interpersonal skills when working individually or within multidisciplinary teams to complete work on *construction projects****.**

Elements of the Performance

- take initiative and work independently with minimal supervision
- work as an effective team player to complete tasks while promoting a positive work environment
- facilitate performance reviews
- use effective time-management and organizational techniques to prioritize tasks and to accomplish goals
- take responsibility for one's job related performance, as an individual and as a member of a multidisciplinary team
- apply human resource management principles to *construction projects** to enhance cost, time and quality performance
- apply basic business and administrative principles and practices
- organize, coordinate and supervise the work of a team
- organize and plan short term and long term project goals
- provide support and guidance to technical staff
- provide motivation and positive feedback to others to accomplish tasks and goals
- use conflict resolution skills in work situations
- lead team and site meetings
- assist in and perform supervisory functions

*See Glossary

Glossary

building science – Systematic theory and research related to construction work, building materials, methods, building envelope and environmental controls including physics, statics, mechanics and strength characteristics of materials.

construction projects – Includes the pre-construction, construction and post-construction phases of building construction projects. Construction projects may include a range of projects within the residential and industrial, commercial and institutional (ICI) construction sectors.

project stakeholders – Any group or individual who has a vested interest in the project including the clients, architects, quantity surveyors, engineers, sub-contractors, tradespersons, suppliers, management team, government authorities, building operators, building users and the public.

quality control – The control and improvement of construction projects by sampling, testing, calibrating, monitoring, correcting and enhancing performance. Quality control is based on the potential, specifications and limitations of materials, equipment, methods, human resources and environmental benefit/deficit.

survey/geomatics and layout information – A field of scientific and technical activities which uses an integrated approach to the measurement, analysis, management, storage and display of spatially referenced data; construction information includes construction layouts and levels, field data and survey/geomatics information relevant to construction projects.

sustainability practices – Includes the decisions and activities that apply the concepts of environmental, economic and social sustainability and lifecycle assessment into the planning, design, operation and evaluation of construction projects (adapted from The Canadian Society of Civil Engineering, *"Entrusted to Our Care" Guidelines for Sustainable Development*, 2007).

technical mathematics - the application of mathematical concepts to solve engineering problems. Technical mathematics includes algebra, trigonometry, plane and analytical geometry, vectors, matrix, calculus, discrete math and statistics (adapted from National Technology Benchmarks, 2014).

III. Essential Employability Skills

All graduates of the Construction Engineering Technology program of instruction must have reliably demonstrated the essential employability skills learning outcomes listed on the following pages, in addition to achieving the vocational learning outcomes and meeting the general education requirement.

Context

Essential Employability Skills (EES) are skills that, regardless of a student's program or discipline, are critical for success in the workplace, in day-to-day living and for lifelong learning.

The teaching and attainment of these EES for students in, and graduates from, Ontario's colleges of applied arts and technology are anchored in a set of three fundamental assumptions:

- these skills are important for every adult to function successfully in society today;
- our colleges are well equipped and well positioned to prepare graduates with these skills;
- these skills are equally valuable for all graduates, regardless of the level of their credential, whether they pursue a career path, or they pursue further education.

Skill Categories

To capture these skills, the following six categories define the essential areas where graduates must demonstrate skills and knowledge.

- Communication
- Numeracy
- Critical Thinking & Problem Solving
- Information Management
- Interpersonal
- Personal

Application and Implementation

In each of the six skill categories, there are a number of defining skills, or sub skills, identified to further articulate the requisite skills identified in the main skill categories. The following chart illustrates the relationship between the skill categories, the defining skills within the categories and learning outcomes to be achieved by graduates from all postsecondary programs of instruction that lead to an Ontario College credential.

EES may be embedded in General Education or vocational courses, or developed through discrete courses. However these skills are developed, all graduates with Ontario College credentials must be able to reliably demonstrate the essential skills required in each of the six categories.

Skill Category	**Defining Skills:** Skill areas to be demonstrated by graduates:	**Learning Outcomes:** The levels of achievement required by graduates. The graduate has reliably demonstrated the ability to:
Communication	• Reading • Writing • Speaking • Listening • Presenting • Visual literacy	1. communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. 2. respond to written, spoken or visual messages in a manner that ensures effective communication.
Numeracy	• Understanding and applying mathematical concepts and reasoning • Analyzing and using numerical data • Conceptualizing	1. execute mathematical operations accurately.
Critical Thinking & Problem Solving	• Analyzing • Synthesizing • Evaluating • Decision making • Creative and innovative thinking	1. apply a systematic approach to solve problems. 2. use a variety of thinking skills to anticipate and solve problems.

Skill Category	**Defining Skills:** Skill areas to be demonstrated by graduates:	**Learning Outcomes:** The levels of achievement required by graduates. The graduate has reliably demonstrated the ability to:
Information Management	• Gathering and managing information • Selecting and using appropriate tools and technology for a task or a project • Computer literacy • Internet skills	1. locate, select, organize and document information using appropriate technology and information systems. 2. analyze, evaluate and apply relevant information from a variety of sources.
Interpersonal	• Teamwork • Relationship management • Conflict resolution • Leadership • Networking	1. show respect for the diverse opinions, values, belief systems and contributions of others. 2. interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
Personal	• Managing self • Managing change and being flexible and adaptable • Engaging in reflective practices • Demonstrating personal responsibility	1. manage the use of time and other resources to complete projects. 2. take responsibility for one's own actions, decisions and their consequences.

IV. General Education Requirement

All graduates of the Construction Engineering Technology program must have met the general education requirement described on the following pages, in addition to achieving the vocational and essential employability skills learning outcomes.

Requirement

The General Education Requirement for programs of instruction is stipulated in the Credentials Framework (Appendix A in the Minister's Binding Policy Directive Framework for Programs of Instruction).

In programs of instruction leading to either an Ontario College Diploma or an Ontario College Advanced Diploma, it is required that graduates have been engaged in learning that exposes them to at least one discipline outside their main field of study and increases their awareness of the society and culture in which they live and work. This will typically be accomplished by students taking 3 to 5 courses (or the equivalent) designed discretely and separately from vocational learning opportunities.

This general education learning would normally be delivered using a combination of required and elective processes.

Purpose

The purpose of General Education in the Ontario college system is to contribute to the development of citizens who are conscious of the diversity, complexity and richness of the human experience; who are able to establish meaning through this consciousness; and who, as a result, are able to contribute thoughtfully, creatively and positively to the society in which they live and work.

General Education strengthens students' essential employability skills, such as critical analysis, problem solving and communication, in the context of an exploration of topics with broad-based personal and/or societal importance.

Themes

The themes listed below will be used to provide direction to colleges in the development and identification of courses that are designed to fulfil the General Education Requirement for programs of instructions.

Each theme provides a statement of Rationale and offers suggestions related to more specific topic areas that could be explored within each area. These suggestions are neither prescriptive nor exhaustive. They are included to provide guidance regarding the nature and scope of content that would be judged as meeting the intent and overall goals of General Education.

1. Arts in Society:

Rationale:

The capacity of a person to recognize and evaluate artistic and creative achievements is useful in many aspects of his/her life. Since artistic expression is a fundamentally human activity, which both reflects and anticipates developments in the larger culture, its study will enhance the student's cultural and self-awareness.

Content:

Courses in this area should provide students with an understanding of the importance of visual and creative arts in human affairs, of the artist's and writer's perceptions of the world and the means by which those perceptions are translated into the language of literature and artistic expression. They will also provide an appreciation of the aesthetic values used in examining works of art and possibly, a direct experience in expressing perceptions in an artistic medium.

2. Civic Life:

Rationale:

In order for individuals to live responsibly and to reach their potential as individuals and as citizens of society, they need to understand the patterns of human relationships that underlie the orderly interactions of a society's various structural units. Informed people will have knowledge of the meaning of civic life in relation to diverse communities at the local, national and global level and an awareness of international issues and the effects of these on Canada, as well as Canada's place in the international community.

Content:

Courses in this area should provide students with an understanding of the meaning of freedoms, rights and participation in community and public life, in addition to a working knowledge of the structure and function of various levels of government (municipal, provincial, national) in a Canadian and/or in an international context. They may also provide an historical understanding of major political issues affecting relations between the various levels of government in Canada and their constituents.

3. Social and Cultural Understanding:

Rationale:

Knowledge of the patterns and precedents of the past provide the means for a person to gain an awareness of his or her place in contemporary culture and society. In addition to this awareness, students will acquire a sense of the main currents of their culture and that of other cultures over an extended period of time in order to link personal history to the broader study of culture.

Content:

Courses in this area are those that deal broadly with major social and cultural themes. These courses may also stress the nature and validity of historical evidence and the variety of historical interpretation of events. Courses will provide the students with a view and understanding of the impact of cultural, social, ethnic or linguistic characteristics.

4. Personal Understanding:

Rationale:

Educated people are equipped for life-long understanding and development of themselves as integrated physiological and psychological entities. They are aware of the ideal need to be fully functioning persons: mentally, physically, emotionally, socially, spiritually and vocationally.

Content:

Courses in this area will focus on understanding the individual: his or her evolution; situation; relationship with others; place in the environment and universe; achievements and problems; and his or her meaning and purpose. They will also allow students the opportunity to study institutionalized human social behaviour in a systematic way. Courses fulfilling this requirement may be oriented to the study of the individual within a variety of contexts.

5. Science and Technology:

Rationale:

Matter and energy are universal concepts in science, forming a basis for understanding the interactions that occur in living and non-living systems in our universe. Study in this area provides an understanding of the behaviour of matter that provides a foundation for further scientific study and the creation of broader understanding about natural phenomena.

Similarly, the various applications and developments in the area of technology have an increasing impact on all aspects of human endeavour and have numerous social, economic and philosophical implications. For example, the operation of computers to process data at high speed has invoked an interaction between machines and the human mind that is unique in human history. This and other technological developments have a powerful impact on how we deal with many of the complex questions in our society.

Content:

Courses in this area should stress scientific inquiry and deal with basic or fundamental questions of science rather than applied ones. They may be formulated from traditional basic courses in such areas of study as biology, chemistry, physics, astronomy, geology or agriculture. As well, courses related to understanding the role and functions of computers (e.g., data management and information processing) and assorted computer-related technologies should be offered in a non-applied manner to provide students with an opportunity to explore the impact of these concepts and practices on their lives.