Construction Techniques Program Standard

The approved program standard for Construction Techniques program of instruction leading to an Ontario College Certificate delivered by Ontario Colleges of Applied Arts and Technology (MTCU funding code 48200)

Ministry of Advanced Education and Skills Development
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Ministry of Advanced Education and Skills Development
Programs Branch, Program Standards and Evaluation Unit
23rd floor, Mowat Block
900 Bay Street
Toronto, Ontario
M7A

psu@ontario.ca

Inquiries regarding specific Civil Engineering Techniques 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 Techniques program of instruction leading to an Ontario College Certificate delivered by Ontario colleges of applied arts and technology (MTCU funding code 48200).

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 Techniques 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 Techniques programs have achieved the eleven 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 Techniques program carry out trades related functions and general labouring tasks in a broad range of *construction projects** within the residential and industrial, commercial and institutional (ICI) construction sectors.

Graduates work collaboratively with a range of tradespersons and *project stakeholders** and perform all tasks in accordance with project plans, workplace health and safety practices, *sustainability practices** and all applicable laws, codes, industry standards and ethical practices. As members of the construction site team, graduates work collaboratively with a range of tradespersons and communicate with *project stakeholders**.

Graduates solve trade-related problems using mathematical equations and geometric concepts. Graduates use computer technologies to support communication, to prepare basic drawings and to maintain project records, logs and schedules.

Graduates select, maintain and safely operate hand and power tools and equipment while assisting skilled tradespersons and performing general labouring tasks at construction sites.

Graduates are typically employed in entry-level positions in the construction field as labourers assisting with general construction tasks i.e., demolition, concrete forming and placement, asphalt spreading, bricklaying, framing and roofing.

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

Graduates have achieved foundational knowledge and skills in the construction field and may pursue further educational opportunities in postsecondary diploma and apprenticeship programs.

Synopsis of the Vocational Learning Outcomes

Construction Techniques (Ontario College Certificate)

The graduate has reliably demonstrated the ability to

1. identify and use strategies to enhance professional growth and ongoing learning in the construction field.

2. identify and adhere to established health and safety practices.

3. perform all construction tasks in compliance with applicable laws, regulations, codes and ethical practices in the construction field.

4. work in accordance with established *sustainability practices**.

5. collaborate with a range of tradespersons and project stakeholders* to maintain effective working relationships.

6. communicate technical information to a variety of clients, supervisors and tradespersons to participate in the successful completion of *construction projects**.

7. identify and use industry-specific technologies to support construction projects*.

8. solve on-site trade-related construction problems using mathematical equations and geometric concepts.

9. select, maintain and safely operate hand and power tools and equipment used in the building construction trades.

10. assist in the preparation of project estimates.

11. assist skilled tradespersons and perform labouring tasks at construction sites.

*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

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

Elements of the Performance

- identify opportunities in construction trades spanning apprenticeships, academic and work options
- identify trends in the construction 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 assistance to resolve problems beyond own knowledge and skills
- seek out and act upon constructive feedback to enhance work performance
- identify training courses, workshops and programs to enhance employment opportunities in the construction trades field

2.   The graduate has reliably demonstrated the ability to

identify and adhere to established workplace health and safety practices.

Elements of the Performance

- identify employee rights and responsibilities associated with health and safety practices
- conduct self in safe manner and in accordance with the requirements of work situation
- identify potential hazards in the workplace setting
- participate in health and safety training
- 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
- select and wear Personal Protective Equipment (PPE)

3.   The graduate has reliably demonstrated the ability to

perform all construction tasks in compliance with applicable laws, regulations, codes and ethical practices in the construction field.

Elements of the Performance

- assist in the implementation of project specifications and drawings
- read and interpret relevant codes and specification plans
- identify how current legislation, codes and standards including the Ontario Building Code and its regulations govern *construction projects**
- adhere to current legislation, standards, codes and bylaws that regulate the equipment and materials used in *construction projects**
- perform ethical work practices within the construction industry

*See Glossary

4.   The graduate has reliably demonstrated the ability to

work in accordance with established *sustainability practices**.

Elements of the Performance

- identify legislative requirements for environmental compliance
- identify the principles of sustainable development, including environmental stewardship and economic performance in project work
- use recycled materials when appropriate and alternative resources to reduce impact on environment
- minimize waste and use appropriate waste management strategies as directed
- identify technologies with a lower carbon footprint, e.g., LEED processes

*See Glossary

5. The graduate has reliably demonstrated the ability to

collaborate with a range of tradespersons and *project stakeholders** to maintain effective working relationships.

Elements of the Performance

- identify the role of a range of *project stakeholders** including owners, architects, construction engineers, contractors and tradespersons
- describe own role as a member of a multi-disciplinary team working on *construction projects**
- take initiative and work independently with minimal supervision
- work as an effective team player to complete tasks while promoting a positive work environment
- apply effective organizational and time-management strategies in own work
- maintain project schedule and projected use of materials and person-hours
- take responsibility for one's job related performance, as an individual and as a member of a multidisciplinary team
- obtain assistance and clarification from the appropriate specialist to resolve problems
- use appropriate interpersonal skills including using terminology suited to the situation and *project stakeholders**
- participate as a team member during on-site project-related meetings

*See Glossary

6.   The graduate has reliably demonstrated the ability to

communicate technical information to a variety of clients, supervisors and tradespersons to participate in the successful completion of *construction projects**.

Elements of the Performance

- use industry specific terminology as it relates to building materials, projects and trades
- read and interpret construction documents including drawings, specifications and schedules
- maintain project records, logs and schedules
- use basic sketching skills to prepare preliminary and working drawings
- prepare sketches and drawings in accordance with industry standards, formats, symbols and reference systems
- keep ongoing, accurate project records and accounts of construction tasks according to established formats, policies and procedures
- 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

identify and use industry-specific technologies to support *construction projects**.

Elements of the Performance

- identify how technology and technological change affect the construction industry
- use communication technologies to access and share information
- use software to access and view digital drawings and specification
- use computers and appropriate software to contribute to the organization of project related data

*See Glossary

8.	The graduate has reliably demonstrated the ability to

	solve on-site trade related construction problems using mathematical equations and geometric concepts.

Elements of the Performance

- calculate building elevations
- calculate angles and slopes in framing and roofing layout
- determine calculations for floor layouts and spacing for fixtures and appliances
- calculate areas, volumes and quantities of materials

9. The graduate has reliably demonstrated the ability to

select, maintain and safely operate hand and power tools and equipment used in the building construction trades.

Elements of the Performance

- select, use and maintain hand tools, portable and stationary power tools
- use rakes, shovels and wheelbarrows
- operate safely and maintain pneumatic hammers, vibrators and tampers
- tend to machines or equipment used in construction such as mixers, compressors and pumps
- select and use materials, fasteners and connectors commonly used in the construction industry
- use building layout instruments

10.   The graduate has reliably demonstrated the ability to

        assist in the preparation of project estimates.

Elements of the Performance

- apply basic quantity surveying principles to assist in construction takeoff and ordering
- assist in the calculation of quantities for excavation, concrete, formwork, masonry and framing
- use industry standards relating to allowance for material and time allotments for labour calculations

11.   The graduate has reliably demonstrated the ability to

assist skilled tradespersons and perform labouring tasks at construction sites.

Elements of the Performance

- load and unload construction materials and move materials to work area
- direct traffic at construction sites
- remove rubble and debris at construction sites
- build and dismantle concrete forms, scaffolding, shoring and barricades
- mix, pour and spread materials such as concrete and asphalt
- assist with the cleanup of spills, contaminants and the safe remove hazardous materials
- assist tradespersons such as carpenters, bricklayers, concrete finishers, roofers etc.
- construct forms for footings, flatwork, foundation, walls and framing
- install exterior components such as doors, windows and exterior residential finishes

Glossary

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.

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).

III. Essential Employability Skills

All graduates of the Construction Techniques 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 Techniques 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.