Ontario

Mechanical Engineering Technology Program Standard

The approved program standard for the Mechanical Engineering Technology program of instruction leading to an Ontario College Advanced Diploma delivered by Ontario Colleges of Applied Arts and Technology.
(MCU funding code 61007)

Ministry of Colleges and Universities
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- Vertha Coligan, the Project Officer who led the review

Contents

Introduction

This document is the Program Standard for the Mechanical Engineering Technology program of instruction leading to an Ontario College Advanced Diploma delivered by Ontario Colleges of Applied Arts and Technology (MCU funding code 61007).

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 of Applied Arts and Technology across the province of Ontario. 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 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 of Ontario 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 Mechanical 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 of Colleges and Universities.

Vocational standard

All graduates of the Mechanical Engineering Technology program have achieved the ten vocational learning outcomes (VLOs), in addition to achieving the essential employability outcomes and meeting the general education (GE) requirement.

Preamble

Graduates of the Mechanical Engineering Technology program carry out mechanical engineering functions in compliance with the pertinent legislation, and established standards, policies and procedures within the scope of practice of the mechanical engineering technologist as defined by OACETT or other governing bodies and they have demonstrated achievement of vocational learning outcomes which relate to engineering in general and mechanical engineering in particular.

Graduates of the Mechanical Engineering Technology program may design, analyze, and supervise the production of mechanical components, equipment, and systems, as well as monitor the application of manufacturing and quality control procedures. They apply skills in oral and written communication, teamwork, documentation, engineering CAD models and design, sketching and drawing, mathematics and mechanical problem solving, computer and information technology applications, as well as entrepreneurial skills to support and manage mechanical engineering projects.

Graduates of the Mechanical Engineering Technology program work in a broad range of employment settings in the mechanical engineering sector, including manufacturing industries (e.g., aerospace and defence, automation, automotive, building products, fabricated metal products, machinery, primary metal, railway equipment, as well as shipbuilding and industrial marine) and natural resource industries (e.g., agricultural, energy, forestry, mining, and petrochemical). The graduates' activities may include a range of careers from computer-aided design and manufacturing or industrial purchasing and sales, cost estimating or co-ordinating quality assurance and **sustainability**, inspecting, planning, as well as supervisory and managerial positions or self-employment in consulting in the mechanical engineering field. Graduates may also perform work that falls within the practice of professional engineering, but only under the supervision of a professional engineer except in limited circumstances. The exceptions are positions where there is no risk to life, health, property, or the public welfare.

Opportunities for graduates to pursue further educational or occupational qualifications are available through articulation agreements between the colleges, universities, and professional organizations, whereby graduates may be granted credits towards a degree or certification. For details, students should contact individual colleges and professional associations, such as the Ontario Association of Certified Engineering Technicians and Technologists (OACETT) and Professional Engineers Ontario (PEO). To practise as a professional engineer in Ontario, an individual must be licensed by Professional Engineers Ontario (PEO). Graduates may also pursue further education

through various apprenticeship pathways to earn a Certificate of Qualification in a particular trade.

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

Synopsis of the vocational learning outcomes
Mechanical Engineering Technology (Ontario College Advanced Diploma)

The graduate has reliably demonstrated the ability to:

1. Initiate, monitor and complete all work in compliance with legislation, regulations, standards, guidelines, and industry and engineering **practices**.
2. Develop, implement and evaluate quality control/quality assurance procedures and systems to meet industry and organizational standards and end-use requirements.
3. Monitor and assess adherence to health and safety legislation to prevent workplace injuries and incidents.
4. Develop, implement and monitor sustainability protocols to prioritize resource efficiency and environmental conservation.
5. Troubleshoot and analyze mechanical problems by applying engineering principles to provide solutions that meet manufacturer and/or customer specifications.
6. Assess and use technology to support the design and implementation of mechanical engineering projects.
7. Prepare, analyze, and modify engineering drawings, models, and other related technical documents according to project specifications.
8. Design, manufacture, assemble, inspect and adjust mechanical components and systems according to required specifications.
9. Recommend and verify the specifications, required materials, processes and operations to support the design and production of mechanical components, **assemblies** and **systems**.
10. Use project management tools and techniques when planning, implementing, and evaluating projects to meet business objectives within time, cost, and quality constraints.
11. Develop strategies for personal and professional development to enhance work performance, career progression and mobility.

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: initiate, monitor and complete all work in compliance with legislation, regulations, standards, guidelines, and industry and engineering practices.

Elements of the performance

a. Complete all work within the legal and ethical scope of practice of the mechanical engineering technologist
b. Monitor ongoing compliance with industry standards and regulations as required (e.g., Canadian Standards Association (CSA), Technical Standards and Safety Authority (TSSA), International Organization for Standardization (ISO) or American National Standards Institute (ANSI), ASTM International (ASTM))
c. Complete all work and monitor ongoing compliance with organizational practices and procedures
d. Monitor ongoing compliance with regulatory requirements when completing the design, installation, maintenance and/or repair of mechanical components and **systems**
e. Develop and promote organizational policies that strengthen an inclusive, equitable, respectful, safe and co-operative workplace environment
f. Manage employer-employee contractual obligations within collective agreements
g. Accept responsibility and be accountable for one's actions
h. Implement manufacturers' guidelines for the installation, use and maintenance of components and **assemblies**

See Glossary

2. The graduate has reliably demonstrated the ability to: develop, implement and evaluate quality control/quality assurance procedures and systems to meet industry and organizational standards and end-use requirements.

Elements of the performance

a. Promote production efficiency and effectiveness by implementing quality control and/or assurance systems (e.g., International Organization for Standardization (ISO) series systems, **LEAN**, **5-S**, **Six Sigma** or continuous improvement (**kaizen**) efforts)
b. Evaluate whether engineering products or services match the intended purposes, including workplace
c. Plan and co-ordinate quality assurance inspections, sampling, testing or audits to verify that mechanical components and products are manufactured according to required specification
d. Evaluate the results of quality assurance sampling and testing to recommend appropriate improvements to manufacturing processes
e. Select, **calibrate** and use appropriate measuring instruments to inspect mechanical components and **systems**
f. Inspect, sample and evaluate for quality control against established standards to uncover defects, identify root causes of quality problems, and recommend the needed corrective measures
g. Prepare and analyze reports on quality assurance and quality control data for statistical process control and planning purposes
h. Monitor compliance with current quality assurance procedures and required specifications
i. Prepare, manage and maintain current, clear and accurate project-related documents and progress reports in accordance with current organizational practices
j. Develop and implement effective systems to securely share, store and retrieve information
k. Use project-related records to prepare reports and plan activities

See Glossary

3. The graduate has reliably demonstrated the ability to: monitor and assess adherence to health and safety legislation to prevent workplace injuries and incidents.

Elements of the performance

a. Interpret and apply safety codes, policies and practices, and accident prevention procedures from design to delivery of final product
b. Complete all work in accordance with health and safety legislation (e.g., OH&S Act and associated codes and regulations)
c. Develop strategies to eliminate workplace hazards and take appropriate actions to promote a safe working environment
d. Use personal protective equipment (PPE) and wear task-appropriate clothing to ensure personal health and safety in the workplace.
e. Develop, promote and apply best practices for a healthy and safe workplace
f. Follow and implement safe work practices and procedures when using hand and power tools, as well as machine tools and related equipment
g. Handle all work materials appropriately and safely
h. Handle, store and dispose of hazardous materials safely in accordance with the Workplace Hazardous Materials Information System (WHMIS) or Global Harmonized System (GHS) and Transporting of Dangerous Goods (TDG) regulations
i. Respond appropriately to emergency situations according to organizational practices and procedures
j. Report unsafe behaviours or non-compliances, hazards and accidents according to codes, regulations and organizational practices and procedures

See Glossary

4. The graduate has reliably demonstrated the ability to: develop, implement, and monitor sustainability protocols to prioritize resource efficiency and environmental conservation.

Elements of the performance

a. Implement environmental management systems (e.g., International Organization for Standardization (ISO) series systems, Leadership in Energy and Environmental Design (LEED), American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) standards, etc.)
b. Comply with environmental policies and standards
c. Apply **sustainability** best practices and procedures in the workplace
d. Determine and consider take into account the interrelationships among technology, society, the environment, politics, the economy and a mechanical engineering projects
e. Develop and promote policies that foster technical, functional, environmental, ecological and sociocultural improvements
f. Develop and promote methods for managing waste, energy consumption and emissions to bring about effective and efficient use of resources
g. Develop and promote methods for **sustainability** when selecting and using materials (e.g., renewable, recyclable or recycled)
h. Develop and implement strategies to promote the socioeconomic benefits of mechanical engineering projects

See Glossary

5. The graduate has reliably demonstrated the ability to: troubleshoot and analyze mechanical problems by applying engineering principles to provide repair solutions that meet manufacturer and/or customer specifications.

Elements of the performance

a. Analyze and solve complex technical problems by applying mathematics, such as algebra, trigonometry, geometry, differential and integral calculus, statistics, and linear algebra
b. Convert and perform accurate calculations using relevant systems of measurement: International System of Units (SI), Imperial and U.S. Customary using both manual methods and digital technology
c. Analyze and solve complex technical problems applying engineering fundamentals
d. Analyze materials and mechanical components using appropriate testing and measurement equipment (e.g., destructive testing, non-destructive testing, mechanical testing, dimensional inspection, failure analysis or specimen machining)
e. Access and select relevant technical information from various reliable and current sources
f. Identify, select and use appropriate methods, tools and techniques to repair mechanical components and systems
g. Apply fundamentals of mechanical engineering to the design, analysis, manufacturing and testing of mechanical components
h. Carry out advanced procedures involving the design, implementation, monitoring and reporting of experimental operations
i. Identify the technical criteria necessary to design and manufacture mechanical components and systems
j. Use computer-aided numerical methods and model analysis to solve complex technical problems

See Glossary

6. The graduate has reliably demonstrated the ability to: ***a***ssess and use technology to support the design and implementation of mechanical engineering projects.

Elements of the performance

a. Acquire and maintain computer skills applicable to current and emerging technologies to prepare and modify mechanical engineering drawings, models and other related technical documents
b. Use current technology to research, as well as to design and test tools, machines and mechanical components and **systems**
c. Use current technology to design, manufacture and maintain mechanical components to required specifications
d. Access and exchange technical information using current and emerging technologies
e. Develop and implement an effective electronic file management process to access, organize, securely share and store information and prepare technical documents

See Glossary

7. The graduate has reliably demonstrated the ability to: prepare, analyze, and modify engineering drawings, models, and other related technical documents according to project specifications.

Elements of the performance

a. Prepare, analyze and modify engineering CAD drawings, models and other related technical documents for the design of mechanical components, processes and **systems**
b. Determine the geometric dimensions and tolerances required for manufacturing mechanical components and **assemblies**
c. Determine the materials specifications required for manufacturing mechanical components and **assemblies**
d. Use freehand drawing techniques to prepare engineering sketches
e. interpret, validate, and create bills of materials and revision annotations
f. Use engineering terminology correctly and accurately in written and oral communication
g. Prepare, organize, analyze and evaluate relevant information, data, materials and documents in accordance with recognized standards (e.g., organizational standards, CSA, ISO)
h. Apply parametric modelling methodology to create dynamic and flexible 3-D solid models
i. Apply geometric dimensioning in and tolerancing (GD&T) principles to ensure manufacturability
j. Process the communication and documentation of engineering designs with an awareness of intellectual property issues and cybersecurity considerations relevant to the industry and organizational practices.

See Glossary

8. The graduate has reliably demonstrated the ability to: design, manufacture, assemble, inspect and adjust mechanical components and systems according to required specifications.

Elements of the performance

a. Analyze and assess the performance characteristics, limitations, and safety aspects of machinery, tools and equipment
b. Design and manufacture components and **systems** according to tolerance specifications
c. Utilize fabricating, assembling, fusing and finishing, and material removal processes in the production of components and **systems**
d. Program and use computer-aided design and manufacturing (CAD/CAM) to produce components according to the required specifications
e. Analyze and assess manufacturing processes using non-destructive testing methodologies (e.g., vibration analysis, magnetic-particle inspection or ultrasonic testing)
f. Identify, assess and eliminate hazards associated with the manufacturing processes or end product
g. Specify and source tools, equipment, supplies and services related to the production of components and **systems**
h. Design and manufacture components and **systems** using appropriate manufacturing practices and procedures
i. Use computer-aided design to create and modify engineering drawings
j. Incorporate sustainability into new and existing designs
k. Use computer simulation and modelling software to validate engineering processes and design
l. Set up required procedures using appropriate work-holding devices and assist in their design

See Glossary

9. The graduate has reliably demonstrated the ability to: recommend and verify the specifications, required materials, processes and operations to support the design and production of mechanical components, **assemblies** and **systems**.

Elements of the performance

a. Use a systematic approach to design and produce mechanical components, **assemblies** and **systems**
b. Use data to accurately predict the effects of manufacturing processes on materials when designing and manufacturing mechanical components, **assemblies** and **systems**
c. Develop and implement material and process testing methods
d. Use computer-aided manufacturing (CAM) or additive manufacturing in the prototyping and production of mechanical components, **assemblies** and **systems**
e. Design, build, test and evaluate prototypes and guide design changes as required
f. Identify the tolerances and materials specifications required for manufacturing processes
g. Select and safely use materials in accordance with required procedures
h. Source materials related to the production of mechanical components, **assemblies** and **systems**
i. Assess vendor capability, lead times and costs of materials
j. Assess and recommend appropriate materials and processes, taking into consideration sustainability, cost, economies of scale, use and life of the component, **assembly** or **system**
k. Evaluate and report test results to recommend design changes as necessary
l. Select and implement the most appropriate control systems for any required automation

See Glossary

10. The graduate has reliably demonstrated the ability to: use project management tools and techniques when planning, implementing, and evaluating projects to meet business objectives within time, cost, and quality constraints.

Elements of the performance

a. Develop an engineering project schedule and determine criteria necessary for the timely completion of an engineering project using relevant project management software (e.g., Critical Path Method (CPM), Gantt Chart or Program Evaluation and Review Technique (PERT) Chart)
b. Plan, sequence, schedule, co-ordinate and monitor projects while considering **sustainability**
c. Prepare, interpret and review various elements of estimates while considering **sustainability**
d. Monitor the resources and expenditures to increase cost effectiveness and meet expected timelines while considering **sustainability**
e. Establish and ensure required specifications in an engineering project are met
f. Maintain current, clear and accurate project-related documents, in compliance with codes, regulations, organizational procedures and industry standards
g. Participate in the information management, cost control and materials management of a project while considering **sustainability**
h. Contribute to the follow-up audit of an engineering project to assess if goals have been met

See Glossary

11. The graduate has reliably demonstrated the ability to: develop strategies for personal and professional development to enhance work performance, career progression and mobility.

Elements of the performance

a. Seek out and act upon constructive feedback to enhance work performance
b. Keep pace with, and adapt to, changing workforce demands and trends, as well as technological and scientific advances in the mechanical engineering field
c. Apply problem-solving techniques for specific knowledge acquisition and skill development
d. Take responsibility for one's job-related performance, as an individual and as a member or a leader of a team
e. Identify training courses, workshops and programs to enhance employment opportunities in the mechanical engineering field
f. Engage in activities that include critical thinking and self-evaluation to promote professionalism and career sustainability
g. Develop a plan that includes learning strategies and activities to improve one's skill level and to expand one's skill base
h. Develop a professional network and participate in mechanical engineering-based professional associations and activities leading to certification
i. Use effective time-management and organizational techniques to accomplish personal and professional goals
j. Develop and maintain a portfolio of accomplishments in the mechanical engineering field

See Glossary

Glossary

5-S: Visual Management System (everything has its place)

Additive Manufacturing: the construction of a three-dimensional object from a digital model in which material is deposited layer by layer using computer control

Artificial Intelligence: refers to the intelligence of machines or software

Assembly: a number of components connected to each other

Automation: working with a process that incorporates various technologies to operate with minimal human involvement.

Calibrate: to verify and adjust the accuracy of a measurement instrument against a standard.

Emerging Technologies: technologies which are not yet part of current use but which will be adopted in the short term. It appears that an emerging technology will become part of common use once its application reaches maturity.

Industry practices: in the context of mechanical techniques, refer to the established methods, processes, norms, and standards commonly used within mechanical industries. These practices encompass a wide range of activities, including manufacturing processes, quality control procedures, safety protocols, project management methodologies, and professional conduct standards. Adhering to industry practices ensures that work is conducted efficiently, safely, and in alignment with industry standards and expectations.

Kaizen: A Japanese term for continuous improvement, improving operations that involves all company employees.

LEAN: methodology that reduces or eliminates waste, improving process flow, cost, speed and time.

Six Sigma: methodology that reduces or eliminates variation that improves process capability.

Sustainability: aims to improve the vitality of three interdependent systems—environmental, social and economic. In a manufacturing context, sustainability aims to improve the quality of human life, while protecting nature, by engaging in design and manufacturing processes that are non-polluting, conserve energy and resources and protect ecosystems; benefit employees, consumers, and communities; and strengthen enterprises that foster economic growth and prosperity.

System: a set of physical components that convert an input motion into a desired. output motion and force.

Essential employability skills

All graduates of the Mechanical Engineering Technology program of instruction must have reliably demonstrated the essential employability skills learning outcomes listed below, 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: communication

Defining skills

Skill areas to be demonstrated by graduates:

- reading
- writing
- speaking
- listening
- presenting
- visual literacy

Learning outcomes

The graduate has reliably demonstrated the ability to:

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.

Skill category: numeracy

Defining skills

Skill areas to be demonstrated by graduates:

- understanding and applying mathematical concepts and reasoning
- analyzing and using numerical data
- conceptualizing

Learning outcomes

The graduate has reliably demonstrated the ability to:

1. execute mathematical operations accurately

Skill category: critical thinking and problem solving

Defining skills

Skill areas to be demonstrated by graduates:

- analyzing
- synthesizing
- evaluating
- decision making
- creative and innovative thinking

Learning outcomes

The graduate has reliably demonstrated the ability to:

1. Apply a systematic approach to solve problems.
2. Use a variety of thinking skills to anticipate and solve problems.

Skill category: information management

Defining skills

Skill areas to be demonstrated by graduates:

- gathering and managing information
- selecting and using appropriate tools and technology for a task or a project
- computer literacy
- Internet skills

Learning outcomes

The graduate has reliably demonstrated the ability to:

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.

Skill category: interpersonal

Defining skills

Skill areas to be demonstrated by graduates:

- teamwork
- relationship management
- conflict resolution
- leadership
- networking

Learning outcomes

The graduate has reliably demonstrated the ability to:

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.

Skill category: personal

Defining skills

Skill areas to be demonstrated by graduates:

- managing self
- managing change and being flexible and adaptable
- engaging in reflective practices
- demonstrating personal responsibility

Learning outcomes

The graduate has reliably demonstrated the ability to:

1. Manage the use of time and other resources to complete projects.
2. Take responsibility for one’s own actions, decisions and their consequences.

General education requirement

All graduates of the Mechanical Engineering Technology program must have met the general education requirement described below, 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 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 Ontario 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.

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.

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.

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.

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.

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.

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315 Front Street West
15th floor
Toronto, Ontario
M7A 0B8

Or by email: psu@ontario.ca

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