Ontario

Electrical Engineering Technician Program Standard

The approved program standard for the Electrical Engineering Technician program of instruction leading to an Ontario College Diploma delivered by Ontario Colleges of Applied Arts and Technology (MCURES funding code 55613).

Ministry of Colleges, Universities, Research Excellence and Security
January 2026

Acknowledgements

The Ministry of Colleges, Universities, Research Excellence and Security acknowledges with thanks the significant contribution of the many individuals and organizations which participated in the development of this program standard. In particular, the Ministry of Colleges, Universities, Research Excellence and Security would like to acknowledge the important roles of:

- all individuals and organizations which participated in the consultations
- the faculty, coordinators and deans of the Electrical Engineering Technician (Ontario College Diploma) program for their assistance throughout the project
- Vertha Coligan, the Project Officer who led the English review
- Isabel Bellon, the Project Officer who led the French review

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Introduction

This document is the Program Standard for the Electrical Engineering Technician program of instruction leading to an Ontario College Diploma delivered by Ontario Colleges of Applied Arts and Technology (MCURES funding code 55613).

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, Universities, Research Excellence and Security 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, Universities, Research Excellence and Security will undertake regular reviews of the vocational learning outcomes for this program to ensure that the Electrical Engineering Technician 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, Universities, Research Excellence and Security.

Vocational standard

All graduates of the Electrical Engineering Technician have achieved the twelve vocational learning outcomes (VLOs), in addition to achieving the essential employability outcomes and meeting the general education (GE) requirement.

Preamble

The Electrical Techniques program provides graduates with a foundational understanding of electrical principles, systems, and practices in controlled electrical environments. This program equips students with basic skills, knowledge, and safety awareness necessary to assist in a range of electrical functions under the supervision of a qualified person.

Graduates of this program will have demonstrated achievement of the vocational learning outcomes, which are designed to reflect current industry practices and align with workplace expectations and safety regulations. The vocational learning outcomes and their respective elements of performance define the essential competencies required for graduates to engage in electrical-related tasks at an entry level.

Throughout the program, students gain practical experience and exposure to various electrical tasks, including assisting with the installation, testing, **troubleshooting**, maintenance, and repair of electrical circuits, components, and systems. Emphasis is placed on workplace safety, regulatory compliance, **quality assurance**, and environmental responsibility to ensure that graduates are prepared to contribute effectively in electrical workplaces.

Upon completion, graduates may pursue entry-level employment in industries such as manufacturing, assembly, electrical testing, or electrical parts supply and sales. Those interested in further advancing their careers in the electrical field, including roles in power distribution, electrical maintenance, installation, automation, and control systems, may choose to pursue additional education, apprenticeship training, or certification pathways.

This program standard establishes a common framework of skills, knowledge, and professional attitudes that are essential for entry-level employment in the electrical field. While this standard provides a broad foundation, individual colleges may offer specialized courses or pathways to support various career aspirations. Graduates may also be eligible for credit recognition or advanced standing in apprenticeship training programs. Prospective students should contact individual colleges for details regarding articulation agreements, apprenticeship pathways, and industry certifications.

See Glossary

Note: The Ontario Council on Articulation and Transfer (ONCAT) maintains the

provincial postsecondary credit transfer portal, ONTransfer.

Synopsis of the vocational learning outcomes
Electrical Engineering Technician (Ontario College Diploma)

The graduate has reliably demonstrated the ability to:

1. Perform duties as directed and within the scope of practice.
2. Produce and maintain electrical and electronic drawings and records to ensure the integrity of the information and workflow control.
3. Diagnose and resolve routine malfunctions and performance issues in electrical systems to ensure reliable operation in compliance with industry standards.
4. Use, verify, and troubleshoot **instrumentation** equipment and control systems in accordance with manufacturer's recommendations.
5. Assemble, test, verify and maintain electrical and electronic circuits and components according to project specifications.
6. Install, test, and troubleshoot electromagnetic machines and electrical power systems to maintain operational integrity and safety.
7. Conduct **quality assurance** or **control** procedures for electrical systems and components to ensure reliability and compliance.
8. Assist in configuring, installing, and applying electrical cabling, **grounding**, and **bonding** requirements for various applications to ensure safe and compliant system operation.
9. Comply with and promote workplace best practices, health and safety standards in adherence to industry specifications.
10. Install, test, and troubleshoot communication systems to maintain operational integrity and safety.
11. Perform tasks in compliance with relevant legislation, industry standards, and ethical principles to support safety, efficiency, and sustainability in the electrical workplace.
12. Contribute to the planning, implementation, and evaluation of electrical projects to meet timelines and performance goals.

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 consistently demonstrated the ability to: perform duties as directed and within scope of practice.

Elements of the performance

a. Carry out assigned tasks independently while recognizing when to seek clarification or guidance.
b. Apply workplace regulations, industry standards, and ethical guidelines within defined responsibilities.
c. Demonstrate accountability for completing assigned tasks within the defined scope of practice.
d. Identify and report potential safety risks or non-compliance issues.
e. Maintain clear and accurate documentation of tasks performed in accordance with workplace policies.
f. Collaborate effectively with colleagues, supervisors, and other professionals to complete tasks efficiently.

2. The graduate has consistently demonstrated the ability to: produce and maintain electrical and electronic drawings and records to ensure the integrity of the information and workflow control.

Elements of the performance

a. Use computer software, including Computer-Aided Design, and other technology to produce, reproduce, and modify drawings, sketches, diagrams, charts, tables, and graphs.
b. Apply relevant codes, standards, and symbols in the creation and modification of drawings.
c. Interpret and produce technical graphics such as single-line drawings, schematics, and assembly diagrams to convey complex technical data.
d. Assist in the interpretation and preparation of electrical specifications, project-related documents, and circuit diagrams.
e. Create and maintain equipment lists and bills of materials to support technical applications.
f. Document **commissioning**, testing, and modifications of electrical and electronic systems, ensuring compliance with electrical standards.
g. Use systems to store, organize, and retrieve technical information and prepare reports.
h. Maintain accurate, current, and clear records to support project requirements and ensure compliance with organizational and industry standards.
i. Assist in producing and updating project documentation, including specifications, drawings, and system configurations.
j. Ensure all documentation adheres to industry standards, regulatory requirements, and project specifications.

See Glossary

3. The graduate has consistently demonstrated the ability to: diagnose and resolve routine malfunctions and performance issues in electrical systems to ensure reliable operation in compliance with industry standards.

Elements of the performance

a. Use mathematical and scientific applications, including algebra, trigonometry, and physics, to solve routine technical problems.
b. Apply mathematical and scientific concepts to troubleshoot, maintain, and test electrical circuits, equipment, systems, and subsystems accurately.
c. Use statistical measures to analyze data and identify trends or anomalies in electrical system performance.
d. Identify routine technical problems in electrical systems and formulate alternative solutions.
e. Interpret and represent experimental data graphically to support analysis and decision-making.
f. Perform conversions among number systems, such as hexadecimal, decimal, octal, binary, Boolean, and binary-coded decimal, as required for diagnosing and resolving issues.
g. Install and use appropriate software tools for calculations, analysis, and **troubleshooting** of electrical systems.
h. Use software to document electrical and electronic circuits and prepare data collection and display tools (e.g., spreadsheets).
i. Employ computer programming languages to analyze electrical problems and develop potential solutions.
j. Research and utilize online resources, including reference manuals, handbooks, knowledge bases, and databases, to support problem-solving.
k. Integrate control and data collection hardware with appropriate software to monitor and control components and systems.
l. Leverage software as an analysis tool to interpret results and support **troubleshooting** and optimization of system performance.
m. Prepare and communicate results of analyses, **troubleshooting** activities, and solutions effectively to supervisors or team members.
n. Support recommendations with accurate data, calculations, and graphical representations.
o. Analyze and assess power quality issues, such as harmonics, voltage fluctuations, transients, and power factor correction.
p. Utilize power quality analyzers and software tools to identify and mitigate inefficiencies in electrical systems.
q. Apply principles of power electronics, including high-efficiency switching technology, to improve system performance and energy efficiency.
r. Implement solutions to optimize power factor correction and harmonic mitigation for industrial and commercial power systems.

See Glossary

4. The graduate has consistently demonstrated the ability to: use, verify, and troubleshoot equipment and control systems in accordance with manufacturer's recommendations.

Elements of the performance

a. Safely select and operate a variety of **instrumentation** equipment, including signal generators, frequency counters, oscilloscopes, and multimeters.
b. Perform accurate measurements of power, voltage, resistance, and current using appropriate tools.
c. Inspect and verify the proper operation of **instrumentation** and control systems to ensure compliance with standards.
d. Identify and mitigate hazards associated with the use and maintenance of test and **instrumentation** equipment, adhering to applicable safety standards.
e. Use test equipment to analyze, test, and troubleshoot a variety of circuits, including electrical, electronic, and digital systems.
f. Support the identification and resolution of issues in **instrumentation** systems using diagnostic tools and techniques.
g. Install, program, test, and troubleshoot Programmable Logic Controllers (PLC) and Human machine **interfaces** (HMI).
h. Assist in analyzing, programming, and tuning open and closed-loop control systems for temperature, pressure level, flow and optimal performance.
i. Test and troubleshoot semiconductor circuits, electromechanical switching circuits, motor speed control systems, and servo drive systems.
j. Ensure all activities involving **instrumentation** and control systems comply with industry regulations and safety practices.
k. Follow proper procedures for handling, testing, and maintaining sensitive equipment to prevent damage or hazards.
l. Maintain accurate records of **instrumentation** usage, testing procedures, **troubleshooting** activities, and outcomes.
m. Communicate findings and recommendations to supervisors or team members effectively.
n. Install and troubleshoot smart control systems used in automated power distribution, industrial automation, and introductory robotics applications, incorporating emerging technologies such as collaborative systems and intelligent monitoring platforms.
o. Utilize intelligent monitoring and predictive maintenance strategies for electrical infrastructure.
p. Test and verify the operation of automated energy **management systems** in commercial and industrial applications.
q. Troubleshoot issues related to power quality monitoring and control in electrical grids.

5. The graduate has consistently demonstrated the ability to: assemble, test, verify and maintain electrical and electronic, circuits and components according to project specifications.

Elements of the performance

a. Determine appropriate equipment and components based on requirements and specifications.
b. Identify and implement wiring requirements for electrical installations, ensuring compliance with standards.
c. Install equipment protective devices, such as fuses, circuit breakers, instrument transformers, and relays.
d. Follow Electrostatic Discharge (ESD) procedures when handling electrical components to prevent damage.
e. Install, test, and configure automation and control systems, including Programmable Logic Controllers (PLC).
f. Perform tests to verify the functionality of electrical circuits, components, and equipment, ensuring alignment with technical specifications.
g. Use standard electrical, electronic, and computer-based test equipment for testing and verification purposes.
h. Identify problems in circuits and equipment using established diagnostic procedures and tools.
i. Analyze and troubleshoot AC and DC networks, including analog, digital, power electronic, and electromechanical devices.
j. Test, maintain, troubleshoot, repair, and/or replace electrical equipment as required.
k. Assist in upgrading and modifying equipment to meet updated requirements or improve performance.
l. Follow established service and preventative maintenance schedules to ensure the reliability and functionality of electrical systems.
m. Apply appropriate techniques to refurbish or maintain equipment to extend its operational lifespan.
n. Assist in the performance of cost-benefit analyses to support the selection and purchase of equipment.
o. Consult manufacturers' specifications, catalogs, and online resources to identify suitable electrical equipment that meets project requirements and to select appropriate equipment and components.
p. Ensure compliance with electrical codes, safety regulations, and manufacturer requirements during assembly, testing, and **troubleshooting** activities.
q. Operate and test equipment according to manufacturers' specifications to ensure safe and accurate functionality.
r. Assist in developing, updating, and documenting procedures for equipment assembly, testing, and **troubleshooting**.
s. Maintain accurate records of modifications, maintenance, and **troubleshooting** activities for reporting and compliance purposes.

t. Install and program grid-resilient smart control systems to enhance electrical system stability.
u. Assemble and test power electronic systems, including high-efficiency switching devices, inverters, and rectifiers.
v. Install and troubleshoot photovoltaic (PV) power conversion equipment and storage
w. integration components.
x. Implement energy-efficient technologies in building and industrial applications to support sustainability efforts.
y. Assist in setting up and maintaining microgrid and distributed energy systems for residential and commercial settings.

See Glossary

6. The graduate has consistently demonstrated the ability to: install, test, and troubleshoot electromagnetic machines and electrical power systems to maintain operational integrity and safety.

Elements of the performance

a. Install and test alternating current (AC) and direct current (DC) machines and associated control systems to meet requirements and applications.
b. Assist in the selection, specification, and installation of electrical machines based on industrial design, regulatory standards, and applicable legislation (e.g., frame size, types, or torque class).
c. Install and troubleshoot AC and DC motor drives and control systems.
d. Perform routine maintenance on electromagnetic machines and associated control systems to ensure long-term reliability.
e. Apply safety procedures during the installation, maintenance, and **troubleshooting** of electrical machines to minimize hazards.
f. Install and maintain equipment protective devices, such as fuses, circuit breakers, instrument transformers, and relays.
g. Assist in the installation, testing, and maintenance of power, instrument, and control transformers to meet specifications, including voltage/current ratios, power, and impedance requirements.
h. Support the installation of alternative and sustainable energy generation systems.
i. Perform power calculations for single-phase and polyphase systems to identify and resolve system issues.
j. Troubleshoot system faults, instabilities, and harmonics in electrical power systems.
k. Perform power factor correction calculations to optimize system performance.
l. Interpret electrical drawings related to power systems, including single-line diagrams, relaying, metering, and protection drawings.
m. Use technical documentation to support installation, testing, and **troubleshooting** activities.
n. Maintain generation, transmission, and distribution systems to ensure reliable power delivery.
o. Operate equipment in accordance with manufacturer specifications, safety regulations, and organizational standards.
p. Follow established safety procedures and industry best practices during all installation, testing, and **troubleshooting** activities.
q. Ensure compliance with relevant legislation and codes when working with electrical machines and power systems.
r. Accurately document the **commissioning**, testing, and **troubleshooting** of electrical machines and power systems.
s. Maintain records of system performance, calculations, and corrective actions for reporting and compliance purposes.
t. Perform power quality analysis to diagnose issues related to grid voltage stability and transient disturbances.

u. Install, test, and maintain battery energy storage systems (BESS) used in smart grids, EV charging stations, and renewable energy applications.
v. Implement and troubleshoot voltage regulation and frequency stabilization techniques in electrical power systems.
w. Diagnose and repair high-efficiency switching technology applications in power electronics.

See Glossary

7. The graduate has consistently demonstrated the ability to: conduct **quality assurance** or **control** procedures for electrical systems and components to ensure reliability and compliance.

Elements of the performance

a. Collaborate in reviewing and interpreting specifications applicable to electrical circuits, equipment, and systems to identify quality requirements.
b. Contribute to the creation and refinement of **quality assurance** or **control** procedures to align with organizational goals and industry best practices.
c. Ensure **quality assurance** or **control** processes incorporate relevant standards and codes to maintain consistency and reliability.
d. Use appropriate equipment and tools to conduct **quality assurance** or **control** testing on electrical systems and components.
e. Monitor and meticulously document test results, ensuring they meet predefined quality standards and specifications.
f. Report findings to supervisors, highlighting deviations from quality norms and suggesting corrective actions.
g. Participate in the evaluation of existing **quality assurance** or **control** procedures to identify areas for improvement.
h. Assist in implementing changes to enhance the effectiveness and efficiency of **quality assurance** or **control** processes.
i. Evaluate energy efficiency and sustainability compliance in electrical systems, including green technologies and renewable energy integration.
j. Apply **quality assurance** procedures to smart grid technology, energy storage systems, and automated control systems.
k. Verify compliance with grid resilience standards, including power factor correction and load balancing.

See Glossary

8. The graduate has consistently demonstrated the ability to: assist in configuring, installing, and applying electrical cabling, **grounding**, and **bonding** requirements for various applications to ensure safe and compliant system operation.

Elements of the performance

a. Create and interpret electrical drawings related to cabling, **grounding**, and **bonding** systems.
b. Verify that drawings align with industry standards and project requirements.
c. Configure and install electrical cabling and wiring in compliance with applicable electrical and safety codes.
d. Follow construction practices, procedures and related codes to ensure proper cabling and wiring installations for various applications.
e. Apply relevant codes, procedures, and processes for testing the functionality of system **grounding** and **bonding**.
f. Assist in **troubleshooting** faults, instabilities, harmonics, and impedance **grounding** issues.
g. Use appropriate tools and techniques to ensure system **grounding** and **bonding** meet operational and safety requirements.
h. Prepare wire and cable lists and assemblies in accordance with the Electrical Code of the province or country where the equipment will operate.
i. Ensure that documentation reflects accurate specifications and is updated as required during installation and testing.
j. Follow all safety protocols and best practices during the configuration and installation of electrical cabling, **grounding**, and **bonding** systems.
k. Ensure compliance with industry standards, project specifications, and legal regulations in all tasks.
l. Assist in configuring and applying **grounding** and **bonding** solutions for a variety of applications, including residential, commercial, and industrial settings.
m. Ensure installations are tailored to meet the specific needs of the operational environment and equipment.
n. Identify and resolve potential issues in cabling, **grounding**, and **bonding** systems under supervision.
o. Document and report findings during **troubleshooting** to inform corrective actions.
p. Design and implement cabling solutions for EV charging infrastructure and smart grid integration.
q. Install and test renewable energy microgrid cabling and interconnections for distributed power systems.
r. Ensure compliance with electrical codes and utility standards for high-efficiency power distribution networks.
s. Perform power conditioning and surge protection installation for critical infrastructure applications.

See Glossary

9. The graduate has consistently demonstrated the ability to: comply with and promote workplace best practices, health and safety standards in adherence to industry specifications.

Elements of the performance

a. Select and use appropriate PPE and clothing, including arc flash protection, to ensure personal safety in electrical workplaces.
b. Inspect and maintain PPE to ensure it complies with health and safety standards.
c. Select, operate, and maintain hand and power tools in accordance with safety protocols and manufacturer guidelines.
d. Identify and mitigate potential hazards associated with tool use and maintenance.
e. Interpret and adhere to safety codes, organizational policies, and accident prevention procedures.
f. Apply regulatory and licensing requirements when completing installations, maintenance, and repairs of electrical equipment.
g. Conduct safety inspections of work environments to detect and address hazardous conditions.
h. Promote health and safety best practices, such as maintaining clean, organized, and secure premises.
i. Lead by example in fostering a safety-first culture in electrical workplaces.
j. Apply procedures for the safe handling, storage, and disposal of hazardous materials in compliance with WHMIS and Transporting of Dangerous Goods (TDG) and other relevant regulations.
k. Train and encourage others to follow proper hazardous materials handling procedures.
l. Conduct job safety planning, including risk assessments for operating electrical equipment.
m. Implement safety-related design practices to mitigate risks associated with electrical systems and equipment.
n. Maintain accurate records of safety inspections, incidents, and corrective actions.
o. Communicate health and safety protocols and updates effectively to team members.
p. Ensure compliance with EV charging station safety protocols and high-voltage DC (HVDC) battery storage regulations.
q. Monitor and implement arc flash protection measures in smart grid and distributed energy applications.
r. Ensure compliance with fire suppression and emergency safety standards for battery energy storage and photovoltaic systems.
s. Evaluate automated building system safety features, including remote monitoring and cybersecurity risks.

10. The graduate has consistently demonstrated the ability to: install, test, and troubleshoot communication systems to maintain operational integrity and safety.

Elements of the performance

a. Install cabling and components for communication systems and data systems.
b. Implement Local Area Networks (LANs), Wide Area Networks (WANs), and automation communication systems using appropriate cabling and devices.
c. Assist in setting up emergency, fire alarm, and other security communication systems.
d. Test the functionality and performance of communication and intercommunication systems.
e. Verify the operation of LANs, WANs, and building management systems using networking devices, tools, and protocols.
f. Conduct testing for computer networking or electronic data processing cabling, optical fiber cabling, and other communication infrastructures.
g. Diagnose and troubleshoot issues in communication systems, including audio, video, and data systems, as well as their relevant interfaces.
h. Identify and resolve cabling and wiring issues for automation communication systems and building management systems.
i. Test and troubleshoot emergency, fire alarm, and other security communication systems to ensure compliance with safety and operational standards.
j. Assist in identifying appropriate cabling and wiring requirements for communication systems.
k. Maintain accurate documentation of cabling, testing, and **troubleshooting** activities to ensure compliance with industry standards and project specifications.
l. Follow industry standards, safety codes, and manufacturer guidelines during installation, testing, and **troubleshooting**.
m. Ensure communication systems are installed and maintained in compliance with applicable regulations and best practices.
n. Install and maintain smart home automation and building automation systems for residential and commercial properties.
o. Configure and test Internet of Things (IoT)-based monitoring solutions for power grids, energy management, and automation.
p. Troubleshoot fiber-optic and wireless communication systems used for grid monitoring and EV charging infrastructure.
q. Support the implementation of real-time power quality monitoring and smart metering solutions.

See Glossary

11. The graduate has consistently demonstrated the ability to: perform tasks in compliance with relevant legislation, industry standards, and ethical principles to support safety, efficiency and sustainability in the electrical workplace.

Elements of the performance

a. Interpret and adhere to relevant legislation, codes, and standards, including occupational health and safety regulations and labor laws.
b. Use equipment and materials in accordance with applicable legislation, standards, and organizational policies to ensure compliance.
c. Stay informed about updates to laws and regulations that impact electrical engineering practices.
d. Follow professional ethical principles as established by governing associations, ensuring integrity and accountability in all activities.
e. Make decisions that enhance the positive environmental, ecological, and social impact of all tasks.
f. Respect client confidentiality and intellectual property rights in all professional activities.
g. Collaborate with legal and compliance teams to address ambiguities or concerns in contractual agreements.
h. Promote sustainability and best practices in the workplace by recommending and implementing environmentally conscious approaches.
i. Ensure compliance with renewable energy regulations and green technology standards in electrical installations.
j. Interpret and apply energy management codes and policies related to solar power, battery storage, and grid integration.
k. Promote the adoption of environmentally sustainable electrical engineering practices, including energy-efficient designs and net-zero energy solutions.

See Glossary

12. The graduate has consistently demonstrated the ability to contribute to: the planning, implementation and evaluation of electrical projects to meet timelines and performance goals.

Elements of the performance

a. Interpret and utilize project planning tools, such as Gantt charts, Critical Path Analysis, and PERT charts, to support project scheduling and resource allocation.
b. Assist in estimating the time, materials, and resources required to complete project elements efficiently.
c. Assist in the completion of project elements according to established timelines, ensuring adherence to the project plan.
d. Monitor resource usage and expenditures to maintain cost-effectiveness and ensure the project stays within budget.
e. Use project management software to track progress and organize project tasks.
f. Assist in consolidating regular project updates to ensure stakeholders are informed of progress.
g. Identify potential issues that could impact the project timeline and propose adjustments or corrective actions to minimize delays.
h. Maintain accurate, current, and clear project-related documentation that adheres to organizational and industry standards.
i. Contribute to the evaluation of completed project elements, identifying lessons learned and areas for improvement.
j. Support the planning, implementation, and evaluation of projects in alignment with organizational policies, safety standards, and industry regulations.
k. Collaborate with team members to ensure all project activities meet required standards and deliverables.
l. Assist in the planning and execution of smart grid infrastructure projects, including renewable energy integration and microgrid deployment.
m. Manage timelines and resource allocation for large-scale energy storage projects, photovoltaic system installations, and EV infrastructure rollouts.
n. Track and report project progress for sustainability-focused electrical projects using energy analytics and monitoring tools.
o. Ensure adherence to project specifications related to green energy initiatives, energy-efficient building automation, and electrification strategies.

See Glossary

Glossary

Bonding: A low-impedance connection between conductive parts to ensure electrical continuity and equalize potential. Often confused with **grounding**.

Commissioning: The formal process of verifying, testing, adjusting, and documenting that electrical systems meet design specifications and operate as intended.

Grounding: The connection of an electrical system to the earth to prevent electric shock hazards and stabilize voltage.

Instrumentation: Devices and systems used to measure, monitor, or control physical and electrical parameters (e.g., voltage, current, pressure, temperature).

Quality assurance: Planned and systematic activities within a quality system that provide confidence a product or service will meet specified requirements.

Quality control: Operational techniques and activities used to fulfill quality requirements, such as inspection and testing.

Troubleshooting: The process of diagnosing and resolving faults or malfunctions in electrical systems, equipment, or circuits.

Essential employability skills

All graduates of the Electrical Engineering Technician 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 Electrical Engineering Technician must 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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978-1-4868-9381-2 PDF