



Electrical Engineering Technology: Automation and Control (243.D0)

College Program

Sector 09 – Electrotechnology

College Education Program

Coordination and development

[Direction de la formation technique](#)

[Direction générale des affaires collégiales et des relations de travail](#)

[Secteur des affaires collégiales et des interventions régionales](#)

Title of original document: *Technologie du génie électrique: automatisation et contrôle (243.D0),
Programme d'études techniques*

English version

Services linguistiques en anglais

Direction du soutien au réseau éducatif anglophone

Ministère de l'Éducation

For additional information, contact:

General Information

Direction des communications

Ministère de l'Éducation

1035, rue De La Chevrotière, 28^e étage

Québec (Québec) G1R 5A5

Telephone: 418 266-1337

Toll-free: 1 877 266-1337

© Gouvernement du Québec

Ministère de l'Enseignement supérieur

[ISBN 978-2-550-96063-8 \(PDF\)](#)

Legal Deposit - Bibliothèque et Archives nationales du Québec, 2023

Table of Contents

College-Level Programs	2
Aims of College Education	3
Common Competencies of College Education	3
Implementation of College-Level Programs.....	4
The Electrical Engineering Technology: Automation and Control Program.....	5
Goals of the Program.....	6
Program-Specific Component	6
Educational Aims	6
General Education Component Common to All Programs and General Education Component Specific to the Program.....	7
Complementary General Education Component	10
Goals of the Program-Specific Component	12
Objectives.....	13
Statements of the Competency	13
Grid of Competencies	15
Program-Specific Component	17
General Education Component Common to All Programs and General Education Component Specific to the Program.....	64
Complementary General Education Component	83
Additional Information.....	98
Vocabulary Used in Technical Programs	98
Glossary	100
Harmonization.....	104
Occupational Health and Safety Hazards.....	105

Code 243.D0 Electrical Engineering Technology: Automation and Control 2023

Type of certification:	Diploma of College Studies
Number of credits:	91 $\frac{2}{3}$ credits
Number of periods of instruction:	2 790 periods of instruction

General education component:	660	periods of instruction
Program-specific component:	2130	periods of instruction

Admission Requirements:

To be admitted to the program, a person must meet the general requirements for admission set out in the *College Education Regulations*, as well as the following special requirements, where applicable:

- In the Education Reform curriculum:
 - Secondary IV Mathematics, Technical and Scientific Option or Science Option
 - Secondary IV Environmental Science and Technology or Secondary IV Science and the Environment

College-Level Programs

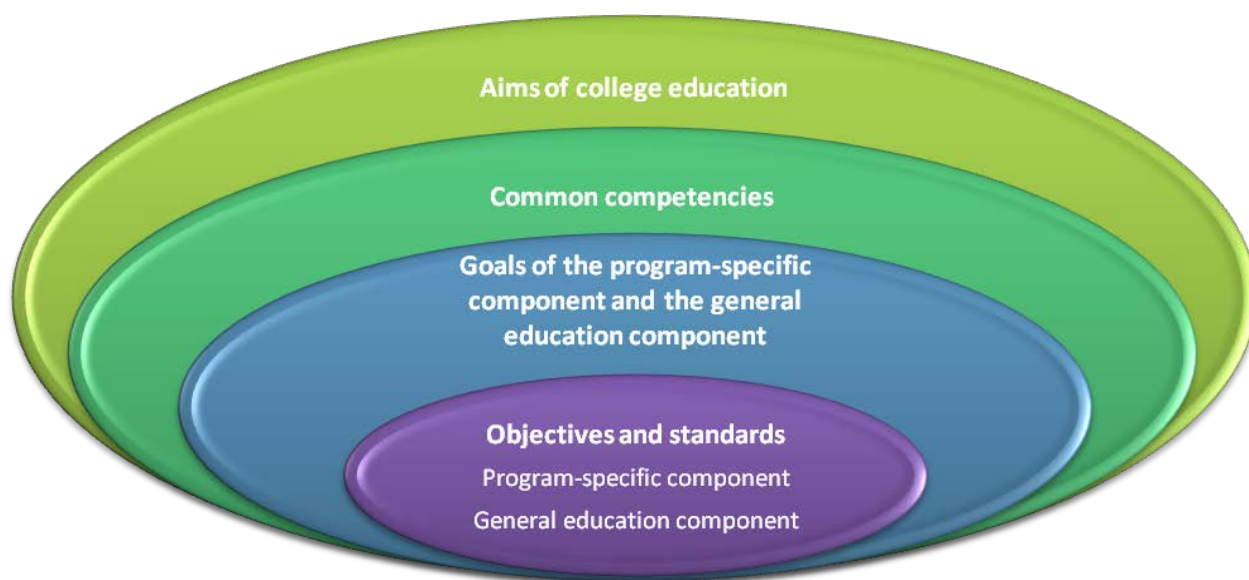
In Québec, college is the next stage after the compulsory years of schooling (elementary and secondary school). College graduates enter the labour market directly or proceed to university studies. The Minister of Education and the Minister of Higher Education establish the programs of study, while individual colleges ensure their implementation.

A college-level program provides the frame of reference within which the students acquire designated competencies in order to qualify for a profession or to pursue their studies. For the teachers, the program outlines learning objectives and defines the scope of their application.

The following figure illustrates the relationships among the elements of a college-level program, going from the general to the specific:

- Aims of college education
- Common competencies
- Goals of the program-specific component and the general education component
- Objectives and standards of the program-specific component and the general education component

Figure 1 – Elements of a College-Level Program



Programs leading to the Diploma of College Studies (DCS) include two main components: a general education component and a program-specific component. Both these components contribute to a student's education, as the knowledge, skills and attitudes imparted in one are emphasized and applied in the other, whenever possible. General education is an integral part of each program and, when coupled with the program-specific component as part of an integrated approach, fosters the development of the competencies required by all programs.

All college-level programs are characterized by three educational aims and five common competencies.

Aims of College Education

Educational aims guide the actions of those involved in the students' education. They facilitate the program-based approach by establishing the outcomes expected of students at the end of their college studies.

To educate students to live responsibly in society

At the personal level, students show they are engaged in their learning. They demonstrate rigour and perseverance as well as skills enabling them to analyze, synthesize and carry out research. At the professional level, they draw on their ability to apply their knowledge, skills and attitudes and to adapt to new situations. In the realm of social and civic life, students assume their role as informed and responsible citizens by adopting desirable attitudes and behaviours. They show evidence of open-mindedness and a sense of community in their dealings with others.

To help students integrate cultural knowledge into their studies

Students continue to enhance their personal culture and are able to appreciate various forms of cultural expression. Through their studies, they have become familiar with cultural productions. They can interpret the meaning and assess the value of these productions and are aware of the role they themselves play in the expression of culture. The development of their critical judgment and social conscience and the consolidation of their historical references have broadened their cultural horizons. Students recognize the diversity of social and cultural realities and appreciate the breadth and wealth of Québec's culture. Lastly, they apply their cultural knowledge by making connections among events occurring around them and by being involved in cultural, artistic, sports, technical or scientific activities.

To help students master language as a tool for thought, communication and openness to the world

Students understand and produce various forms of complex discourse in different situations. They are able to read and write independently at an advanced skill level. Their mastery of language allows them to engage in independent reflection, to know where they stand relative to various forms of discourse, and to express themselves in a structured, rational and precise manner. When faced with different communication situations, students are able to express their world view and identity. Language mastery also helps students be receptive to the dissemination of a broad range of knowledge. It allows them to share points of view and improve their communication skills in both the language of instruction and a second language.

Common Competencies of College Education

Common competencies are associated with the aims of college education. They help to ensure students are adequately prepared for personal and professional life.

Solve problems

Students can identify a problem and analyze its elements. They can list and classify possible solutions and implement the one they feel is most effective. They reflect on their approach, assess the appropriateness of the chosen solution and determine whether it can be applied in other situations.

Use creativity

Students discover new possibilities by juxtaposing, combining and reorganizing existing concepts, and by using ideas, strategies and techniques in new ways. Students are open to new ideas and different ways of doing things, while assessing their effectiveness.

Adapt to new situations

When faced with a new situation, students are both open and critical. After analyzing the situation at hand, they identify and test ways of dealing with it. To adapt to a world that is constantly changing, students work in teams and show concern for keeping their knowledge up to date.

Exercise a sense of responsibility

Students assume their role as responsible citizens and act in accordance with socially and democratically desirable attitudes and behaviours. They act ethically and with integrity, exercise critical judgment and are fully engaged, personally, socially and professionally. Independent and organized, they respect their commitments.

Communicate

Students deliver a coherent message adapted to each situation. They are able to listen and to structure their thoughts in order to formulate a clear message. They rely on a variety of communication strategies and use information and communications technologies. They evaluate the impact of their communication and review their strategies, as needed.

Implementation of College-Level Programs

Each college determines the ways in which the educational aims, common competencies, goals, objectives and standards are implemented. This does not mean that students in a college must follow common courses. Each course may contribute to the full or partial achievement of these elements. The important thing is that all of these elements are taken into consideration in one or more courses and that they become specific focuses of teaching and learning, since they have been recognized as essential to the practice of a profession or to the pursuit of university studies in a given discipline.

The Electrical Engineering Technology: Automation and Control Program

The *Electrical Engineering Technology: Automation and Control* program was designed in accordance with the framework for developing technical programs. This approach involves the participation of partners working in the occupational field and in education, and takes into account training needs, the job analysis and the general goals of technical education. The objectives and standards serve as the basis for the definition and evaluation of learning activities, for which the colleges are responsible. By successfully completing this program of study, students acquire not only the entry-level competencies required by the workplace to practise the occupation, but also a range of knowledge, skills and attitudes that will ensure their versatility.

The *Electrical Engineering Technology: Automation and Control* program includes four components: a program-specific component, a general education component that is common to all programs, a general education component that is specific to each program, and a general education component that complements the program.

- The program-specific component consists of 65 credits.
- The general education component that is common to all programs consists of 16 $\frac{2}{3}$ credits:
 - Language of Instruction and Literature: 7 $\frac{1}{3}$ credits
 - Philosophy or Humanities: 4 $\frac{1}{3}$ credits
 - Physical Education: 3 credits
 - Second Language: 2 credits
- The general education component that is specific to the program consists of 6 credits:
 - Language of Instruction and Literature: 2 credits
 - Philosophy or Humanities: 2 credits
 - Second Language: 2 credits
- The complementary general education component, which aims to expose students to subject areas outside their program of study, consists of 4 credits and includes courses in the following areas:
 - Social Sciences
 - Science and Technology
 - Modern Language
 - Mathematics Literacy and Computer Science
 - Art and Aesthetics
 - Contemporary Issues

Students may choose courses only in those areas that are outside their program of study.

Goals of the Program

Program-Specific Component

The goals of the program-specific component of the *Electrical Engineering Technology: Automation and Control* program are based on the general goals of vocational and technical training. These goals are:

- To help students develop effectiveness in the practice of a trade or occupation, that is:
 - to teach students to perform roles, functions, tasks and activities associated with the trade or occupation upon entry into the job market
 - to prepare students to progress satisfactorily on the job (which implies having the necessary technical and technological knowledge and skills in such areas as communication, problem solving, decision making, ethics, health and safety)
- To help students integrate into the workforce, that is:
 - to familiarize students with the job market in general and the context surrounding the occupation they have chosen
 - to familiarize students with their rights and responsibilities as workers
- To foster students' personal development and acquisition of occupational knowledge, skills, perceptions and attitudes, that is:
 - to help students develop their autonomy and the desire to learn, and acquire effective work methods
 - to help students understand the principles underlying the techniques and the technology used in the trade or occupation
 - to help students develop self-expression, creativity, initiative and entrepreneurial spirit
 - to help students adopt the attitudes required to successfully practise the trade or occupation, and instill in them a sense of responsibility and a concern for excellence
- To promote job mobility, that is:
 - to help students develop positive attitudes toward change
 - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

Educational Aims

Educational aims in the program-specific component are based on important values and concerns and serve as guidelines for interactions with students. As a general rule, educational aims focus on important aspects of the students' professional and personal development, such as attitudes, work habits and intellectual skills, which have not been explicitly formulated in the program's goals, objectives and standards.

The following is a description of the aims of the program-specific component of the *Electrical Engineering Technology: Automation and Control* program:

- Develop autonomy, rigour, a methodical approach and analytical skills
- Develop the ability to exercise judgment and solve problems with an open mind
- Develop the ability to respond to contingencies
- Develop a concern for keeping their skills and knowledge up to date
- Develop the ability to adapt to technical, scientific and organizational changes
- Develop a concern for working with a view to sustainable development

In keeping with the aims of college education, the program-specific component is also intended to educate students to live responsibly in society, to help them integrate cultural knowledge into their studies and, lastly, to help them master language as a tool for thought, communication and openness to the world.

General Education Component Common to All Programs and General Education Component Specific to the Program

The general education components that are common to all programs and specific to the program contribute to the development of 12 competencies associated with the three aims of college education:

- for the aim *To educate students to live responsibly in society*:
 - Demonstrate independence and creativity in thought and action
 - Demonstrate rational, critical and ethical thinking
 - Develop strategies that promote reflection on their knowledge and actions
 - Pursue the development of a healthy and active lifestyle
 - Assume their social responsibilities
- for the aim *To help students integrate cultural knowledge into their studies*:
 - Recognize the influence of culture and lifestyle on the practice of physical activity and sports
 - Recognize the influence of the media, sciences or technology on culture and lifestyle
 - Analyze works in philosophy or the humanities emanating from different historical periods and movements
 - Appreciate literary and non-literary works of other artistic expressions emanating from different historical periods and movements
- for the aim *To help students master language as a tool for thought, communication and openness to the world*:
 - Improve communication in the second language
 - Master the basic rules of discourse and argumentation
 - Refine oral and written communication in the language of instruction

English, Language of Instruction and Literature

Students who have achieved the general education objectives in English, Language of Instruction and Literature:

- will be able to demonstrate their knowledge of the following:
 - the basic vocabulary and terminology used when discussing literary works
 - ways to apply an independent analytical approach to literary genres
 - ways to apply an independent analytical approach to literary themes
 - the appreciation of literary and non-literary works or other artistic expressions of different historical periods and movements
 - ways to identify the socio-cultural and historical context of different periods and movements
 - ways to refine oral and written communication in the language of instruction

- will be able to demonstrate their ability to do the following:
 - read, write, listen and speak at a college level of proficiency
 - develop their own ideas in arguments and theses
 - organize their arguments and theses in a discourse and edit their work
 - produce and analyze various styles of discourse
 - communicate in the styles of discourse appropriate to one or more fields of study
- will be encouraged to develop the following attitudes:
 - independence, individuality, and open-mindedness in thought and action
 - an appreciation of literature and other artistic works from different periods
 - a recognition of the role of media within a society and its culture
 - an awareness of strategies that foster self-reflective practice in their learning and actions
 - critical and ethical thought

Humanities

Humanities constitutes a thematic, multidisciplinary and, at times, transdisciplinary exploration of humankind, including its accomplishments, failures, abilities, creations, ideas and values. Students who have achieved the general education objectives in humanities

- will be able to demonstrate their knowledge of the following:
 - the main concepts, limits and uses of a form of knowledge including significant historical reference points
 - the main concepts, limits and uses of a world view
 - the nature and organization of the basic elements of an ethical question
 - methods for coherent integration of concepts and the formulation and synthesis of ideas
 - the importance and practice of adequately substantiated argumentation, written and oral
- will be able to demonstrate their ability to do the following:
 - describe, explain and organize the main elements, ideas, values and implications of a world view in a coherent fashion
 - compare world views
 - recognize the basic elements in a specific example of the organization, transmission, and use of knowledge
 - recognize forms of creativity and original thought
 - define the dimensions, limits and uses of knowledge in appropriate historical contexts
 - identify, organize and synthesize the salient elements of a particular example of knowledge
 - situate important ethical and social issues in their appropriate historical and intellectual contexts
 - explain, analyze and debate ethical issues in a personal and professional context
 - utilize the multiple strategies of critical thinking

- will be encouraged to develop the following attitudes:
 - openness to diversity and pluralism
 - awareness of the limits of knowledge claims, world views and ethical perspectives
 - respect for the points of view of others
 - empathy and acceptance of others
 - concern for global issues
 - determination to continue learning

French as a Second Language

Students who have achieved the general education objectives in French as a Second Language:

- will be able to demonstrate their knowledge of the following:
 - different reading techniques
 - the formal elements needed to produce a structured text, both orally and in writing
 - different forms of discourse and their specific uses
- will be able to demonstrate their ability to do the following:
 - question, analyze, judge and defend an argument in French
 - reflect on their knowledge and actions notably by revising their written productions
 - maintain social relationships and share in the cultural life of Québec
 - establish and maintain work-related relationships in French
- will be encouraged to develop: the following attitudes of:
 - openness to the various aspects of Québec culture
 - recognition and promotion of creativity
 - readiness to participate in social and economic life

Physical Education

Students who have achieved the general education objectives in physical education:

- will be able to demonstrate their knowledge of the following:
 - notions and concepts based on the findings of scientific research and how to apply them methodically to physical or sporting activities
 - the relationship between lifestyle, physical activity, physical fitness and health
 - ways to evaluate their own abilities and needs with respect to activities that can enhance their health and fitness
 - the rules, techniques and conditions involved in different types of physical or sporting activity
 - the main socio-cultural determinants of physical activity and a healthy lifestyle
- will be able to demonstrate their ability to do the following:
 - give an initial account of their abilities, attitudes and needs
 - choose physical activities on the basis of their motivation, their ability to adapt to effort and their need for change
 - apply the rules and techniques of a certain number of physical activities with a view to practising them sufficiently on a regular basis
 - set goals that are realistic, measurable, challenging and situated within a specific time frame
 - improve their mastery of basic techniques and strategies associated with physical activities

- evaluate their skills, attitudes and progress in order to adapt their means or objectives in their practice of physical activities
 - autonomously maintain or increase their physical activity and fitness levels in order to develop a healthy and active lifestyle
 - use their creativity in physical activities
 - express their choice of activities in a clear and reasoned manner
- will be encouraged to develop the following attitudes:
 - awareness of the importance of regular and sufficient physical activity in order to improve their fitness
 - awareness of the factors that encourage them to practise physical activity more often
 - awareness of the importance of evaluating and respecting their ability to adapt to effort, as well as an awareness of the conditions necessary to carry out a physical activity program, before committing to it
 - self-confidence, self-control, cooperation, respect and understanding, through knowledge and through the practice of a physical activity
 - respect for ethical behaviour when participating in a sport or a physical activity
 - respect for individual and cultural differences as well as for the environment in which the sport or physical activity takes place
 - appreciation for the aesthetic value of physical activity as well as the opportunities for enjoyment it provides
 - readiness to adopt the values of discipline, effort, consistency and perseverance
 - readiness to promote, as a social value, the regular and sufficient practice of physical activity

Complementary General Education Component

Social Sciences

The goal of this subject area is to help students view the social sciences as a specific approach to the study of human existence. This goal may cover various aspects, including the study of the specific contribution of the social sciences to an understanding of contemporary issues and the application of approaches from the social sciences.

Science and Technology

The goal of this subject area is to present science and technology as a specific approach to the study of reality, by introducing students to this area of knowledge. This goal may cover various aspects, including the study of the general nature of science and technology and contemporary scientific or technological issues as well as the application of the scientific method.

Modern Language

The goal of this subject area is to introduce students to the basic structures and vocabulary of a third language and help them develop an awareness of the culture of its native speakers.

Mathematics Literacy and Computer Science

The goal of this subject area is to highlight a culture of mathematics and computer science. This goal may cover various aspects, including the study of the role of mathematics or computers in contemporary society as well as the use of mathematical or computer concepts, procedures and tools.

Art and Aesthetics

The goal of this subject area is to provide students with a cultural awareness by exploring various forms of art and to help students develop an aesthetic awareness. This goal may cover various aspects, including an appreciation of different art forms and the production of a work of art.

Contemporary Issues

This subject area focuses on current, transdisciplinary issues. The concept of transdisciplinarity refers to a type of approach that addresses a contemporary issue from the perspective of different disciplines and areas of knowledge, beyond a mere juxtaposition of the subjects studied.

Goals of the Program-Specific Component

The *Electrical Engineering Technology: Automation and Control* program is designed to train students to become electrical engineering technologists in the fields of automation and control.

The work of electrical engineering technologists consists primarily of selecting, installing, commissioning, troubleshooting and maintaining industrial equipment and systems; assisting in the design, analysis, programming, optimization and configuration of industrial equipment and systems; verifying that the installation of industrial equipment and systems conforms to standards and schematics; and analyzing and identifying operating problems with industrial equipment and systems. As part of their job function, electrical engineering technologists are also called on to perform supervisory activities in the installation, commissioning, start-up, troubleshooting, and maintenance of industrial equipment and systems.

The industrial equipment and systems in question are of the electrical, electronic, pneumatic, hydraulic (water), electromechanical, robotic, computing and networking type and are used for the control, protection, monitoring and automation of industrial processes as well as for the distribution and conversion of electrical energy. The mechanical and hydraulic (oil) aspects of industrial equipment and systems are usually handled by other professions.

More specifically, electrical engineering technologists are expected to perform the following tasks:

- Locate, analyze and diagnose operating problems with industrial equipment and systems.
- Repair and maintain industrial equipment and systems.
- Alone or in collaboration with the engineer, participate in developing technological solutions to improve and optimize industrial equipment, systems and processes and/or to automate existing industrial equipment, systems and processes.

Their technological environment consists of distributed and computerized automated systems and electrical distribution devices such as transformers, distribution lines, as well as industrial control and command equipment, control loops, measuring devices, sensors, programmable automated systems, variable speed drives, motors, industrial programmable controllers, valves, industrial robots, positioning systems, machine safety equipment, protective relays, computer systems, etc.

Electrical engineering technologists are employed in all workplaces where machinery, production lines or industrial, commercial and public safety equipment are present.

Consulting engineering firms, electrical and electronic equipment distributors, integrators and consulting firms, and research laboratories may also hire these technologists.

Objectives

Statements of the Competency

Program-Specific Component

- 04A0 Explore the profession.
- 04A1 Use mathematics in electrical engineering.
- 04A2 Intervene in matters of health and safety.
- 04A3 Diagnose problems on electronic circuits.
- 04A4 Connect the elements of an industrial measuring chain.
- 04A5 Characterize the elements of an electrical network and/or an industrial electrical installation.
- 04A6 Create electrical engineering schematics.
- 04A7 Use workshop tools and machines in an industrial environment.
- 04A8 Determine the physical variables of industrial equipment.
- 04A9 Ensure the operation of an industrial motor drive system.
- 04AA Program an industrial programmable controller in a discrete (on/off) control mode.
- 04AB Use information and operation technologies.
- 04AC Program an industrial programmable controller and/or a distributed control system in a continuous (analog) control mode.
- 04AD Install control panels and/or power equipment.
- 04AE Integrate an industrial programmable controller and/or a distributed control system into an automated system.
- 04AF Install a control loop.
- 04AG Integrate a positioning system.
- 04AH Program an industrial robot.
- 04AJ Integrate safety components into an automated system.
- 04AK Maintain industrial equipment and systems.
- 04AL Integrate robotics equipment into an automated system.
- 04AM Commission industrial equipment and/or systems.
- 04AN Troubleshoot industrial equipment and/or systems.
- 04AP Contribute to the design or modification of industrial equipment or systems.

General Education Component Common to All Programs and General Education Component Specific to the Program

16⅔ credits and 420 periods of instruction, 6 credits and 150 periods of instruction

English, Language of Instruction and Literature

- 4EA0 Analyze and produce various forms of discourse
- 4EA1 Apply an analytical approach to literary genres
- 4EA2 Apply an analytical approach to a literary theme
- 4EAP Communicate in the forms of discourse appropriate to one or more fields of study

Humanities

- 4HU0 Apply a logical analytical process to how knowledge is organized and used
- 4HU1 Apply a critical thought process to world views
- 4HUP Apply a critical thought process to ethical issues relevant to the field of study

French as a Second Language

One objective to be met from the following:

- 4SF0 Apply basic concepts for communicating in standard French
- 4SF1 Communicate in standard French with some ease
- 4SF2 Communicate with ease in standard French
- 4SF3 Explore a cultural and literary topic

One objective to be met from the following:

- 4SFP Apply basic concepts for communicating in French in relation to the student's field of study
- 4SFQ Communicate in French on topics related to the student's field of study
- 4SFR Communicate with ease in French on topics related to the student's field of study
- 4SFS Produce a text in French on a topic related to the student's field of study

Physical Education

- 4EP0 Analyze one's physical activity from the standpoint of a healthy lifestyle
- 4EP1 Improve one's effectiveness when practising a physical activity
- 4EP2 Demonstrate one's ability to assume responsibility for maintaining a healthy lifestyle through the continued practice of physical activity

Complementary General Education Component

4 credits, 90 periods of instruction

Two objectives to be met from the following, in subject areas outside the student's program of study:

- 000V Estimate the contribution of the social sciences to an understanding of contemporary issues
- 000W Analyze one of the major problems of our time using one or more social scientific approaches
- 000X Explain the general nature of science and technology and some of the major contemporary scientific or technological issues
- 000Y Resolve a simple problem by applying the basic scientific method
- 000Z Communicate with limited skill in a modern language
- 0010 Communicate on familiar topics in a modern language
- 0067 Communicate with relative ease in a modern language
- 0011 Recognize the role of mathematics or computer science in contemporary society
- 0012 Use various mathematical or computer science concepts, procedures and tools for common tasks
- 0013 Consider various forms of art produced according to aesthetic practices
- 0014 Produce a work of art
- 021L Consider contemporary issues from a transdisciplinary perspective
- 021M Explore a contemporary issue from a transdisciplinary perspective

Grid of Competencies

The grid of competencies provides an overview of a technical program. It brings together all of the components of a program and shows the relationship among the competencies.

The grid of competencies includes:

- the general competencies of the program-specific component, which deal with work-related activities common to various tasks or situations
- the specific competencies, which deal with tasks directly related to the practice of the trade or occupation

The grid of competencies shows the relationship between the general competencies on the horizontal axis and the specific competencies on the vertical axis. The symbol (O) indicates a correlation between a general and a specific competency.

The order in which the competencies are presented reflects the program's design; it does not dictate the course sequence. The grid of competencies is provided for information purposes only.

Electrical Engineering Technology: Automation and Control		Competency Code	GENERAL COMPETENCIES													
			Explore the profession	Use mathematics in electrical engineering	Intervene in matters of health and safety.	Diagnose problems on electronic circuits	Connect the elements of an industrial measuring chain	Characterize the elements of an electrical network and/or an industrial electrical installation	Create electrical engineering schematics	Use workshop tools and machines in an industrial environment	Determine the physical variables of industrial equipment	Program an industrial programmable controller in a discrete (on/off) control mode	Use information and operation technologies	Program an industrial programmable controller and/or a distributed control system in a continuous (analog) control mode	Program an industrial robot	
SPECIFIC COMPETENCIES		Competency Codee	1	2	3	4	5	6	7	8	9	11	12	13	18	
Ensure the operation of an industrial motor drive system		10	0	0	0	0	0	0	0	0	0					
Install control panels and/or power equipment		14	0	0	0	0	0	0	0	0	0	0	0			
Integrate an industrial programmable controller and/or a distributed control system into an automated system		15	0	0	0	0	0	0	0	0	0	0	0	0		
Install a control loop		16	0	0	0	0	0	0	0	0	0	0	0	0		
Integrate a positioning system		17	0	0	0	0	0	0	0	0	0	0	0	0		
Integrate safety components into an automated system		19	0	0	0	0	0	0	0	0	0	0	0	0	0	
Maintain industrial equipment and systems		20	0	0	0	0	0	0		0	0	0	0	0	0	
Integrate robotics equipment into an automated system		21	0	0	0	0	0	0	0	0	0	0	0	0	0	
Commission industrial equipment and/or systems		22	0	0	0	0	0	0			0	0	0	0	0	
Troubleshoot industrial equipment and/or systems		23	0	0	0	0	0	0		0	0	0	0	0	0	
Contribute to the design or modification of industrial equipment or systems		24	0	0	0	0	0	0	0	0	0	0	0	0	0	

Program-Specific Component

Code: 04A0

Objective

Standard

Statement of the Competency	Achievement Context
Explore the profession.	- From a career-long orientation and training perspective - Individually or in teams - Based on: - regulations governing the profession - information on the workplace - recent information on the practice of the profession - Using: - the four main sectors of economic activity - publication platforms (media) - documents on sustainable development - a tutorial or help feature
Performance Criteria for the Competency as a Whole	
- Relevance of the information collected - Critical analysis of information - Demonstration of interest in the profession - Responsible use of the digital environment	
Elements of the Competency	Performance Criteria
1. Differentiate among workplaces.	- Correctly distinguish between the main sectors of economic activity - Appropriate identification of the types of business models
2. Examine the characteristics of the profession.	- Correct interpretation of applicable laws and regulations - Adequate examination of job opportunities - Recognition of major trends in the fields of electricity and electronics - Consideration of the importance of time and stress management - Accurate definition of the place of sustainable development in the profession
3. Review the tasks and duties of the profession.	- Accurate identification of the responsibilities of the profession - Proper recognition of the rules of professional ethics - Careful consideration of the skills and behaviours required to practice the profession - Consideration of the importance of time and stress management when practicing the profession

Elements of the Competency	Performance Criteria
4. Recognize the importance of teamwork and collaboration.	• Correct identification of attitudes and behaviours that facilitate teamwork • Recognition of the aspects related to consensus decisions in a team • Correct identification of appropriate ways to resolve interpersonal conflicts
5. Examine their skills and behaviours.	• Accurate recognition of the rules of professional ethics • Careful consideration of ways to ensure continued development of skills throughout their career

Objective**Standard**

Statement of the Competency	Achievement Context
Use mathematics in electrical engineering.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Based on technical set-ups • Using: ○ user manuals ○ appropriate technical documents ○ spreadsheet software ○ simulation software ○ data loggers ○ signal simulators
Performance Criteria for the Competency as a Whole	
• Rigorous use of applied mathematics to solve problems in electricity • Appropriate use of scientific and engineering notations	
Elements of the Competency	Performance Criteria
1. Apply the mathematical relationships of electrical quantities.	• Accurate determination of electrical quantities in an electrical circuit • Accurate resolution of electrical quantities in a circuit • Efficient use of algebra
2. Apply mathematical functions in electricity.	• Effective use of correlation, interpolation and extrapolation • Correct distinction between steady state and transient state • Accurate scaling calculation • Meticulous graphical representation
3. Verify the results by dimensional analysis.	• Correct distinction between imperial and metric units • Rigorous conversion of units of measure from one system to the other • Proper use of dimensional analysis
4. Perform trigonometric calculations.	• Correct application of trigonometry to electrical quantities • Correct distinction of the characteristics of a sine wave

Elements of the Competency	Performance Criteria
5. Calculate vectors and complex numbers in electricity.	• Correct determination of electrical quantities in an electrical circuit • Correct definition of electrical quantities in a sinusoidal waveform • Correct distinction between polar and Cartesian coordinates • Efficient use of the power triangle
6. Apply differential and integral calculus to processes and/or electrical quantities.	• Accurate estimate of a rate of change • Accurate graphical estimate of an intermittent variation rate • Accurate calculation of effective electrical quantities • Accurate numerical estimate of electrical quantities • Accurate calculation of speed, acceleration and distance

Objective**Standard**

Statement of the Competency	Achievement Context
Intervene in matters of health and safety.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with others • Based on: ○ information on occupational health and safety risks and hazards ○ a safety analysis of tasks • Using: ○ applicable laws, standards and regulations ○ company policies and procedures ○ technical documents such as the Workplace Hazardous Materials Information System (WHMIS 2015) and Canadian Standards Association (CSA) manuals ○ personal and collective protective equipment
Performance Criteria for the Competency as a Whole	
	• Compliance with occupational health and safety laws and regulations • Adherence to the lockout procedure • Demonstration of safe attitudes and behaviours
Elements of the Competency	Performance Criteria
1. Recognize health and safety hazards.	• Appropriate assessment of risks and hazards that are: ○ chemical ○ physical ○ biological ○ ergonomic ○ psychosocial ○ related to safety or security • Consideration of the consequences of health and safety violations • Proper identification of potentially hazardous situations • Proper identification of dangerous locations • Accurate recording of dangerous equipment and hazardous products

Elements of the Competency	Performance Criteria
2. Check personal and collective protective equipment.	• Rigorous research of the required level of protection • Proper validation of the expiration date of the personal and collective protective equipment • Proper identification of defects
3. Prevent workplace accidents.	• Proper identification of technologies presenting health and safety risks • Safe organization of the work area • Proper use of personal and collective protective equipment • Proper identification of procedures to be followed in case of an emergency
4. Follow administrative guidelines for workplace accidents.	• Correct interpretation of directives • Correct application of safety standards according to accident prevention plans • Appropriate use of forms to be filled out in the event of a work-related accident

Objective**Standard**

Statement of the Competency	Achievement Context
Diagnose problems on electronic circuits.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Based on defective circuits or electronic components • Using: ○ current laws, standards and regulations ○ personal protective equipment ○ passive or active electronic components ○ control and power electronics circuits ○ filtering circuits ○ voltage and current sources ○ measuring devices ○ manufacturers' technical documents ○ electronic schematics ○ work tools such as simulation or graphing software
Performance Criteria for the Competency as a Whole	
• Compliance with health and safety rules • Safe use of measuring instruments	
Elements of the Competency	Performance Criteria
1. Gather information about the operation of the circuit.	• Correct use of technical documents • Accurate interpretation of the function of the circuit • Systematic consultation of schematics • Correct distinction of the function of the components in a circuit
2. Measure electrical signals.	• Rigorous use of measurement units • Correct characterization of electrical signals • Careful notation of electrical quantities measured
3. Monitor the signal propagation of the electronic control and power circuit.	• Correct identification of components • Correct distinction of signals • Accurate measurement of electrical quantities • Methodical monitoring of signal propagation in a circuit

Elements of the Competency	Performance Criteria
4. Analyze the electronic circuit.	• Accurate interpretation of signals • Accurate determination of the state of the circuit
5. Identify problems in the operation of the electronic circuit.	• Rigorous examination of the problems • Precise identification of the defective components • Correct identification of the cause of the problems

Objective**Standard**

Statement of the Competency	Achievement Context
Connect the elements of an industrial measuring chain.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Using: ○ current laws, standards and regulations ○ measuring and calibration devices ○ analog sensors and discrete (on/off) sensors ○ vision systems ○ data acquisition systems ○ plotting and timeline software ○ manufacturers' technical documents and tutorials ○ WHMIS documents ○ calibration sheets ○ electrical, control, pneumatic, hydraulic (water) and mechanical schematics ○ automated systems programming software ○ user interfaces ○ personal and collective protective equipment
Performance Criteria for the Competency as a Whole	
• Compliance with health and safety rules • Compliance with appropriate procedures • Compliance with norms and standards	
Elements of the Competency	Performance Criteria
1. Analyze industrial sensors.	• Accurate distinction of: ○ sensor symbols ○ variables ○ electrical signals • Appropriate validation of sensors according to the application
2. Validate sensor signals.	• Proper use of: ○ calibration products and equipment ○ sensors • Conformity of the wiring to cable shielding standards • Precise calibration of sensors • Accurate recognition of sources of error

Elements of the Competency	Performance Criteria
3. Choose a conditioning circuit.	• Appropriate selection of: ○ the change of scale ○ the electrical conversion • Proper assessment of the need for galvanic isolation or intrinsic safety
4. Configure the entry points.	• Correct recognition of entry point types • Appropriate configuration of entry points • Accurate simulation of sensor signals • Appropriate selection of scales • Appropriate selection of filtering • Appropriate use of manufacturers' tutorials
5. Configure a data acquisition system.	• Appropriate selection of sampling parameters • Appropriate selection of scales and units of measure • Appropriate selection of filtering • Appropriate use of manufacturers' tutorials • Meticulous representation of data

Objective**Standard**

Statement of the Competency	Achievement Context
Characterize the elements of an electrical network and/or an industrial electrical installation.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Given: ○ single and three-phase AC circuits ○ AC motors ○ alternators ○ electric generators ○ electrical transformers ○ inverters ○ non-linear loads • Using: ○ applicable laws, standards and regulations ○ measuring devices ○ manufacturers' technical documents ○ electrical schematics ○ simulation or graphic representation software
Performance Criteria for the Competency as a Whole	
	• Compliance with health and safety regulations • Proper use of personal and collective protective equipment • Safe resetting of protective devices • Compliance with regulations, the Québec Construction Code (Chapter V, Electricity), and applicable standards • Proper use of measuring instruments
Elements of the Competency	Performance Criteria
1. Connect components of single-phase AC circuits.	• Correct distinction of power sources • Accurate distinction between types of electrical loads • Correct identification of the proper operation of a voltage and current transformer • Accurate measurement of electrical circuit quantities

Elements of the Competency	Performance Criteria
2. Connect components of three-phase AC circuits.	• Accurate identification of the characteristics of a power source • Correct distinction among the types of three-phase electrical loads • Accurate identification of the use of a three-phase transformer • Precise measurement of electrical quantities
3. Analyze the behaviour of an AC motor as an electrical load.	• Correct interpretation of the nominal characteristics • Correct distinction of the operating phases • Accurate measurement of electrical quantities • Correct distinction of the motor's effects on the circuit
4. Analyze a generator or an alternator.	• Correct interpretation of the nominal characteristics • Correct distinction of the operating phases • Accurate measurement of electrical quantities • Correct distinction of the load's effects on performance
5. Analyze the components of an electrical network.	• Correct distinction of the sources of electricity generation • Correct distinction among generation, transmission and distribution elements • Correct distinction between the measurement and protection devices of a network
6. Analyze the quality of an electrical wave.	• Correct distinction of the sources of electrical disturbance • Accurate measurement of the power quality • Application of an appropriate solution to the power quality problem

Objective**Standard**

Statement of the Competency	Achievement Context
Create electrical engineering schematics.	• In workplaces requiring the production or modification of schematics for automation, instrumentation and control, or electrodynamics as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with an engineer • Using: ○ national and international standards for types of schematics and diagrams ○ computer-aided drafting software for electrical engineering ○ schematics, specifications and diagrams ○ symbol libraries ○ technical documents ○ a functional description
Performance Criteria for the Competency as a Whole	
• Observance of terminology • Observance of the rules of legibility	
Elements of the Competency	Performance Criteria
1. Interpret schematics.	• Correct distinction of types and formats of electrical engineering schematics • Correct distinction of the components of the title block • Correct interpretation of symbols according to type of schematic
2. Make schematic sketches.	• Rigorous use of information • Accurate reproduction of symbols • Detailed transposition of the sketch into a schematic
3. Format schematics.	• Appropriate choice of the drafting template • Rigorous setting of parameters for the elements of the drafting template • Appropriate selection of the symbol library
4. Draw schematics.	• Effective use of drafting software • Effective use of a drafting software tutorial or help function • Sufficient documentation for the schematics • Compliance with drafting standards • Neat presentation • Complete production of the Bill of Materials (BOM) • Correct use of cross-references

Elements of the Competency	Performance Criteria
5. Print schematics.	• Appropriate use of paper size • Meticulous presentation of the result
6. Archive schematics.	• Compliance with cybersecurity standards • Periodic saving of schematics • Methodical backup of technical documents

Objective**Standard**

Statement of the Competency	Achievement Context
Use workshop tools and machines in an industrial environment.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or as part of a team • Using: ○ current laws, standards and regulations ○ principles of sustainable development ○ manufacturers' technical documents ○ control panels ○ industrial equipment or components ○ hand and power tools ○ additive manufacturing equipment and software ○ personal and collective protective equipment ○ charts, e.g. a tap and drill chart
Performance Criteria for the Competency as a Whole	
	• Proper use of personal and collective protective equipment • Selection of equipment, tools and accessories according to the operations to be carried out and the materials to be worked on • Proper disposal of residual products • Proper maintenance of the work area • Systematic verification of tools
Elements of the Competency	Performance Criteria
1. Plan the work.	• Prevention of health and safety hazards • Careful determination of technical installation documents • Rigorous assessment of personal and collective protective equipment • Comprehensive development of a task list • Proper selection of tools • Appropriate knowledge of what to do in the event of an accident, incident or injury
2. Perform drilling activities.	• Appropriate selection of the drilling method • Appropriate selection of the drill bit for the part to be drilled • Precise execution of the drilling • Rigorous cleaning of the part

Elements of the Competency	Performance Criteria
3. Join mechanical assemblies.	• Adherence to the manufacturer's requirements • Appropriate choice of fasteners • Meticulous execution of threading or tapping • Proper attachment of mechanical assemblies • Careful assembly of seals • Proper use of crimping tools
4. Perform soldering activities.	• Careful removal of electronic components • Careful soldering of electronic or electrical components
5. Use additive manufacturing equipment.	• Simple modelling of replacement parts • Proper selection of printing medium • Careful printing of replacement parts

Objective**Standard**

Statement of the Competency	Achievement Context
Determine the physical variables of industrial equipment.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Using: ○ current laws, standards and regulations ○ appropriate technical documents ○ hydraulic (water) or pneumatic circuits ○ motor load requirements ○ measuring devices ○ the laws of physics
Performance Criteria for the Competency as a Whole	
• Compliance with health and safety rules • Proper use of personal and collective protective equipment	
Elements of the Competency	Performance Criteria
1. Analyze the behaviour of a hydraulic fluid (water) and/or pneumatic fluid (air).	• Appropriate examination of the behaviour of a fluid • Correct recognition of the characteristics of a fluid • Proper measurement of fluid characteristics • Correct recognition of a pressure drop • Accurate interpretation of the parameters of a pump
2. Apply the laws of the dynamics of rotation of solids.	• Correct definition of the motion parameters • Correct estimate of the value of the physical variables of the motion • Accurate measurement of the value of the physical variables of the motion
3. Analyze heat transfers.	• Correct recognition of the types of heat • Correct recognition of heat propagation • Correct verification of the performance of a heat exchanger

Objective**Standard**

Statement of the Competency	Achievement Context
Ensure the operation of an industrial motor drive system.	• In workplaces spread across the four sectors of economic activity, including automation, instrumentation and control, electrodynamics, robotization, equipment distribution, consulting engineering, etc. • Individually or in collaboration with the personnel concerned • Based on motor load requirements • Using: ○ current laws, standards and regulations ○ electric motor control equipment or components ○ measuring devices ○ manufacturers' technical documents
Performance Criteria for the Competency as a Whole	
	• Compliance with current standards • Adherence to the lockout procedure • Proper use of personal and collective protective equipment • Proper use of measuring devices
Elements of the Competency	Performance Criteria
1. Analyze motor load requirements.	• Correct distinction of the types of mechanical loads • Correct distinction of motor characteristics according to the load
2. Choose an industrial electric motor.	• Correct distinction of the power sources • Correct anticipation of the control mode • Appropriate selection of the motor according to the load
3. Design a relay drive system for an industrial electric motor.	• Appropriate selection of drive system components • Proper selection of protective components • Detailed production of the wiring schematic • Compliance with the Québec Construction Code (Chapter V, Electricity)

Elements of the Competency	Performance Criteria
4. Operate an electronic drive system for an industrial electric motor.	• Appropriate selection of the electronic motor drive system • Appropriate selection of the control mode according to the load • Appropriate configuration of the control device • Detailed production of the wiring • Compliance with manufacturer's technical documents
5. Install an industrial electric motor drive system.	• Safe resetting of protective devices • Methodical verification of the control and power parts • Installation compliant with applicable standards
6. Put the industrial motor drive system into service.	• Systematic use of the commissioning procedure • Safe resetting of protective devices • Correct verification of operation • Correct application of corrective measures
7. Document the implementation of the industrial motor drive system.	• Structured archiving of configuration and schematics • Methodical archiving of technical documents

Objective**Standard**

Statement of the Competency	Achievement Context
Program an industrial programmable controller in a discrete (on/off) control mode.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Based on a system to be automated • Using: ○ current laws, standards and regulations ○ programming software for automated systems ○ industrial programmable controllers and simulators ○ networking equipment ○ user interfaces ○ schematics, specifications, diagrams or the functional description ○ a method of pre-operational verification ○ manufacturers' technical documents
Performance Criteria for the Competency as a Whole	
	• Compliance with health and safety rules • Compliance with laws, standards and regulations governing industrial control equipment
Elements of the Competency	Performance Criteria
1. Examine the physical system.	• Accurate analysis of the functional description • Clear description of operation • Accurate analysis of the list of sensors and actuators
2. Choose the type of logic	• Correct selection of the type of logic according to the functional description
3. Develop schematics and/or graphic pages.	• Rigorous use of the functional description • Careful production of schematics or graphic pages • Adherence to the standards of functional diagrams and/or user interfaces

Elements of the Competency	Performance Criteria
4. Proceed with the programming.	• Careful production of the flow chart • Correct development of the list of inputs and outputs • Observance of the functional description • Documented coding of the program • User-friendly interface
5. Test the program.	• Rigorous simulation of the program. • Methodical resolution of errors • Complete verification of the operation of the industrial programmable controller and/or user interface
6. Document the programming.	• Methodical archiving of programming and documents

Objective**Standard**

Statement of the Competency	Achievement Context
Use information and operation technologies.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with other technicians, engineers or users of enterprise resource planning software packages • Using: ○ current laws, standards and regulations ○ a data recording system ○ system simulation software ○ automation chains ○ cyber-physical systems ○ network connectivity solutions ○ object detection devices: barcode, radio-tag, camera, etc. ○ industrial networking equipment ○ intelligent electronic devices
Performance Criteria for the Competency as a Whole	
	• Compliance with standards, norms and regulations • Ongoing concern for cybersecurity • Proper assessment of the effects of latency • Respectful communication with various stakeholders • Appropriate use of business data processing terminology
Elements of the Competency	Performance Criteria
1. Examine a cyber-physical system.	• Accurate analysis of the functional description • Accurate assessment of the impact of the operational and information technologies (OT/IT) linkage project on production • Correct distinction between the topology of an industrial network (production) and the topology of an information network (management) • Detailed development of a list of connected components
2. Simulate an industrial system.	• Accurate development of a simple digital model • Accurate simulation of the industrial system • Rigorous annotation of the simulation

Elements of the Competency	Performance Criteria
3. Connect industrial components.	• Accurate distinction of: ○ industrial network protocols ○ industrial network equipment • Proper connection of the OT/IT link • Appropriate selection of the transmitted information • Correct anticipation of the volume of information transmitted
4. Transmit data.	• Correct distinction between the application layer and the analytical layer • Collaborative realization of network configurations • Correct distinction among production, maintenance and management data
5. Store data.	• Correct distinction between Big data storage methods • Collaborative validation of data format • Correct anticipation of the volume of information • Rigorous use of storage space
6. Make data available.	• Close collaboration with business data processing staff • Accurate validation of data compatibility • Relevance of data displayed

Objective**Standard**

Statement of the Competency	Achievement Context
Program an industrial programmable controller and/or a distributed control system in a continuous (analog) control mode.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Based on a system to be automated • Using: ○ current laws, standards and regulations ○ programming software for automated systems ○ programmable automation controllers and simulators ○ networking equipment ○ user interfaces ○ schematics, specifications, diagrams or the functional description ○ industrial systems using instrumentation and control or electrical power generation, transmission and distribution ○ a Big data system ○ a pre-operational verification method ○ calibration records
Performance Criteria for the Competency as a Whole	
• Compliance with laws, standards and regulations governing industrial control equipment • Compliance with health and safety regulations	
Elements of the Competency	Performance Criteria
1. Examine the physical system.	• Accurate analysis of the functional description • Clear description of operation • Accurate analysis of the list of sensors and actuators
2. Choose an automation and/or control strategy.	• Accurate assessment of the characteristics of the process • Appropriate control strategy
3. Develop diagrams, schematics and/or graphic pages.	• Rigorous use of the functional description of the task • Careful production of diagrams, schematics and/or graphics pages • Adherence to standards for instrumentation and user interfaces

Elements of the Competency	Performance Criteria
4. Carry out the programming.	• Accurate listing of inputs and outputs • Observance of the functional description or the flow chart • Periodic saving of the programming • Documented coding of the program • User-friendly interface
5. Test the program.	• Rigorous simulation of the program • Methodical resolution of errors • Complete verification of the operation of the industrial programmable controller and/or user interface
6. Document the programming.	• Methodical archiving of programming and documents

Objective**Standard**

Statement of the Competency	Achievement Context
Install control panels and/or power equipment.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with the personnel concerned • Given schematics, diagrams or specifications and a lockout procedure • Using: ○ current laws, standards and regulations ○ manufacturers' technical documents ○ control panels, equipment or industrial components ○ hand and power tools ○ user interfaces, automated systems or intelligent electronic devices ○ planning software ○ personal and collective protective equipment
Performance Criteria for the Competency as a Whole	
	• Proper use of personal and collective protective equipment • Compliance with laws, standards and regulations governing industrial control equipment • Proper use of tools, materials and equipment
Elements of the Competency	Performance Criteria
1. Plan the installation.	• Prevention of health and safety hazards • Systematic consultation of schematics, plans and specifications • Correct development of a logical sequence of execution • Appropriate selection of materials and tools required
2. Assemble the control panel.	• Methodical use of layout plans • Observance of the execution sequence • Proper installation of components
3. Fasten the control panel.	• Careful installation of the panel • Installation compliant with the specifications

Elements of the Competency	Performance Criteria
4. Connect the control and power parts.	• Methodical use of wiring schematics • Observance of the execution sequence • Proper use of wiring tools • Careful execution of wiring • Conformity of the wiring installation
5. Implement the program(s) and/or parameters.	• Conscientious implementation of the program(s) or configuration • Correct interpretation of possible error messages • Saving of the program(s) or configuration
6. Check the operation.	• Systematic performance of pre-operational checks • Methodical verification of overall operation
7. Document the installation of control panels and/or power equipment.	• Complete updating of the schematics as installed • Methodical archiving of documents

Objective**Standard**

Statement of the Competency	Achievement Context
Integrate an industrial programmable controller and/or a distributed control system into an automated system.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Given a set of specifications • Using: ○ current laws, standards and regulations ○ plans, specifications, diagrams and schematics ○ control strategies ○ measuring and calibration equipment ○ manufacturers' technical documents ○ a lockout procedure
Performance Criterion for the Competency as a Whole	
• Proper use of personal and collective protective equipment	
Elements of the Competency	Performance Criteria
1. Examine industrial equipment and/or an industrial process.	• Rigorous application of preventive measures for health and safety • Accurate analysis of physical operation • Accurate production of the functional description of the task • Detailed development of a list of sensors and terminal elements
2. Associate the elements of the measuring chain and the terminal elements with the inputs and outputs.	• Correct analysis of compatibility • Connection of the measuring chain and terminal elements according to the schematics • Conformity of the wiring installation • Meticulous verification of the measuring chain and terminal elements • Precise adjustment and calibration of the elements • Rigorous annotation of results
3. Develop diagrams, schematics and/or graphic pages.	• Rigorous use of the functional description of the task • Careful production of diagrams, schematics and/or graphic pages • Observance of instrumentation and user interface standards

Elements of the Competency	Performance Criteria
4. Choose an automation and/or control strategy.	• Correct assessment of process parameters • Appropriate strategy selection • Appropriate control strategy
5. Carry out the fastening and connection of the components.	• Proper positioning of components • Careful connection of the components • Installation compliant with the schematics
6. Implement programming and/or configuration.	• Conscientious implementation of the program and/or configuration • User-friendly interface • Effective error resolution • Correct verification of process operation and performance • Saving of the program and/or configuration
7. Document the integration of an industrial programmable controller and/or distributed control system.	• Orderly representation of verification results • Methodical archiving of documents

Objective**Standard**

Statement of the Competency	Achievement Context
Install a control loop.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Using: ○ current laws, standards, and regulations ○ plans, specifications, diagrams and schematics ○ control strategies ○ measuring and calibration equipment ○ hand and power tools ○ manufacturers' technical documents ○ a lockout procedure
Performance Criteria for the Competency as a Whole	
	• Compliance with regulations • Proper use of personal and collective protective equipment • Precise notation of settings • Rigorous application of the procedure to be followed in case of accident, incident or injury
Elements of the Competency	Performance Criteria
1. Plan the installation.	• Rigorous application of prevention measures for health and safety • Systematic consultation of schematics, plans and specifications • Development of an appropriate procedure • Appropriate selection of the control strategy • Appropriate selection of required tools and equipment
2. Install the components of the measuring chain.	• Proper positioning of components • Conformity of schematics to standards • Accurate calibration of the elements of the measuring chain • Appropriate configuration of the elements of the measuring chain
3. Install the terminal elements.	• Careful installation of components • Conformity of schematics to standards • Accurate calibration of terminal elements • Proper configuration of terminal elements

Elements of the Competency	Performance Criteria
4. Proceed with the connection.	• Methodical use of wiring schematics • Observance of the start-up sequence • Proper use of wiring tools • Careful execution of wiring • Conformity of the wiring installation
5. Adjust the control loop.	• Appropriate use of control methods • Acceptable loop performance • Adequate justification of deviations
6. Check the operation.	• Systematic performance of pre-operational checks • Methodical verification of operation
7. Document the installation and adjustment.	• Orderly presentation of performance results • Proper archiving of documents • Updating of schematics as installed

Objective**Standard**

Statement of the Competency	Achievement Context
Integrate a positioning system.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Using: ○ current laws, standards, and regulations ○ plans, specifications, diagrams and schematics ○ a lockout procedure ○ automated systems ○ industrial programmable controllers ○ positioning systems ○ configuration software ○ tutorials ○ manufacturers' technical documents
Performance Criteria for the Competency as a Whole	
	• Rigorous application of preventive measures for health and safety • Proper use of personal and collective protective equipment
Elements of the Competency	Performance Criteria
1. Analyze the production system or equipment to be automated.	• Adequate consultation of the required level of machine safety • Correct description of needs • Careful execution of the functional description
2. Determine the hardware configuration of the positioning system.	• Appropriate selection of hardware configuration requirements • Suitable planning of grounding and shielding • Constant concern for grounding and shielding • Proper configuration of built-in safety devices • Proper configuration of external safety devices
3. Add a programmable industrial controller to the positioning system.	• Validation of the compatibility of the components • Documented coding of the program • Complete testing of the communication

Elements of the Competency	Performance Criteria
4. Configure the axes or groups of axes.	• Rigorous monitoring of a configuration sequence • Correct verification of the limits of the system axes • Complete testing of the system axes • Accurate adjustment of the system axes
5. Put the positioning system into operation.	• Complete verification of electrical and mechanical safety • Rigorous monitoring of a start-up sequence • Complete verification of system operation
6. Document the integration of the positioning system.	• Complete archiving of the configuration and programming • Proper presentation of the results

Objective**Standard**

Statement of the Competency	Achievement Context
Program an industrial robot.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Using: ○ current laws, standards and regulations ○ a functional description ○ schematics, specifications and diagrams ○ an automated system ○ appropriate technical documents ○ programming software ○ virtual simulators ○ industrial robots
	Performance Criteria for the Competency as a Whole
	• Compliance with occupational health and safety rules • Proper use of personal and collective protective equipment • Compliance with cybersecurity standards
Elements of the Competency	Performance Criteria
1. Analyze a robot system.	• Accurate description of the robot system • Clear distinction of safety devices • Appropriate correlation between machine safety and application
2. Describe the functionality of the task to be robotized.	• Accurate interpretation of the task to be robotized • Accurate definition of the robot movements
3. Determine the movements of a robot.	• Correct distinction of coordinate systems • Correct distinction of robot location parameters • Appropriate choice of the mode of movement • Methodical development of a flow chart
4. Choose the characteristics and the end effectors of an industrial robot.	• Correct distinction of robot classifications according to their applications • Appropriate selection of the robot according to the task • Appropriate selection of the robot end effector for the task

Elements of the Competency	Performance Criteria
5. Carry out the programming and simulation of a robotic task.	• Effective use of tutorials • Documented coding of the task according to the flow chart • Effective resolution of error messages • Correct interpretation of alarms • Complete virtual simulation of the task • Systematic saving of results
6. Implement the program in a robot.	• Methodical transfer of the program to the robot • Full verification of the robot's safety devices • Manual test of the task • Correct validation of operation limits • Correct validation of the robot task • Systematic saving of the program

Objective**Standard**

Statement of the Competency	Achievement Context
Integrate safety components into an automated system.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Based on the results of the machine safety analysis • Using: ○ appropriate technical documents ○ safety components or equipment ○ current laws, standards and regulations ○ plans, specifications, diagrams and schematics ○ the functional description of the system to be secured ○ a lockout procedure
Performance Criteria for the Competency as a Whole	
	• Compliance with occupational health and safety rules • Proper use of personal and collective protective equipment • Compliance with regulations
Elements of the Competency	Performance Criteria
1. Refer to a machine safety analysis.	• Accurate validation of machine safety • Careful study of the safety analysis of the machines • Detailed formulation of the functional description of the system to be secured
2. Select safety components.	• Appropriate selection of safety components • Matching of components to the machine safety analysis
3. Check the topology of the communication network.	• Accurate assessment of the network infrastructure • Accurate assessment of network cabling • Correct validation of the compatibility of components

Elements of the Competency	Performance Criteria
4. Develop control and power schematics.	• Conformity of schematics to the functional description of the system to be secured • Careful production of schematics • Conformity of schematics to standards
5. Perform the installation and connection of the secured automated system.	• Appropriate wiring of safety components • Careful execution of the connection • Installation compliant with the schematics
6. Carry out programming and/or configuration of safety components.	• Build an intuitive user interface • Accurate reference to the functional description • Documented coding of the program and/or configuration • Methodical resolution of errors and faults • Complete verification of system operation
7. Carry out the commissioning of the automated system.	• Exhaustive pre-operational testing of components • Systematic annotation of tests • Methodical verification of the operation of safety components • Exhaustive verification of system operation
8. Document the integration of safety components into the automated system.	• Methodical updating of schematics and documents • Systematic archiving of schematics, documents and test results

Objective**Standard**

Statement of the Competency	Achievement Context
Maintain industrial equipment and systems.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with operations, maintenance or engineering personnel • Based on maintenance programs • Using: ○ current laws, standards, and regulations ○ schematics ○ technical documents ○ industrial materials and equipment ○ maintenance software (computerized maintenance management system) ○ an inventory ○ a lockout procedure ○ personal and collective protective equipment
Performance Criteria for the Competency as a Whole	
	• Compliance with procedures (e.g. lockout, grounding, etc.) • Proper use of personal and collective protective equipment • Compliance with safe task analyses • Compliance with applicable standards (e.g. ISO, CSA)
Elements of the Competency	Performance Criteria
1. Plan the maintenance work.	• Correct use of maintenance data • Methodical preparation of the work
2. Take equipment out of service.	• Strict application of mechanical and electrical lockout rules • Validation of the absence of voltage
3. Carry out the cleaning.	• Careful cleaning of equipment • Proper use of cleaning equipment • Proper disposal of residues

Elements of the Competency	Performance Criteria
4. Carry out verification.	• Careful inspection of physical components • Careful inspection of electrical components • Methodical verification of the control and power parts • Correct verification of process operation and performance • Validation of the accuracy of the settings • Accurate calibration of components
5. Return equipment to service.	• Application of mechanical and electrical lockout rules • Methodical validation of operation • Careful annotation of results
6. Document the maintenance.	• Rigorous updating of the maintenance system • Systematic archiving of results

Objective**Standard**

Statement of the Competency	Achievement Context
Integrate robotics equipment into an automated system.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Based on automated systems and robotics equipment • Using: ○ current laws, standards, and regulations ○ plans, specifications, diagrams and schematics ○ a lockout procedure ○ automated systems ○ technical documents ○ a functional description
	Performance Criteria for the Competency as a Whole
	• Compliance with regulations • Proper use of personal and collective protective equipment • Rigorous application of preventive measures for health and safety
Elements of the Competency	Performance Criteria
1. Analyze the functional description of the task.	• Accurate description of the task to be robotized • Accurate review of the scope of application • Accurate review of the safety systems of the robot system or safety area • Realistic planning of implementation steps • Methodical development of the task in a flow chart • Accurate assessment of the impact on the automated system
2. Install robotics equipment.	• Appropriate selection of the robot according to the task • Appropriate selection of sensors required for exteroceptive perception • Appropriate selection of the robot end effectors • Thorough examination of the flow chart • Appropriate selection of the data exchange devices • Detailed production of a wiring schematic

Elements of the Competency	Performance Criteria
3. Carry out the interfacing of the robotized system.	• Methodical use of schematics • Careful installation of electrical wiring • Methodical verification of data exchanges
4. Carry out the programming and simulation of a robotic task.	• Careful writing of the programming according to the flow chart • Rigorous simulation of the task • Accuracy of the simulation of the task to be robotized
5. Test the robotic system in the system.	• Validation of machine safety • Accurate assessment of the operation of the robotic system and its task • Relevant recommendations for improving the automated system
6. Document the integration of robotics equipment into the automated system.	• Rigorous updating of schematics and documents • Complete archiving of schematics and documents

Objective**Standard**

Statement of the Competency	Achievement Context
Commission industrial equipment and/or systems.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Given plans, specifications, diagrams and schematics • Using: ○ current laws, standards and regulations ○ industrial equipment ○ a lockout procedure ○ manufacturers' technical documents ○ personal and collective protective equipment
Performance Criteria for the Competency as a Whole	
	• Compliance with applicable health and safety regulations • Rigorous application of preventive measures for health and safety • Proper use of personal and collective protective equipment • Appropriate application of the procedure to follow in case of accident, incident or injury
Elements of the Competency	Performance Criteria
1. Plan the commissioning.	• Detailed study of the specifications • Correct development of a commissioning procedure • Dissemination of information to the people concerned
2. Power the industrial equipment and/or system.	• Validation of off-line tests • Safe activation of control components
3. Implement the programming and/or configuration.	• Methodical transfer of programming and/or configuration • Effective management of errors • Validation of data exchanges between equipment and/or industrial system components

4. Perform the industrial equipment start-up and/or system start-up.	• Methodical application of pre-operational checks • Rigorous validation of operation • Accurate assessment of performance
5. Document the commissioning.	• Careful drafting of the commissioning report • Rigorous archiving of the documents

Objective**Standard**

Statement of the Competency	Achievement Context
Troubleshoot industrial equipment and/or systems.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Based on a request or a service call • Using: ○ current laws, standards and regulations ○ electrical, pneumatic, hydraulic (water) and mechanical schematics ○ manufacturers' technical documents ○ databases ○ the functional description ○ measuring devices ○ specialized software ○ a lockout procedure ○ equipment history
Performance Criteria for the Competency as a Whole	
	• Compliance with applicable standards, laws and regulations • Proper use of personal and collective protective equipment • Methodical approach to problems
Elements of the Competency	Performance Criteria
1. Gather information.	• Rigorous application of preventive measures for health and safety • Accurate description of the current state • Gathering of relevant information • Planning for a rollback, at any time
2. Analyze the problem.	• Methodical execution of a diagnostic technique • Accurate assessment of the nature of the problem • Accurate assessment of the impact on activities • Ongoing annotation of tests
3. Diagnose operating problems with industrial equipment or systems.	• Proper use of diagnostic methods • Dissemination of information to the people concerned • Judicious proposal of repair solutions (temporary or permanent)

Elements of the Competency	Performance Criteria
4. Perform the repair.	• Application of the lockout procedure • Secure removal of equipment • Efficient repair or replacement of equipment • Validation of the quality of the repair
5. Return the equipment to service.	• Dissemination of information • Safe start-up of equipment • Rigorous execution of the return-to-service procedure
6. Follow up on troubleshooting.	• Complete documentation of the intervention • Systematic updating of the equipment or system history • Appropriate recommendation of permanent solutions • Careful updating of schematics or documents • Systematic archiving of documents

Objective**Standard**

Statement of the Competency	Achievement Context
Contribute to the design or modification of industrial equipment or systems.	• In workplaces where there is automation, instrumentation and control, electrodynamics and robotization, as well as in environments involving equipment distribution, consulting engineering, etc. • Individually or in collaboration with members of other professions, or under the supervision of the project manager or engineer • Based on plans, requests, specifications, diagrams and schematics • Using: ○ current laws, standards and regulations ○ industrial systems such as control loops, automation, robotics or positioning ○ planning, programming and computer-aided drafting (CAD) software
Performance Criteria for the Competency as a Whole	
• Compliance with health and safety rules • Compliance with regulations • Accurate assessment of the project's orientation with respect to sustainable development	
Elements of the Competency	Performance Criteria
1. Examine the request.	• Exhaustive review of the specifications • Accurate identification of the client's needs • Relevant questioning on the needs
2. Develop the functional description.	• Detailed description of needs • Effective search for applicable strategies • Production of a complete estimate
3. Plan the work.	• Systematic consultation with resource persons • Production of a realistic schedule • Accurate estimate of human and material resources
4. Produce the schematics.	• Careful preparation of electrical schematics • Careful preparation of installation schematics • Appropriate selection of components • Complete production of a Bill of Materials (BOM) • Compliance with norms and standards
5. Carry out the programming or configuration.	• Rigorous development of the flow chart • Coding compliant with the flow chart • Proper configuration of parameters

Elements of the Competency	Performance Criteria
6. Create a prototype.	• Proper use of personal and collective protective equipment • Proper wiring of components or equipment • Careful execution of the installation • Compliance of the installation with the schematics and applicable standards
7. Test the equipment or system.	• Proper use of personal and collective protective equipment • Methodical application of the test procedure • Methodical validation of operation • Effective troubleshooting of problems • Validation of data exchanges between the operation (OT) and information (IT) layers
8. Document the design or modification.	• Production of a detailed operating manual • Dissemination of information • Complete archiving of documents

General Education Component Common to All Programs and General Education Component Specific to the Program

English, Language of Instruction and Literature

Code: 4EA0

Objective

Standard

Statement of the Competency

Analyze and produce various forms of discourse.

Elements of the Competency	Performance Criteria
1. Identify the characteristics and functions of the components of literary texts.	• Accurate explanation of the denotation of words • Adequate recognition of the appropriate connotation of words • Accurate definition of the characteristics and function of each component
2. Determine the organization of facts and arguments of a given literary text.	• Clear and accurate recognition of the main idea and structure • Clear presentation of the strategies employed to develop an argument or thesis
3. Prepare ideas and strategies for a projected discourse.	• Appropriate identification of topics and ideas • Adequate gathering of pertinent information • Clear formulation of a thesis • Coherent ordering of supporting material
4. Formulate a discourse.	• Appropriate choice of tone and diction • Correct development of sentences • Clear and coherent development of paragraphs • Formulation of a 750-word discourse
5. Revise the work.	• Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: English, Language of Instruction and Literature
 Weighting: 2-2-4 or 1-3-4
 Credits: 2 $\frac{2}{3}$

Objective

Standard

Statement of the Competency

Apply an analytical approach to literary genres.

Elements of the Competency	Performance Criteria
1. Distinguish genres of literary texts.	• Clear recognition of the formal characteristics of a literary genre
2. Recognize the use of literary conventions within a specific genre.	• Accurate recognition of the figurative communication of meaning • Adequate explanation of the effects of significant literary and rhetorical devices
3. Situate a work within its historical and literary period.	• Appropriate recognition of the relationship of a text to its period
4. Write a critical analysis of a literary genre.	• Selective use of appropriate terminology • Effective presentation of a 1000-word coherent response to a literary text
5. Revise the work.	• Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: English, Language of Instruction and Literature
Weighting: 2-2-3
Credits: 2½

Objective

Standard

Statement of the Competency

Apply an analytical approach to a literary theme.

Elements of the Competency	Performance Criteria
1. Recognize the treatment of a theme within a literary text.	• Clear recognition of elements within the text, which define and reinforce a theme and its development • Adequate demonstration of the effects of significant literary and rhetorical devices
2. Situate a literary text within its cultural context.	• Appropriate recognition of a text as an expression of cultural context • Adequate demonstration of the effects of significant literary and rhetorical devices
3. Detect the value system inherent in a literary text.	• Appropriate identification of expression (explicit/implicit) of a value system in a text
4. Write an analysis on a literary theme.	• Selective use of appropriate terminology • Effective presentation of a 1000-word coherent response to a literary text
5. Revise the work.	• Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: English, Language of Instruction and Literature
Weighting: 2-2-3
Credits: 2½

Objective

Standard

Statement of the Competency

Communicate in the forms of discourse appropriate to one or more fields of study.

Elements of the Competency

Performance Criteria

1. Identify the forms of discourse appropriate to given fields of study.	• Accurate recognition of specialized vocabulary and conventions • Accurate recognition of the characteristics of the form of discourse • Exploration of a variety of topics
2. Recognize the forms of discourse appropriate to given fields of study.	• Clear and accurate recognition of the main ideas and structure • Appropriate distinction between fact and argument
3. Formulate an oral and a written discourse.	• Examine ways to address and structure a given topic • Appropriate choice of tone and diction • Correctly developed sentences • Clearly and coherently developed paragraphs • Appropriate use of program-related communication strategies including media and technology • Formulation of a 1000-word discourse
4. Revise the work.	• Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: English, Language of Instruction and Literature
Periods of instruction: 60
Credits: 2

Humanities

Code: 4HU0

Objective

Standard

Statement of the Competency

Apply a logical analytical process to how knowledge is organized and used.

Elements of the Competency

Performance Criteria

1. Recognize the basic elements of a field of knowledge.	• Appropriate description of the basic elements • Appropriate use of terminology relevant to a field of knowledge
2. Define the modes of organization and utilization of a field of knowledge.	• Adequate definition of the dimensions, limits, and uses of a field of knowledge
3. Situate a field of knowledge within its historical context.	• Accurate identification of the main components in the historical development of a field of knowledge • Accurate description of the effects of historical development and social context on the limits and uses of a field of knowledge
4. Organize the main components into coherent patterns.	• Coherent organization of the main components
5. Produce a synthesis of the main components.	• Appropriate analysis of the components • Coherent synthesis of the main components • Appropriate expression, including a significant individual written component, of an analysis of the context, importance and implications of the organization and uses of knowledge • Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: Humanities
Weighting: 3-1-3
Credits: 2½

Humanities

Code: 4HU1

Objective

Standard

Statement of the Competency

Apply a critical thought process to world views.

Elements of the Competency	Performance Criteria
1. Describe world views.	• Accurate description of a society or group with a distinctive world view • Appropriate use of terminology relevant to these societies or groups
2. Explain the major ideas, values, and implications associated with a given world view.	• Adequate explanation of the salient components of a world view
3. Organize the ideas, values and experiences of a world view into coherent patterns.	• Coherent organization of ideas about a world view • Appropriate expression, including a significant individual written component, of an analysis of the context, importance, and implications of world views
4. Compare world views.	• Comparative analysis of these world views • Appropriate inclusion of central elements, relationships, and organizational principles of the societies or groups in the analysis
5. Convey the ideas, attitudes, and experiences of the societies or groups studied.	• Coherent integration of the importance and implications of the world views for the given societies or groups • Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline: Humanities
Weighting: 3-0-3
Credits: 2

Humanities

Code: 4HUP

Objective

Standard

Statement of the Competency

Apply a critical thought process to ethical issues relevant to the field of study.

Elements of the Competency

Performance Criteria

1. Situate significant ethical issues in appropriate world views and fields of knowledge.	• Accurate recognition of the basic elements of ethical issues • Appropriate use of relevant terminology • Adequate identification of the main linkages with world views and fields of knowledge
2. Explain the major ideas, values, and social implication of ethical issues.	• Adequate description of the salient components of the issues
3. Organize the ethical questions and their implications into coherent patterns.	• Coherent organization of the ethical questions and their implications • Appropriate expression, including a significant individual written component, of an analysis of the context, importance and implications of the issues
4. Debate the ethical issues.	• Adequate development of substantiated argumentation including context and diverse points of view • Clear articulation of an individual point of view • Appropriate use of revision strategies • Appropriate revision of form and content

Learning Activities

Discipline:	Humanities
Periods of instruction:	45
Credits:	2

Objective

Standard

Statement of the Competency

Apply basic concepts for communicating in standard French.

Elements of the Competency	Performance Criteria
1. Write and revise a simple text.	• Clear, coherent formulation of a text of about 250 words • Adequate development of the text: intention, topic, reader • Formulation of simple, well-constructed sentences • Use of adequate vocabulary for the task • Satisfactory application of the rules of grammar, in particular agreement in gender and number; regular verbs; verb tenses in the present, compound past and simple future • Satisfactory correction of errors in spelling or grammar • Appropriate use of revision strategies
2. Understand the meaning of a simple text.	• Accurate description of the general meaning and essential ideas of a 500-word text • Accurate identification of the difficulties in understanding the text • Appropriate use of reading techniques • Accurate identification of the main elements of the text
3. Convey a simple oral message.	• Clear and coherent formulation of an oral presentation of at least four minutes • Appropriate use of standard vocabulary • Clear and coherent statements
4. Understand the meaning of a simple oral message.	• Accurate identification of the general meaning and essential ideas of an oral message of at least four minutes • Accurate identification of the difficulties in understanding the message • Accurate description of the general meaning and essential ideas of the message

Learning Activities

Discipline: French as a Second Language
Weighting: 2-1-3
Credits: 2

Objective

Standard

Statement of the Competency

Communicate in standard French with some ease.

Elements of the Competency

Performance Criteria

1. Write and revise a simple text.

- Writing of a text of about 350 words
- Respect for grammar and spelling rules
- Appropriate use of the main elements of the corpus
- Clear, coherent formulation of sentences
- Coherent organization of paragraphs
- Appropriate use of revision strategies
- Satisfactory correction of spelling and grammatical errors

2. Interpret a written text.

- Accurate identification of the main ideas and structure of a text of 700 to 1 000 words
- Accurate identification of the main elements of the text
- Accurate explanation of the meaning of the words of the text

3. Produce a planned oral text.

- Clear and coherent formulation of an oral presentation of at least five minutes
- Appropriate use of standard vocabulary
- Respect for the level of language and rules of grammar and pronunciation

4. Interpret a simple oral text.

- Accurate identification of the main elements of an oral text of at least five minutes
- Accurate identification of the ideas and subjects dealt with in the text
- Accurate explanation of the meaning of the words of the text

Learning Activities

Discipline: French as a Second Language

Weighting: 2-1-3

Credits: 2

Objective

Standard

Statement of the Competency

Communicate with ease in standard French.

Elements of the Competency	Performance Criteria
1. Write a text of moderate complexity.	• Writing of a text of about 450 words • Respect for grammar and spelling rules • Adaptation to the intended audience • Appropriate use of the main elements of the corpus • Clear and coherent formulation of sentences, including at least three that are complex • Coherent organization of paragraphs
2. Revise and correct a text of moderate complexity.	• Appropriate use of revision strategies • Appropriate revision of the text
3. Comment on a written text of moderate complexity.	• Accurate identification of the main elements of a text of between 2 500 and 3 000 words • Accurate explanation of the meaning of the words of the text • Accurate identification of the main and secondary ideas, of facts and opinions • Accurate identification of what is implicit and what is explicit
4. Produce a planned oral text of moderate complexity.	• Clear and coherent formulation of an oral presentation of at least five minutes • Appropriate use of standard vocabulary • Respect for the level of language and rules of grammar and pronunciation • Adaptation to the intended audience • Appropriate sequencing of ideas

Learning Activities

Discipline: French as a Second Language
Weighting: 2-1-3
Credits: 2

Objective

Standard

Statement of the Competency

Explore a cultural and literary topic.

Elements of the Competency

Performance Criteria

1. Write a text on a cultural or literary topic.

- Clear and coherent formulation of a text of about 550 words
- Respect for the topic
- Respect for grammar and spelling rules
- Adaptation to the intended audience
- Appropriate use of the main elements of the corpus
- Clear articulation of a personal point of view

2. Revise and correct a text on a cultural or literary topic.

- Appropriate use of revision strategies
- Appropriate revision of the text

3. Analyze a cultural or literary text.

- Personal formulation of the main elements of the text
- Identification of the main themes
- Identification of clues that help situate the text in its socio-cultural and historical context
- Accurate identification of the values expressed
- Accurate identification of the structure of the text
- Clear articulation of a personal point of view

Learning Activities

Discipline: French as a Second Language
Weighting: 3-0-3
Credits: 2

Objective

Standard

Statement of the Competency

Apply basic concepts for communicating in French in relation to the student's field of study.

Elements of the Competency	Performance Criteria
1. Write and revise a short text related to the student's field of study.	• Accurate identification of difficulties in writing • Appropriate use of writing techniques • Appropriate use of standard and specialized vocabulary • Clear and coherent formulation of the text • Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors
2. Understand the meaning and characteristics of a text related to the student's field of study.	• Accurate identification of difficulties in understanding the text • Accurate identification of the characteristics of the text • Accurate identification of specialized vocabulary • Accurate identification of the main elements of the text • Accurate description of the general meaning and essential ideas of the text
3. Convey a simple oral message related to the student's field of study.	• Accurate identification of the difficulties in oral expression • Appropriate use of techniques of oral expression • Appropriate use of standard and specialized vocabulary • Intelligible expression of the message
4. Understand the meaning of a simple oral message related to the student's field of study.	• Accurate identification of difficulties in understanding the message • Accurate identification of the characteristics of the message • Accurate identification of specialized vocabulary • Accurate identification of the main elements of the message • Accurate description of the general meaning and essential ideas of the message

Learning Activities	
Discipline:	French as a Second Language
Periods of instruction:	45
Credits:	2

Objective

Standard

Statement of the Competency

Communicate in French on topics related to the student's field of study.

Elements of the Competency

Performance Criteria

- | | |
|--|---|
| 1. Write a text related to the student's field of study. | <ul style="list-style-type: none"> • Appropriate use of specialized vocabulary and of conventions specific to different types of texts • Respect for the level of language and rules of grammar and spelling • Clear and coherent formulation of the text • Appropriate use of writing techniques |
| 2. Revise and correct a text on a topic related to the student's field of study. | <ul style="list-style-type: none"> • Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors |
| 3. Differentiate the types of texts specific to the student's field of study. | <ul style="list-style-type: none"> • Accurate identification of the formal characteristics of each of the main types of texts and the conventions used |
| 4. Analyze texts representative of the student's field of study. | <ul style="list-style-type: none"> • Accurate identification of the main elements of the text • Accurate interpretation of specialized vocabulary • Accurate identification of the ideas and subjects dealt with • Appropriate use of reading and listening techniques |

Learning Activities

Discipline:	French as a Second Language
Periods of instruction:	45
Credits:	2

French, Second Language (Level III)

Code: 4SFR

Objective

Standard

Statement of the Competency

Communicate with ease in French on topics related to the student's field of study.

Elements of the Competency

Performance Criteria

- | | |
|--|--|
| 1. Produce a text on a topic related to the student's field of study. | <ul style="list-style-type: none"> • Respect for the topic • Appropriate use of specialized vocabulary and the conventions specific to different types of texts • Respect for the level of language and rules of grammar and spelling • Clear and coherent formulation of the text • Appropriate sequencing of ideas • Appropriate form for the content |
| 2. Revise and correct a text on a topic related to the student's field of study. | <ul style="list-style-type: none"> • Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors |
| 3. Comment on texts specific to the student's field of study. | <ul style="list-style-type: none"> • Accurate identification of the formal characteristics of the main types of texts and the conventions used • Accurate explanation of the meaning of the words in the text • Accurate identification of the structure of the text • Accurate reformulation of the main and secondary ideas, of the facts and opinions • Accurate use of specialized vocabulary |

Learning Activities

Discipline:	French as a Second Language
Periods of instruction:	45
Credits:	2

Objective

Standard

Statement of the Competency

Produce a text in French on a topic related to the student's field of study.

Elements of the Competency

Performance Criteria

- | | |
|--|---|
| 1. Write a text on a topic related to the student's field of study. | <ul style="list-style-type: none"> • Respect for the topic • Appropriate use of specialized vocabulary and the conventions specific to different types of texts • Appropriate choice of the main elements of the corpus based on the type of text • Clear and coherent formulation of the text • Respect for the level of language and rules of grammar and spelling • Clear articulation of a personal point of view |
| 2. Revise and correct a text on a topic related to the student's field of study. | <ul style="list-style-type: none"> • Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors |
| 3. Analyze a text related to the student's field of study. | <ul style="list-style-type: none"> • Precise differentiation of the formal characteristics of specific types of texts • Personal formulation of the main elements • Listing of the main themes • Accurate identification of the structure of the text • Identification of clues that help situate the text in its context • Clear articulation of a personal point of view • Accurate association of elements of the text with the topic |

Learning Activities

Discipline:	French as a Second Language
Periods of instruction:	45
Credits:	2

Objective

Standard

Statement of the Competency

Analyze one's physical activity from the standpoint of a healthy lifestyle.

Elements of the Competency

Performance Criteria

1. Establish the relationship between one's lifestyle habits and health.

- Proper use of documentation from scientific research or the media
- Recognition of the influence of social and cultural factors on the practice of physical activity
- Pertinent links made between one's lifestyle habits and the impact they have on health

2. Be physically active in a manner that promotes one's health.

- Respect for the rules specific to the physical activity practised
- Respect for codes of ethics, safety rules and regulations when being physically active
- Respect for one's abilities when practising physical activities

3. Recognize one's needs, abilities and motivational factors with respect to regular and sufficient physical activity.

- Appropriate use of strategies for the quantitative and qualitative evaluation of one's physical condition
- Overall assessment of one's needs and abilities in terms of physical activity
- Overall assessment of one's motivational factors with respect to being sufficiently active on a regular basis

4. Propose physical activities that promote one's health.

- Appropriate choice of physical activities according to one's needs, abilities and motivational factors
- Use of clear reasoning to explain the choice of physical activity

Learning Activities

Discipline: Physical Education

Weighting: 1-1-1

Credits: 1

Objective

Standard

Statement of the Competency

Improve one's effectiveness when practising a physical activity.

Elements of the Competency

Performance Criteria

1. Plan an approach to improve one's effectiveness when practising a physical activity.

- Initial assessment of one's abilities and attitudes when practising a physical activity
- Statement of one's expectations and needs with respect to the ability to practise the activity
- Appropriate formulation of personal objectives
- Appropriate choice of the means to achieve one's objectives
- Use of clear reasoning to explain the choice of physical activity

2. Use a planned approach to improve one's effectiveness when practising a physical activity.

- Respect for the rules and regulations of the physical activity
- Respect for codes of ethics, safety rules and regulations when being physically active
- Appropriate use of strategies for the quantitative and qualitative evaluation of one's motor skills
- Periodic assessment of one's abilities and attitudes when practising a physical activity
- Meaningful interpretation of progress made and the difficulties encountered in the practice of physical activity
- Pertinent, periodic and proper adjustments of one's objectives or means
- Appreciable improvement in one's motor skills, techniques or complex strategies required by the physical activity

Learning Activities

Discipline: Physical Education

Weighting: 0-2-1

Credits: 1

Objective

Standard

Statement of the Competency

Demonstrate one's ability to assume responsibility for maintaining a healthy lifestyle through the continued practice of physical activity.

Elements of the Competency

Performance Criteria

1. Plan a personal physical activity program.

- Mention of priorities according to one's needs, abilities, and motivational factors with respect to being sufficiently active on a regular basis
- Proper and appropriate formulation of personal objectives
- Appropriate choice of physical activity or activities to achieve personal objectives
- Appropriate planning of the conditions for performing the physical activity or activities in personal program

2. Combine the elements of a regular and sufficient practice of physical activity as part of a healthy lifestyle.

- Respect for the rules and regulations of the physical activity
- Respect for codes of ethics, safety rules and regulations when being physically active
- Regular and sufficient practice of a physical activity while maintaining a balance between effectiveness and health-promoting factors

3. Manage a personal physical activity program.

- Appropriate choice of criteria for measuring the attainment of program objectives
- Appropriate use of strategies for the quantitative and qualitative evaluation of one's physical activity
- Periodic assessment of the time invested and activities practised during the program
- Appropriate, periodic and proper adjustment of personal objectives or means used
- Meaningful interpretation of the progress made and difficulties encountered in the practice of physical activities
- Recognition of the effect of physical activity on one's lifestyle

Learning Activities

Discipline: Physical Education
Weighting: 1-1-1
Credits: 1

Complementary General Education Component

Social Sciences

Code: 000V

Objective

Standard

Statement of the Competency	Achievement Context
Estimate the contribution of the social sciences to an understanding of contemporary issues.	- Working alone - In an essay of approximately 750 words on the contribution of the social sciences to an understanding of contemporary issues - Using documents and data from the field of social sciences
Elements of the Competency	Performance Criteria
1. Recognize the focus of one or more of the social sciences and their main approaches.	- Formulation of the focus specific to one or more of the social sciences - Description of the main approaches used in the social sciences
2. Identify some of the issues currently under study in the social sciences.	Association of issues with the pertinent areas of research in the social sciences
3. Demonstrate the contribution of one or more of the social sciences to an understanding of contemporary issues.	- Presentation of contemporary issues by highlighting the interpretation of the social sciences - Illustration of the interaction between certain social changes and the contribution of the social sciences
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 300 or 400 series of codes (except codes 300 and 360) to link a course to objective 000V. Use code 305 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Social Sciences

Code: 000W

Objective**Standard**

Statement of the Competency	Achievement Context
Analyze one of the major problems of our time using one or more social scientific approaches.	• Working alone • In an essay of approximately 750 words on a topic related to human existence • Using reference materials from the field of social sciences
Elements of the Competency	Performance Criteria
1. Formulate a problem using one or more social scientific approaches.	• Presentation of the background to the problem • Use of appropriate concepts and language • Brief description of individual, collective, spatiotemporal and cultural aspects of the problem
2. Address an issue using one or more social scientific approaches.	• Clear formulation of an issue • Selection of pertinent reference materials • Brief description of historical, experimental and survey methods
3. Draw conclusions.	• Appropriate use of the selected method • Determination of appropriate evaluation criteria • Identification of strengths and weaknesses of the conclusions • Broadening of the issue analyzed
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 300 or 400 series of codes (except codes 300 and 360) to link a course to objective 000W. Use code 305 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Explain the general nature of science and technology and some of the major contemporary scientific or technological issues.	- Working alone - Using a written commentary on a scientific discovery or technological development - In an essay of approximately 750 words
Elements of the Competency	Performance Criteria
1. Describe scientific thinking and the standard scientific method.	- Brief description of the essential characteristics of scientific thinking, including quantification and demonstration - Ordered list and brief description of the essential characteristics of the main steps in the standard scientific method
2. Demonstrate how science and technology are complementary.	Definition of terms and description of the primary ways in which science and technology are interrelated: logical and temporal connections, and mutual contributions
3. Explain the context and the stages related to several scientific and technological discoveries.	- Pertinent and coherent explanation of the relationship between the determining contexts related to several scientific and technological discoveries - Listing of the main stages of scientific and technological discoveries
4. Deduce different consequences and questions resulting from certain recent scientific and technological developments.	- Brief description of important consequences (of different types) and the current major challenges resulting from several scientific and technological discoveries - Formulation of relevant questions and credibility of responses to the questions formulated
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 100 or 200 series of codes to link a course to objective 000X. Use code 105 for a multidisciplinary course. Codes 109, 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Resolve a simple problem by applying the basic scientific method.	- Working alone or in groups - Applying the standard scientific method to a given, simple scientific and technological problem - Using common scientific instruments and reference materials (written or other)
Elements of the Competency	Performance Criteria
1. Describe the main steps of the standard scientific method.	Ordered list and brief description of the characteristics of the steps of the standard scientific method
2. Formulate a hypothesis designed to solve a simple scientific and technological problem.	- Clear, precise description of the problem - Observance of the principles for formulating a hypothesis (observable and measurable nature of data, credibility, etc.)
3. Verify a hypothesis by applying the fundamental principles of the basic experimental method.	- Pertinence, reliability and validity of the experimental method used - Observance of established experimental method - Appropriate choice and use of instruments - Clear, satisfactory presentation of results - Validity of the connections established between the hypothesis, the verification and the conclusion
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 100 or 200 series of codes to link a course to objective 000Y. Use code 105 for a multidisciplinary course. Codes 109, 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Communicate with limited skill in a modern language.	• For modern Latin-alphabet languages: ○ during a conversation consisting of at least eight lines of dialogue ○ in a written text consisting of at least eight sentences • For modern non–Latin-alphabet languages: ○ during a conversation consisting of at least six lines of dialogue ○ in a written text consisting of at least six sentences • Based on learning situations on familiar themes • Using reference materials

Elements of the Competency	Performance Criteria
1. Understand the meaning of an oral message.	• Accurate identification of words and idiomatic expressions • Clear recognition of the general meaning of simple messages • Logical connection between the various elements of the message
2. Understand the meaning of a written message.	• Accurate identification of words and idiomatic expressions • Clear recognition of the general meaning of simple messages • Logical connection between the various elements of the message
3. Express a simple message orally.	• Appropriate use of language structures in main and coordinate clauses • Appropriate application of grammar rules • Use of verbs in the present indicative • Appropriate use of basic vocabulary and idiomatic expressions • Clear pronunciation • Coherent sequencing of simple sentences • Spontaneous and coherent sequencing of sentences in a conversation
4. Write a text on a given subject.	• Appropriate use of language structures in main and coordinate clauses • Appropriate application of basic grammar rules • Use of verbs in the present indicative • Appropriate use of basic vocabulary and idiomatic expressions • Coherent sequencing of simple sentences • Acceptable application of graphic rules for writing systems that do not use the Latin alphabet

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	The acquisition of a modern language requires an awareness of the culture of its native speakers. “Limited skill” refers to the limited use of language structures, grammar and vocabulary. This limitation varies depending on the complexity of the modern language. Use the 600 series of codes to link a course to objective 000Z, with the exception of codes 601, 602, 603 and 604.

Objective**Standard**

Statement of the Competency	Achievement Context
Communicate on familiar topics in a modern language.	• During a conversation that includes at least 15 lines of dialogue • In a written text consisting of at least 20 sentences for Latin-alphabet languages • In a written text consisting of at least 10 sentences for non–Latin-alphabet languages • Based on: • common situations in everyday life • simple topics from everyday life • Using reference materials

Elements of the Competency	Performance Criteria
1. Understand the meaning of an oral message.	• Accurate identification of words and idiomatic expressions • Clear recognition of the general meaning and essential ideas of messages of average complexity • Logical connection between the various elements of the message
2. Understand the meaning of a written message.	• Accurate identification of words and idiomatic expressions • Clear recognition of the general meaning and essential ideas of messages of average complexity • Logical connection between the various elements of the message
3. Express a simple message orally, using sentences of average complexity.	• Appropriate use of language structures in main or subordinate clauses • Appropriate application of grammar rules • Use of verbs in the present indicative • Appropriate use of enriched basic vocabulary and idiomatic expressions • Clear pronunciation • Coherent sequencing of sentences • Dialogue
4. Write a text on a given subject, using sentences of average complexity.	• Appropriate use of language structures in main or subordinate clauses • Appropriate application of grammar rules • Use of verbs in the present and past indicative • Appropriate use of enriched basic vocabulary and idiomatic expressions • Coherent sequencing of sentences of average complexity • Acceptable application of graphic rules for writing systems that do not use the Latin alphabet

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	The acquisition of a modern language requires an awareness of the culture of its native speakers. Use the 600 series of codes to link a course to objective 0010, with the exception of codes 601, 602, 603 and 604.

Modern Language

Code: 0067

Objective**Standard**

Statement of the Competency	Achievement Context
Communicate with relative ease in a modern language.	- Working alone - During a conversation consisting of at least 20 lines of dialogue - In a written text of medium length (at least 25 sentences for Latin-alphabet languages and 15 sentences for other languages) - Given documents of a socio-cultural nature - Using reference materials for the written text
Elements of the Competency	Performance Criteria
1. Understand the meaning of an oral message in everyday language.	- Accurate explanation of the general meaning and essential ideas of the message - Clear identification of structural elements of the language
2. Understand the meaning of a text of average complexity.	- Accurate explanation of the general meaning and essential ideas of the text - Clear identification of structural elements of the language
3. Have a conversation on a subject.	- Appropriate use of the structural elements of the language according to the message to be expressed - Appropriate use of everyday vocabulary - Accurate pronunciation and intonation - Normal flow in a conversation in everyday language - Coherence of the message expressed - Pertinent responses to questions
4. Write a text of average complexity.	- Appropriate use of the structural elements of the language according to the text to be written - Accurate vocabulary - Coherence of the text as a whole - Observance of presentation and writing rules applicable to the text
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	The acquisition of a modern language requires an awareness of the culture of its native speakers. Use the 600 series of codes to link a course to objective 0067, with the exception of codes 601, 602, 603 and 604.

Objective**Standard**

Statement of the Competency	Achievement Context
Recognize the role of mathematics or computer science in contemporary society.	- Working alone - In an essay of approximately 750 words - Using different personally selected concrete examples
Elements of the Competency	Performance Criteria
1. Demonstrate the acquisition of basic general knowledge of mathematics or computer science.	- Identification of basic notions and concepts - Identification of the main branches of mathematics or computer science - Appropriate use of terminology
2. Describe the evolution of mathematics or computer science.	Descriptive summary of several major phases
3. Recognize the contribution of mathematics or computer science to the development of other areas of knowledge.	Demonstration of the existence of important contributions, using concrete examples
4. Illustrate the diversity of mathematical or computer science applications.	Presentation of a range of applications in various areas of human activity, using concrete examples
5. Evaluate the impact of mathematics or computer science on individuals and organizations.	- Identification of several major influences - Explanation of the way in which mathematics or computer science have changed certain human and organizational realities - Recognition of the advantages and disadvantages of these influences
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Only the following codes can be used to link a course to objective 0011: 105, 201, 204, 420. Use code 204 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Use various mathematical or computer science concepts, procedures and tools for common tasks.	• Working alone • While carrying out a task or solving a problem based on everyday needs • Using familiar tools and reference materials
Elements of the Competency	Performance Criteria
1. Demonstrate the acquisition of basic functional knowledge in mathematics or computer science.	• Brief definition of concepts • Correct execution of basic operations • Appropriate use of terminology
2. Select mathematical or computing tools and procedures on the basis of specific needs.	• Listing of numerous possibilities available through the use of mathematical and computing tools and procedures • Analysis of concrete situations and recognition of the usefulness of mathematical or computing tools and procedures • Appropriate choice according to needs
3. Use mathematical or computing tools and procedures to carry out tasks and solve problems.	• Use of a planned and methodical process • Correct use of tools and procedures • Satisfactory results, given the context • Appropriate use of terminology specific to a tool or procedure
4. Interpret the quantitative data or results obtained using mathematical or computing tools and procedures.	• Accurate interpretation, given the context • Clear, precise formulation of the interpretation
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Only the following codes can be used to link a course to objective 0012: 105, 201, 204 and 420. Use code 204 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Consider various forms of art produced according to aesthetic practices.	- Working alone - Given a specified work of art - In a written commentary of approximately 750 words
Elements of the Competency	Performance Criteria
1. Develop an appreciation for the dynamics of the imagination in art.	Precise explanation of a creative process connected to the construction of an imaginary universe
2. Describe art movements.	Descriptive list of the main characteristics of three art movements from different eras, including a modern movement
3. Give a commentary on a work of art.	Coherent organization of observations, including identification of four fundamental elements of form and structure related to the language used as well as a reasoned description of the meaning of the work of art
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 500 series of codes (except 502) to link a course to objective 0013. Use code 504 for a multidisciplinary course. Codes 340, 345, 601, 602, 603 and 604 may be used, provided the courses are not related to the objectives of common or specific general education.

Objective**Standard**

Statement of the Competency	Achievement Context
Produce a work of art.	• Working alone • During a practical exercise • In the context of creating or interpreting a work of art • Using the basic elements of the language and techniques specific to the medium selected
Elements of the Competency	Performance Criteria
1. Recognize the primary forms of expression of an artistic medium.	• Identification of specific features: originality, essential qualities, means of communication, styles, genres
2. Use the medium.	• Personal, coherent use of elements of language • Satisfactory application of artistic techniques • Compliance with the requirements of the method of production
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 500 series of codes to link a course to objective 0014, with the exception of code 502. Use code 504 for a multidisciplinary course. Codes 340, 345, 601, 602, 603 and 604 may be used, provided the courses are not related to the objectives of common or specific general education.

Contemporary Issues

Code: 021L

Objective**Standard**

Statement of the Competency	Achievement Context
Consider contemporary issues from a transdisciplinary perspective.	• Individually or in groups • Drawing on different fields of knowledge • Using documents and data from various disciplines
Elements of the Competency	Performance Criteria
1. Identify major contemporary issues.	• Exploration of various contemporary issues • Description of the main perspectives concerning these issues • Clear formulation of objects to study related to these issues
2. Recognize the specific role of several disciplines in the understanding of an issue.	• Identification of some of the theories used in analyzing the issue • Clear description of the concepts and methods used
3. Demonstrate the contribution of several disciplines to the understanding of an issue.	• Clear formulation of the perspectives of the issue • Precise description of the main contributions of the disciplines • Pertinent explanation of the interaction among various disciplines • Appropriate use of language and concepts from the disciplines
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	This objective lends itself to teaching by one or more teachers. Use code 365 to link a course to objective 021L in order to maintain the transdisciplinary nature of the competency.

Objective**Standard**

Statement of the Competency	Achievement Context
Explore a contemporary issue from a transdisciplinary perspective.	• Individually or in groups • Drawing on different fields of knowledge • Using documents and data from various disciplines
Elements of the Competency	Performance Criteria
1. Present a research problem.	• Justification of the choice of research problem • Brief description of the main issues involved in the problem • Clear formulation of the main dimensions of the problem • Appropriate use of language and concepts from the disciplines • Clear formulation of the research question
2. Analyze the research problem.	• Relevant description of a research approach or method • Appropriate selection of research data • Proper application of the approach or method used • Appropriate use of an analytical framework
3. Propose solutions.	• Clear description of the main contributions from the disciplines • Pertinent explanation of the interaction among various disciplines • Justification of solutions proposed • Assessment of the strengths and weaknesses of the proposed solutions
Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	This objective lends itself to teaching by one or more teachers. Use code 365 to link a course to objective 021M in order to maintain the transdisciplinary nature of the competency.

Additional Information

Vocabulary Used in Technical Programs

Program

A program is an integrated set of learning activities leading to the achievement of education objectives based on set standards (*College Education Regulations*, s. 1). All college programs include a general education component common to all programs; a general education component adapted to the specific program; a complementary general education component; and a program-specific component (*College Education Regulations*, s. 6).

Competency

In the program-specific component of a technical program, a competency is defined as the ability to act, succeed and evolve in order to adequately perform tasks or work-related activities, based on an organized body of knowledge (including elements of knowledge, skills in a variety of fields, perceptions, attitudes, etc.) (*Élaboration des programmes d'études techniques, Cadre général – Cadre technique 2002*, p. 15).

Objective

An objective is defined as the competency, skills or knowledge to be acquired or mastered (*College Education Regulations*, s. 1). Each objective is formulated in terms of a competency and includes a statement of the competency and its elements. The achievement of objectives and respect for the standards ensure the acquisition or mastery of the college-level general education competencies.

Statement of the Competency

In the program-specific component of a technical program, the statement of the competency is the result of an analysis of the needs of the job situation, the general goals of technical training and (in some cases) other factors. In the general education components, it is the result of an analysis of the needs of general education.

Elements of the Competency

In the program-specific component of a technical program, the elements of the competency include only what is necessary in order to understand and master the competency. They refer to the major steps involved in performing a task or to the main components of the competency.

In the general education components, the elements of an objective, formulated in terms of a competency, specify the main aspects of the competency.

Periods of Instruction

A unit of account for the distribution of instructional time, i.e. the time spent by a student under the supervision of a teacher in a lecture, laboratory or practicum.

Standard

A standard is defined as the level of performance at which an objective is considered to be achieved (*College Education Regulations*, s. 1). In the program-specific component of a technical program, it is composed of an achievement context and performance criteria.

Performance Criteria

In the program-specific component of a technical program, the performance criteria define the requirements for determining whether the student has achieved each element of the competency and, by implication, the competency itself. The performance criteria are based on the requirements for entry into the workforce. Each element of the competency has at least one performance criterion.

In the general education component, the performance criteria define the requirements for recognizing the standard.

In both components, all criteria must be met to achieve the objective.

Achievement Context

In the program-specific component of a technical program, the achievement context corresponds to the situation in which the competency is implemented, upon entering the job market. The context does not define either the learning situation or the evaluation situation.

Learning Activities

In the program-specific component of a technical program, the learning activities are classes (or labs, workshops, seminars, practicums or other educational activities) designed to ensure the attainment of the targeted objectives and standards. Colleges are entirely responsible for defining the learning activities and applying the program-based approach.

In the general education components, the elements of the learning activities that may be determined in whole or in part by the Minister are the field of study, the discipline(s), the weightings, the number of contact hours, the number of credits and any details deemed essential.

Glossary

The *Electrical Engineering Technology: Automation and Control* program includes a glossary to clarify certain terms used in formulating the objectives and standards.

The main sources of information used to prepare the glossary were the *Grand dictionnaire terminologique* of the Office québécois de la langue française and the *Terminology and Linguistic Data Bank (TERMIUM Plus)* of the Government of Canada.

Archive (verb)

In a version control system, to transmit, validate and file, in a common workspace, duly marked changes made to files by one user for access by other users of the system.

Big data

Structured or unstructured data, the sheer volume of which requires adapted analysis tools. The unprecedented flows of information produced today give rise to new challenges for companies. Beyond the ever-growing volume of data, it is necessary to consider the speed, variety and quality of the information. This type of information is so extensive and complex that it has led to the definition of a new category: massive data, or "Big data."

Calibration

A calibration can be expressed by a statement, a calibration function, a calibration diagram, a calibration curve or a calibration table. In some cases, it consists of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Compliance

The action of observing a rule, respecting it, complying with it and applying it.

CSA

The Canadian Standards Association is a not-for-profit organization whose mission is to accredit and promote standards in Canada. It is a registered trademark. The abbreviation CSA is used in both English and French. The former French acronym ACNOR is no longer used.

Cyber-physical system

Cyber-physical systems are networked intelligent systems with embedded sensors, computers and actuators that allow them to perceive and interact with the physical world, including human operators.

Cybersecurity

The body of technologies, processes, practices and response and mitigation measures designed to protect networks, computers, programs and data from attack, damage or unauthorized access so as to ensure confidentiality, integrity and availability.

Dimensional analysis

Dimensional analysis is a practical method for verifying the homogeneity of a physical formula through its dimensional equations, i.e. the decomposition of the physical quantities it involves into a product of basic quantities: length, duration, mass, electric intensity, etc., all of which are irreducible.

Distributed control system

A system of sensors, controllers, and associated computers that are distributed throughout a plant. These individual elements communicate with a centralized computer through the plant's local area network.

Document (*verb*)

To provide someone with documentation about something; to support or back up a work with documents; to prepare documentation about a program or a system of programs.

Exteroceptive

Relating to, being, or activated by stimuli received by an organism from outside.

Flow chart

A graphic representation of a process or the step-by-step solution of a problem, using suitably annotated symbols connected by flow lines for the purpose of designing or documenting a process or program.

Functional description

Result of a functional analysis, which is a systematic investigation of the functions of a real or planned system.

Implement

To install software or a given subsystem by carrying out the adaptations necessary for their operation in a defined environment.

Industrial Programmable Controller

An Industrial Programmable Controller is used for controlling and monitoring manufacturing processes. The two types of Industrial Programmable Controllers are Programmable Logic Controllers (PLCs) and Programmable Automation Controllers (PACs).

Industrial robot

A mechanical device that can be programmed to perform some tasks of manipulation or locomotion under automatic control. There are different types of robots according to their mechanical structure, for example, rectangular/cartesian robot, cylindrical robot, polar (spherical) robot, revolute (articulated) robot, gantry robot, pendular robot, spine robot and Scara robot.

Intelligent electronic device (IED)

Microprocessor-based voltage regulators, protection relays, circuit breaker controllers, etc., with the capability of serial communication with other Intelligent Electronic Devices (IEDs).

Networking

Set of activities and techniques intended for creating, managing, operating and using telecommunication or computer networks.

OT/IT

operational technologies (OT) concern the monitoring and controlling of industrial equipment, information technologies (IT) concern business and enterprise systems that store, process, and deliver information including servers, networking devices, and end-point devices.

Process and procedure

A process can be a means used to produce something or a certain result, or a sequence of operations or phases leading to something or to a certain result.

A procedure is the set of rules or steps to be followed to achieve a result.

Robot end effector

A specialized device that refers to any of various tools that can be mounted at the end of the robotic arm and that can be used to interact with or manipulate objects.

Robotics

Robotics is a branch of engineering that involves the conception, design, manufacture and operation of robots.

Robot system

A system that includes the robot (hardware and software) consisting of the manipulator, power supply, and controller; the end effectors; any equipment, devices and sensors required for the robot to perform its task; and any communication interface that is operating and monitoring the robot, equipment and sensors.

Sensor

A device that measures a physical input from its environment and converts it to an electrical signal.

Specifications, estimate

A detailed description of the parts, materials and operations required to complete a production, construction, installation or repair, with estimated expenses.

Use (*verb*)

To put into action or service. Synonyms: apply, employ, harness, utilize.

User interface

The hardware or software through which an operator interacts with an industrial programmable controller. The user interface is also called a human machine interface (HMI).

WHMIS

The Workplace Hazardous Materials Information System (WHMIS) is a Canada-wide system to protect the health and safety of workers by promoting access to information about hazardous products used in the workplace. Created in 1988, it was modified in 2015 to incorporate the Globally Harmonized System (GHS) and is since referred to as WHMIS 2015.

Workshop, shop

Any place where instruction is given in the use of tools or machines or where tools or machines are used for repair, adjustment, or the manufacture of parts or equipment.

Harmonization

The Ministère de l'Éducation and the Ministère de l'Enseignement supérieur harmonize their vocational and technical programs by establishing similarities and continuity between secondary- and college-level programs within a particular sector or between sectors, in order to avoid overlap in program offerings, recognize prior learning and facilitate the students' progress.

Harmonization establishes consistency between training programs and is especially important in ensuring that the tasks of a trade or occupation are clearly identified and described. Harmonization makes it possible to identify tasks requiring competencies that are common to more than one program. Even if there are no common competencies, training programs are still harmonized.

Harmonization is said to be “inter-level” when it focuses on training programs at different levels, “intra-level” when it focuses on programs within the same educational level, and “inter-sector” when carried out between programs in various sectors.

An important aspect of harmonization is that it allows the common features of competencies to be identified and updated as needed. Common competencies are those that are shared by more than one program; once acquired in one program, they can be recognized as having been acquired in another. Competencies with exactly the same statement and elements are said to be identical. Common competencies that are not identical but have enough similarities to be of equal value are said to be equivalent.

Harmonization of the *Electrical Engineering Technology: Automation and Control* program has resulted in identifying competencies that are shared with other programs. Detailed information on the harmonization of this program and its results are presented in the document entitled *Tableaux d'harmonisation, Technologie du génie électrique: automatisation et contrôle*.

Occupational Health and Safety Hazards

This section expands on the risks associated with the competencies in the *Electrical Engineering Technology: Automation and Control* program.

The table below, “Sources and risk levels for each competency,” links competencies with the six sources of risk listed in the following typology. It also indicates whether the risk level is high or low. These levels of risk are provided for information purposes only since they vary depending on the operations carried out and the achievement context. The table serves as a guide for teachers to planning progressive learning activities, a way of organizing their teaching in compliance with occupational health and safety in the workplace.

Typology of occupational health and safety in the workplace with a list of dangers and hazardous situations:

- Chemical hazards or dangers:
 - Form of substance (solid, liquid, aerosol, gas, etc.) and exposure (inhalation, absorption through the skin, ingestion, etc.).
- Physical hazards or dangers:
 - Electrical hazards
 - Thermal hazards
 - Noise
 - Vibration
 - Other physical hazards
- Biological hazards or dangers:
 - Form of substance (dust, mist, fluid, etc.) and exposure (inhalation, absorption through the skin, ingestion, cuts, etc.).
- Ergonomic hazards or dangers:
 - Constrained postures
 - Excessive effort
 - Repetitive movements
- Safety hazards or dangers:
 - Hazards related to general mechanical phenomena
 - Hazards related to moving parts, tools or vehicles
 - Risk of falling (workers and objects)
 - Hazards linked to confined spaces
 - Fire or explosion hazards
 - Violence in the workplace
- Psychosocial hazards or dangers:
 - Factors associated with the nature of the work
 - Factors related to the organization of the work
 - Social factors

TABLE: SOURCES AND RISK LEVELS FOR EACH COMPETENCY

COMPETENCY NUMBER	ELECTRICAL ENGINEERING TECHNOLOGY: AUTOMATION AND CONTROL	Sources of risk					
		Chemical hazards or dangers	Physical hazards or dangers	Biological hazards or dangers	Ergonomic hazards or dangers	Psychosocial hazards or dangers	Safety hazards or dangers
	STATEMENT OF THE COMPETENCY	1	2	3	4	5	6
1	Explore the profession.	○	○	○	○	○	○
2	Use mathematics in electrical engineering.	○	●	○	○	○	○
3	Intervene in matters of health and safety.	○	○	○	○	○	○
4	Diagnose problems on electronic circuits	○	●	○	○	○	●
5	Connect the elements of an industrial measuring chain.	●	●	○	○	○	●
6	Characterize the elements of an electrical network and/or an industrial electrical installation.	○	●	○	○	○	●
7	Create electrical engineering schematics.	○	○	○	○	○	○
8	Use workshop tools and machines in an industrial environment.	●	●	○	○	●	●
9	Determine the physical variables of industrial equipment.	○	●	○	○	○	○
10	Ensure the operation of an industrial motor drive system.	○	●	○	○	●	●
11	Program an industrial programmable controller in a discrete (on/off) control mode.	○	●	○	○	○	○
12	Use information and operation technologies.	○	●	○	○	○	○
13	Program an industrial programmable controller and/or a distributed control system in a continuous (analog) control mode.	○	●	○	○	○	○
14	Install control panels and/or power equipment.	○	●	○	○	●	●
15	Integrate an industrial programmable automation controller and/or a distributed control system into an automated system.	○	●	○	○	●	○
16	Install a control loop.	●	●	○	○	●	○
17	Integrate a positioning system.	○	○	○	○	●	○
18	Program an industrial robot.	○	●	○	○	○	○
19	Integrate safety components into an automated system.	○	○	○	○	●	○
20	Maintain industrial equipment and systems.	○	●	○	○	○	○
21	Integrate robotics equipment into an automated system.	○	○	○	○	○	○
22	Commission industrial equipment and/or systems.	○	○	○	○	○	○
23	Troubleshoot industrial equipment and/or systems.	○	●	○	○	○	○
24	Contribute to the design or modification of industrial equipment or systems.	○	○	○	○	○	○

Risk levels

Risk levels are indicated according to their frequency, duration or intensity, and not according to the severity of their effects on personal health and safety.

Low risk: ○ High risk: ●

