Technical Training Program

243.C0

Industrial Electronics Technology

Training Sector

9

Electrotechnology

Québec

Technical Training Program

243.C0

Industrial Electronics Technology

Training Sector 9 Electrotechnology

Formation professionnelle et technique
et formation continue

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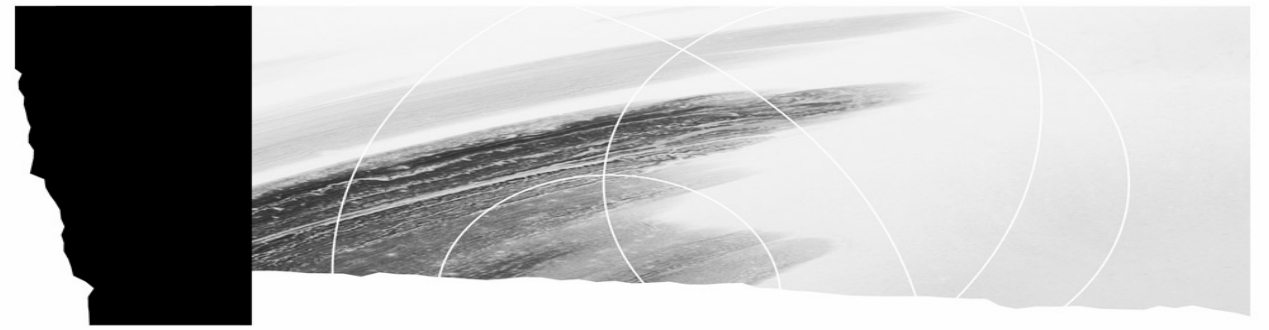


243.C0

Industrial Electronics Technology

Year of approval: 2007

Certification:	Diploma of College Studies
Number of credits:	91 2/3 credits
Total duration:	2 715 hours of instruction

General education components:	660	hours of instruction
Program-specific component:	2 055	hours of instruction

Admission Requirements:

To be admitted to the program, a person must meet the general requirements for admission set out in section 2 of the *College Education Regulations*, as well as the following special conditions, where applicable:

- Mathematics 436
- Physical Science 436

Introduction to the Program

The Industrial Electronics Technology program is in keeping with the aims and orientations of technical training that guide the Ministère de l'Éducation, du Loisir et du Sport. Designed in accordance with the framework for developing technical programs, this program is based on competencies, formulated in terms of objectives and standards.

The Industrial Electronics Technology program includes a general education component common to all programs (16 2/3 credits), a general education component adapted to this program (6 credits), a complementary general education component (4 credits) and a program-specific component of 65 credits.

The program-specific component was also designed according to the framework for developing technical programs. This approach requires the participation of people working in the 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 the 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 a trade or occupation, but also a range of knowledge, skills and attitudes that will ensure the students' versatility.

General Education Component Common to All Programs (16 2/3 credits)

0004 To analyze and produce various forms of discourse.

0005 To apply a critical approach to literary genres.

0006 To apply a critical approach to a literary theme.

00B2 To apply a logical analytical process to how knowledge is organized and used.

000G To apply a critical thought process to world-views.

0017 Appliquer les notions de base de la communication en français courant.

or

000A Communiquer en français avec une certaine aisance.

or

000B Communiquer avec aisance en français.

or

000C Traiter d'un sujet culturel et littéraire.

0064 To establish the role that being physically active plays amongst the lifestyle behaviours which promote health.

0065 To improve one's effectiveness when practising a physical activity.

0066 To demonstrate one's responsibility for being physically active in a manner which promotes health.

General Education Component Adapted to This Program (6 credits)

000L To communicate in the forms of discourse appropriate to one or more fields of study.

000U To apply a critical thought process to ethical issues relevant to the field of study.

0018 Appliquer des notions fondamentales de la communication en français, liées à un champ d'études.

or

000Q Communiquer en français dans un champ d'études particulier.

or

000R Communiquer avec aisance en français dans un champ d'études particulier.

or

000S Disserter en français sur un sujet lié au champ d'études.

Complementary General Education Component (4 credits)

000V To estimate the contribution of the social sciences to an understanding of contemporary issues.

000W To analyze one of the major problems of our time using one or more social scientific approaches.

000X To explain the general nature of science and technology and some of the major contemporary scientific or technological issues.

000Y To resolve a simple problem by applying the basic scientific method.

000Z To communicate with limited skill in a modern language.

0010 To communicate on familiar topics in a modern language.

0067 To communicate with relative ease in a modern language.

0011 To recognize the role of mathematics or informatics in contemporary society.

0012 To use various mathematical or computer concepts, procedures and tools for common tasks.

0013 To consider various forms of art produced by aesthetic practices.

0014 To produce a work of art.

Program-Specific Component **(65 credits)**

042Y To process information about places in which industrial electronics technicians work.
042Z To do shop work.
0431 To manage and use a computer station in an industrial setting.
0432 To produce industrial electronics drawings.
0433 To plan work activities.
0434 To install devices in a control system.
0435 To solve mathematical problems in industrial electronics.
0436 To verify extra-low voltage signals and power supplies.
0437 To inspect power electronics equipment.
0438 To analyze the operation of a process.
0439 To operate control systems.
043A To program control units.
043B To adjust the devices in the measuring chain.
043C To adjust the final controlling elements.
043D To program a supervisory system.
043E To help start up a control system.
043F To do preventive maintenance on control system equipment.
043G To troubleshoot a control system.
043H To participate in the design of a control project.

Glossary

Program

A program is an integrated set of learning activities leading to the achievement of educational objectives based on set standards (*College Education Regulations,* section 1).

Competency

In the program-specific component of a technical program: a competency is the ability to act successfully and evolve in order to adequately perform work-related tasks and activities based on an organized body 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 encompasses the competency, skills or knowledge to be acquired or mastered (*College Education Regulations,* section 1). It describes the competency to be acquired and includes the statement of the competency as well as the elements needed to understand it.

Statement of the Competency

In the program-specific component of a technical program, a statement of the competency is derived from the job analysis, the general goals of technical education and, in certain cases, other determinants. In the general education components, the statement of the competency is the result of an analysis of general education needs.

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 the competency. They specify the major steps involved in carrying out a task or the main aspects of the competency.

In the general education components, the elements of the objective, formulated in terms of a competency, specify the main aspects of the competency. They include only what is necessary in order to understand and attain the competency.

Standard

A standard is the level of performance at which an objective is considered to be achieved (*College Education Regulations,* section 1).

Achievement Context

In the program-specific component of a technical program, the achievement context corresponds to the situation in which the competency is exercised at entry level on the job market. The achievement context does not specify the context for learning or evaluation.

Performance Criteria

In the program-specific component of a technical program, the performance criteria define requirements by which to judge the attainment of each element of the competency and, consequently, of the competency itself. The performance criteria are based on the requirements at entry level on the job market. The performance criteria are not the evaluation instrument but, rather, they serve as a reference for the development of the evaluation instrument. Each element of the competency requires at least one performance criterion.

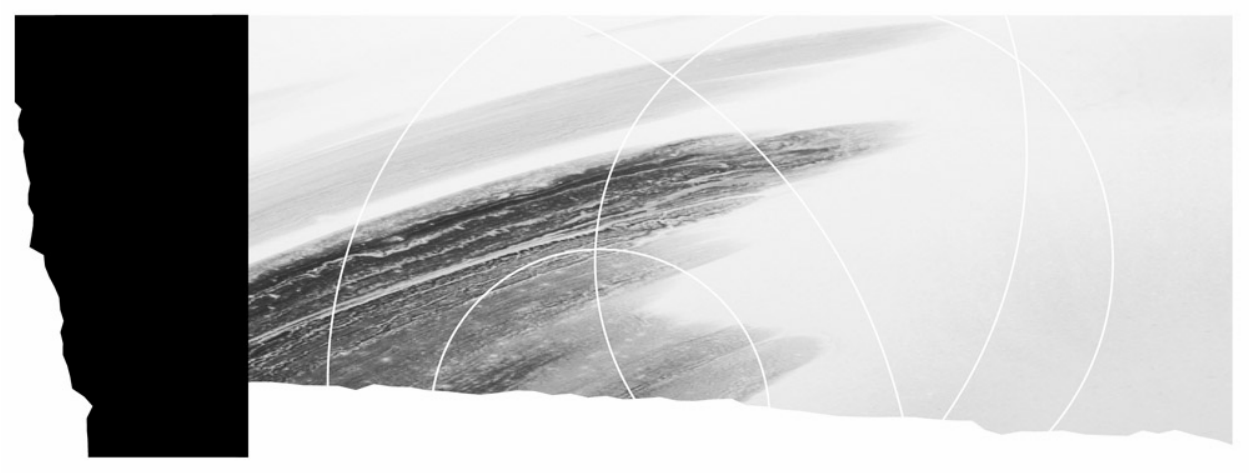
In the general education components, the performance criteria define the requirements for recognition of the attainment of the standard.

All the criteria must be respected for the objective to be recognized as having been attained.

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 organizing the way in which programs are offered.

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 total hours of instruction, the number of credits and any details deemed essential.



Part I

Goals of the General Education Components

Educational Aims of the General Education Components

Objectives and Standards of the General Education Components

Goals of the General Education Components

In Québec, college is the next stage after the compulsory years of schooling in elementary and secondary school, during which students acquire basic knowledge and skills. It represents a major crossroads in that it places greater emphasis on the cultural content of education and leads directly to the job market or to university. The college system meets current needs with respect to technical and pre-university education. It allows students to further their education without narrowing their options, since they may switch from one type of program to the other. Finally, it provides students with a well-rounded, balanced education.

General education is an integral part of every program and comprises three components: a component common to all programs, a component adapted to the particular program and a complementary component. The aim of general education is threefold: to provide students with a common cultural core, to help them learn and develop generic skills, and to foster desirable qualities and attitudes. Its purpose is to educate students as individuals, to prepare them for their role as responsible members of society and to enable them to share in the common cultural heritage.

Common Cultural Core

The common cultural core is intended to help students:

- master the language of instruction as a tool for communication and reflection
- master the basic rules of rational thought, discourse and argumentation
- communicate in another language, primarily French or English
- be open to the world and to cultural diversity
- appreciate the riches of our cultural heritage through awareness of the accomplishments of human civilization
- relate to major currents in the history of human thought
- think independently and critically
- develop personal and social ethics
- acquire the knowledge essential for their physical and intellectual well-being
- become aware of the need to develop habits conducive to good health

Generic Skills

General education allows students to acquire and develop the following generic skills:

- conceptualization, analysis and synthesis
- coherent reasoning
- critical judgment
- articulate expression
- the ability to apply what they have learned to the analysis of situations
- the ability to apply what they have learned to decision making
- work methods
- the ability to reflect on what they have learned

Desirable Qualities and Attitudes

The common cultural core and generic skills help students acquire and develop the following qualities and attitudes:

- autonomy
- a critical sense
- awareness of their responsibilities toward themselves and others
- open-mindedness

- creativity
- openness to the world

These goals apply to the three general education components:

- General education component common to all programs, which is allotted 16 2/3 credits distributed as follows:

  – language of instruction and literature: 7 1/3 credits
  – humanities or *philosophie*: 4 1/3 credits
  – physical education: 3 credits
  – second language: 2 credits

- General education component adapted to programs, which introduces tasks or learning situations that are relevant to the program-specific component of a program. The breakdown of credits, for a total of 6, is as follows:

  – language of instruction and literature: 2 credits
  – humanities or *philosophie*: 2 credits
  – second language: 2 credits

- Complementary general education component, which provides students with learning activities chosen to balance their training and complement the program-specific component. Students may choose courses for a total of 4 credits in the following areas:

  – social sciences
  – science and technology
  – modern languages
  – mathematics literacy and computer science
  – art and aesthetics

The knowledge and skills acquired in the general education components should be emphasized and, whenever possible, applied in the program-specific component, and vice-versa. Thus, general education and the program-specific component of a program enhance each other as they contribute to the students' overall education.

Each college-level institution must provide general education through learning activities that are consistent with its educational project, in keeping with the aims, subject areas and ministerial guidelines provided.

The objectives and standards in the general education components were developed according to the provisions of the *College Education Regulations* (R.S.Q., c. C-29, s. 18).

Educational Aims of the General Education Components

The educational aims describe how each field of study in the common, adapted and complementary components of general education contributes to achieving the goals of general education. For the common and adapted components, the educational aims include a general statement of the role of each field of study; the principles underlying this role; the expected outcomes that define, in terms of cultural knowledge, generic skills, and qualities and attitudes, the contribution of each field to the achievement of the goals of general education; and an explanation of the sequence of objectives and standards.

General Education Common to All Programs and General Education Adapted to Programs

English, Language of Instruction and Literature

General Education Common to All Programs

The three sets of objectives and standards in English, Language of Instruction and Literature, pursue two general goals: mastery of the language of instruction and exploration of the riches of the literary heritage. Achievement of these goals is intended to bring the students to a college level of proficiency in the areas of reading, writing, listening and speaking. Building on the skills developed by students on completion of secondary school, the English program places a marked emphasis on written production and reading comprehension while at the same time consolidating listening and speaking skills.

The mastery of language skills will be achieved through regular and ongoing observance of the rules of correct writing and speaking and the production of texts, supported by reading and the study of literature. Students will also be encouraged to develop an appreciation of literature by becoming acquainted with a number of significant literary works representative of various genres and periods and expressing a variety of literary themes. Both the aesthetic and cultural value of these texts and their formal aspects will be the objects of study.

All students entering college will begin their English studies with an introductory set of objectives and standards. This set has two possible formats. While both provide a range of reading, writing and literary activities, one includes additional reinforcement of reading and writing skills.

General Education Adapted to Programs

The set of objectives and standards for English, Language of Instruction and Literature, is placed in the context of general education and is a complement to the general education common to all programs. Students will develop the skills required in order to communicate in the forms of discourse appropriate to their field of study.

Expected Outcomes

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

- demonstrate a college level of proficiency in the areas of reading, writing, listening and speaking
- develop their own ideas into arguments and theses, organize them and edit their work
- understand basic vocabulary and terminology used when discussing literature
- analyze literary works

Humanities

Humanities, as part of the core curriculum, is intended to promote personal and social development and to give students a foundation that will help them understand their roles in contemporary society as members of the labour force, citizens and individuals. The three sets of objectives and standards in Humanities propose common frameworks for understanding the experiences, ideas and values of human beings and their diversity. They are aimed at developing critical thinking, reinforcing the ancillary skills involved in careful reading, organized writing, and well-developed oral presentations and, where appropriate, improving media and computer literacy. Once students have mastered the three-stage process of analysis, synthesis and evaluation, they will be able to reflect in an informed manner and to communicate what they have learned in an organized and coherent fashion.

Principles

1) Humanities constitutes a thematic, multidisciplinary, at times transdisciplinary, exploration of the human experience, including its accomplishments, failures, abilities, creations, ideas and values.
2) Humanities helps students to recognize, define and classify information and provides them with common frameworks for diverse methods of analyzing, synthesizing and evaluating conceptions of society, knowledge and values.
3) Humanities aims to prepare students for common civic responsibilities and the exercise of rights.
4) Humanities pursues the general goal of developing critical thought, valuing it and recognizing its limitations.

Expected Outcomes

Students who have achieved the general education objectives in Humanities will be able to:

- describe, explain and organize 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
- 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

Sequence of Objectives and Standards

The first two sets of objectives and standards in Humanities, which are part of the general education component common to all programs, develop similar skills in a recursive fashion.

In the first set the emphasis is on how knowledge is defined, acquired, classified, transmitted and applied. Students examine both messages and media to identify the strengths and limitations of each. Students learn to situate knowledge in a social, historical and personal context, a skill they will need in order to become lifelong learners.

The second set focuses on how individuals, groups, societies or nations organize ideas, perceptions and values into explanatory patterns. Students explore major ideas and value systems by which diverse individuals, groups, societies or nations seek to explain the world and their place in it.

The third set, which is part of the general education component adapted to programs, is aimed at deepening and reinforcing the critical thinking skills developed in the first two sets. It is, therefore, sequenced so that students can build on the critical skills, knowledge and insights developed in the first two sets. By situating these issues in their appropriate world-view and knowledge contexts, students

develop a critical and autonomous approach to ethical values in general and to the values involved in their own fields of interest in particular. This final set also provides students with an opportunity to consolidate personal and social values.

Français, langue seconde

L'enseignement du français, langue seconde, contribue à la formation fondamentale de la personne, en même temps qu'il a pour objet de lui permettre de communiquer efficacement avec ses concitoyens et concitoyennes.

Principes

1) La maîtrise du français, langue seconde, est essentielle pour quiconque veut participer pleinement à la vie de la société québécoise, dont le français est la langue officielle. En conséquence, la formation générale en français, langue seconde, a pour finalité de rendre les étudiants et les étudiantes aptes à utiliser de façon efficace les moyens dont dispose la langue pour communiquer en société. À cette fin, ils devront acquérir des connaissances en vue de les déployer dans les formes de discours qu'il leur faudra pratiquer.
2) À leur arrivée au collégial, les étudiants et les étudiantes ont déjà acquis des compétences dans les quatre habiletés langagières, à savoir : parler, lire, écouter et écrire, mais sont, de façon générale, plus compétents en matière d'expression orale. En conséquence, la formation porte sur le développement des quatre habiletés langagières tout en mettant l'accent sur la lecture et l'écriture.
3) En tant que partie intégrante de la formation générale, le français, langue seconde, contribue au développement de la pensée critique et de l'expression structurée.

Résultats attendus

Tout étudiant ou toute étudiante qui a atteint les objectifs de formation générale en français, langue seconde, pourra, selon son niveau de compétence, montrer :

- que, sur le plan des connaissances, il ou elle :
  - sait faire une présentation orale structurée;
  - connaît les différentes formes du discours;
  - connaît les différentes techniques de lecture et d'écriture;

- que, sur le plan des habiletés, il ou elle :
  - est capable de questionner, d'analyser, de juger, et d'argumenter en français;
  - est apte à entretenir des rapports sociaux et à partager la vie culturelle du Québec;
  - est apte à établir, à poursuivre et à pratiquer des rapports professionnels en français;

- que, sur le plan des qualités et des attitudes à développer, il ou elle :
  - fait preuve d'ouverture par rapport aux différents aspects de la culture québécoise;
  - a conscience des différences et des similitudes entre sa culture d'origine et la culture québécoise francophone;
  - a la préparation voulue pour s'insérer dans la vie sociale et économique.

Séquence des objectifs et des standards

Pour répondre aux divers besoins d'apprentissage des étudiants et des étudiantes du collégial, les ensembles en français, langue seconde, sont répartis selon quatre niveaux. Chacun de ces niveaux permet d'amener les étudiants et les étudiantes à interpréter et à produire des textes de plus ou moins grande complexité.

La formation générale en français, langue seconde, comporte deux ensembles prévus en séquence. Le premier, qui fait partie de la formation générale commune à tous les programmes, a pour objet de

consolider les connaissances linguistiques déjà acquises et de les développer pour amener les étudiants et les étudiantes à communiquer de façon plus précise sur le plan tant du vocabulaire et de la syntaxe que de l'organisation textuelle.

Le second ensemble, qui fait partie de la formation générale propre aux programmes, s'appuie sur les acquis développés dans le premier ensemble en les enrichissant d'éléments de compétence liés aux champs d'études de l'étudiant ou de l'étudiante. On cherche à développer la précision de l'expression dans des situations de communication particulières qui relèvent du champ d'études de l'étudiant ou de l'étudiante.

Physical Education

Physical Education is aimed at promoting the development of the whole person and encouraging students to acquire responsible behaviours with respect to their health and quality of life.

Principles

1) Physical Education introduces students to different ways of being physically active with a view to making them aware that they are responsible for their health. Students learn concepts and acquire knowledge drawn from research, and methodically apply them to physical activities that will lead them to adopt healthy lifestyle practices.
2) Physical Education enables students to improve their efficiency in an activity and, in doing so, serves to increase their motivation and perseverance to remain physically active, and makes them aware of the contributing factors. To this end, students use a learning process designed to enhance their aptitudes (i.e. their skills and attitudes) for a given physical activity.
3) Physical Education helps students take responsibility for their own health through the maintenance and improvement of their physical fitness and through the sensible practice of physical activity. Students learn to combine being physically active in an effective manner with other factors that promote health.
4) Physical Education makes students aware of the importance of sharing the knowledge and behaviours they have acquired. The pleasure and sense of well-being students get out of Physical Education classes motivate them to encourage others to be physically active and to adopt healthy practices.

Expected Outcomes

Students who have achieved the general education objectives in Physical Education will be able to demonstrate:

- their knowledge of:
  - the relationship between physical activity, lifestyle and health based on the findings of scientific research
  - the scientific principles for improving or maintaining physical fitness
  - ways to assess their abilities and needs with respect to activities that can improve their health
  - the rules, techniques and conditions involved in different types of physical activity
  - a method for setting goals
  - the factors that help make physical activity part of their lifestyle

- the skills that will enable them to:
  - choose physical activities on the basis of their motivation, abilities and needs
  - establish relationships between lifestyle and health
  - apply the rules, techniques and conditions involved in different types of physical activity
  - set goals that are realistic, measurable, challenging, and situated within a specific time frame

  - improve their mastery of the basic techniques, tactics and strategies associated with sports, outdoor and expression-oriented activities
  - use their creative and communication skills, particularly in group activities
  - evaluate their skills, attitudes and progress with respect to different forms of physical activity
  - maintain or increase their level of physical activity and fitness on their own
  - manage a personal physical activity program and assume responsibility in the organization of physical activities

- the attitudes and qualities that will enable them to:
  - understand the importance of taking responsibility for their health
  - be aware of the need to evaluate and respect their abilities and the conditions for carrying out an activity, before undertaking the activity
  - recognize the importance of self-confidence, self-control, respect for others and cooperation, through knowledge they have acquired and through participation in physical activity
  - respect the environment in which the activities are held
  - appreciate the aesthetic and play value of physical activity
  - promote a balanced and active lifestyle as a social value

Sequence of Objectives and Standards

The three sets of objectives and standards in Physical Education are designed in a learning sequence. The first two are prerequisites for the third.

The first set focuses on the relationship between health and physical activity as related to a healthy lifestyle. Students are required to try one or more activities and to relate them to their abilities, needs, motivation, lifestyle and knowledge of health prevention. This enables them to make an appropriate and justified choice of activities.

The second set looks at the improvement of effectiveness through the use of a goal-oriented approach in a sports, outdoor or expression-oriented activity. After making an initial assessment of their abilities and attitudes, students are called upon to evaluate them with respect to a physical activity, to set goals and to interpret their progress.

The third set is aimed at helping students integrate physical activity into their lifestyle, more particularly through more effective management of factors that facilitate such integration. During the hours of instruction, students apply the knowledge they have acquired in the first two sets of objectives. This is done through the safe and effective practice of physical activity and through the development, realization and evaluation of a personal physical activity program, which students follow and validate under their teacher's supervision. The hours allotted for individual work enable students to complete their personal programs.

Complementary General Education

Social Sciences

The two sets of objectives and standards aim to familiarize students with the social sciences and their particular approach to the human condition.

The first set supports learning activities that allow students to look at one or more of the social sciences in relation to major contemporary issues: subjects studied in the social sciences; contribution of the social sciences to an understanding of contemporary issues; issues facing the social sciences in the future.

The second set supports learning activities in the social sciences that allow students to rigorously analyze one of the major problems of our time, using one or more social scientific approaches.

Science and Technology

In Science and Technology, the educational aim is to present science and technology as a specific approach to reality in order to familiarize students with this field of knowledge. This general intention can take several forms, such as helping students gain experience with the scientific method or study the evolution, challenges and consequences of scientific and technological discoveries.

The first set of objectives and standards emphasizes the general nature and scope of science and technology. The second set emphasizes using the scientific method.

Modern Languages

The three sets of objectives and standards in Modern Languages introduce students to the basic language structures and vocabulary of a third language while making them aware of the culture of the people who speak the language.

Because some modern languages use different structures and writing systems, the three sets of objectives and standards have been designed accordingly. The degree of competency acquisition will therefore vary according to how distant the language is from our own language or system of thought. Furthermore, awareness of the culture of the people using a modern language does not figure as an element of competency, since learning a modern language necessarily implies developing such awareness.

Mathematics Literacy and Computer Science

In Mathematics Literacy and Computer Science, the two sets of objectives and standards are based on the aim of developing mathematical and computer culture.

The educational aim of the first set is to lead students to consider the place, role and evolution of this knowledge and these tools in our society and to describe their different uses. It consists of general education about the language of mathematics or computers, and does not include specialized training.

The second set targets the understanding and use of the language of mathematics or computers for everyday purposes. This intention refers mainly to the concepts, tools and general uses of mathematical or computer language in daily life.

Since the objectives and standards for the field of mathematics literacy and computer science are quite general, they can be used to define various learning activities that foster the development of competencies in mathematics or computer science, or in a combination of these two areas.

Art and Aesthetics

The educational aim of Art and Aesthetics is to help students to acquire general cultural knowledge by exploring various forms of art in one or more artistic fields. This basic education is intended to develop an artistic sensibility through exposure to works of art or experimentation in an artistic medium. Furthermore, it aims to teach the basic elements of the language of art and to enable students to make connections between those elements.

Through the first set of objectives and standards, students are introduced to works of art from contemporary culture and from other periods. This allows them to develop an appreciation for the dynamics of the imagination in art and to learn methods of analyzing artistic production.

Though the second set, students engage in creative or interpretive activities in a given artistic medium. As well, students are introduced to artistic works in that medium so that they may learn to recognize its primary forms of expression.

Language of Instruction and Literature	Code: 0004

Objective *Standard*

Statement of the Competency

To analyze and produce various forms of discourse.

Elements of the Competency	Performance Criteria
1. To identify the characteristics and functions of the components of discourse.	• 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. To determine the organization of facts and arguments of a given discourse.	• Clear and accurate recognition of the main idea and structure • Clear presentation of the strategies employed to develop an argument or thesis
3. To 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. To 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. To edit the discourse.	• Thorough revision of form and content

Learning Activities

Discipline:	English
Weighting:	2-2-4 or 1-3-4
Credits:	2 2/3

Language of Instruction and Literature	Code: 0005

Objective *Standard*

Statement of the Competency

To apply a critical approach to literary genres.

Elements of the Competency	Performance Criteria
1. To distinguish genres of literary discourse.	• Clear recognition of the formal characteristics of a literary genre
2. To 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. To situate a discourse within its historical and literary period.	• Appropriate recognition of the relationship of a text to its period
4. To explicate a discourse representative of a literary genre.	• Selective use of appropriate terminology • Effective presentation of a 1000-word integrated response to a text

Learning Activities

Discipline:	English
Weighting:	2-2-3
Credits:	2 1/3

Language of Instruction and Literature	Code: 0006

Objective	***Standard***

Statement of the Competency

To apply a critical approach to a literary theme.

Elements of the Competency	**Performance Criteria**
1. To 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. To 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. To detect the value system inherent in a literary text.	• Appropriate identification of expression (explicit/implicit) of a value system in a text
4. To explicate a text from a thematic perspective.	• Selective use of appropriate terminology • Effective presentation of a 1000-word integrated response to a text

Learning Activities

Discipline:	English
Weighting:	2-2-3
Credits:	2 1/3

Humanities	Code: 00B2

Objective	***Standard***

Statement of the Competency

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

Elements of the Competency	**Performance Criteria**
1. To recognize the basic elements of a field of knowledge.	• Appropriate description of the basic elements • Appropriate use of terminology relevant to fields of knowledge
2. To define the modes of organization and utilization of a field of knowledge.	• Adequate definition of the dimensions, limits and uses of fields of knowledge
3. To situate a field of knowledge within its historical context.	• Accurate identification of the main components in the historical development of fields of knowledge • Accurate description of the effects of historical development and societal milieu on the limitations and uses of a field of knowledge
4. To organize the main components into coherent patterns.	• Coherent organization of the main components
5. To 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

Learning Activities

Discipline:	Humanities
Weighting:	3-1-3
Credits:	2 1/3

Humanities	Code: 000G

Objective *Standard*

Statement of the Competency

To apply a critical thought process to world-views.

Elements of the Competency	Performance Criteria
1. To 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. To explain the major ideas, values and implications of a world-view.	• Adequate explanation of the salient components of a world-view
3. To 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. To 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

Learning Activities

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

Langue seconde (niveau I) Code: 0017

Objective	***Standard***

Statement of the Competency

Appliquer les notions de base de la communication en français courant.

Elements of the Competency	**Performance Criteria**
1. Dégager le sens d'un message oral simple.	• Repérage précis des difficultés de compréhension du message. • Utilisation pertinente des techniques d'écoute choisies. • Distinction précise du sens général et des idées essentielles du message. • Description précise du sens général et des idées essentielles du message.
2. Émettre un message oral simple.	• Repérage précis des difficultés d'expression. • Utilisation pertinente des techniques d'expression orales choisies. • Emploi pertinent du vocabulaire courant. • Expression intelligible du propos.
3. Dégager le sens d'un texte.	• Repérage précis des difficultés de compréhension du texte. • Utilisation pertinente des techniques de lecture choisies. • Distinction claire des principaux éléments du texte. • Description précise du sens général et des idées essentielles d'un texte de 500 mots.
4. Rédiger un texte simple.	• Repérage précis des difficultés d'écriture. • Utilisation pertinente des techniques d'écriture choisies. • Emploi pertinent du vocabulaire courant. • Formulation claire et cohérente d'un texte de 100 mots.

Learning Activities

Discipline: Français, langue seconde
Weighting: 2-1-3
Credits: 2

Langue seconde (niveau II) — Code: 000A

Objective	***Standard***

Statement of the Competency

Communiquer en français avec une certaine aisance.

Elements of the Competency	**Performance Criteria**
1. Interpréter un texte oral simple de trois minutes en français courant.	• Distinction claire des principaux éléments du texte oral. • Explication précise du sens des mots dans le texte. • Repérage précis des idées et des sujets traités dans le texte.
2. Produire un texte oral planifié de cinq minutes en français courant.	• Emploi pertinent du vocabulaire courant. • Respect du niveau de langue, du code grammatical et des règles de la prononciation. • Formulation claire et cohérente du propos.
3. Interpréter un texte écrit en français courant.	• Distinction claire des principaux éléments du texte. • Explication précise du sens des mots dans le texte. • Repérage précis des idées principales et de la structure d'un texte de 700 à 1000 mots.
4. Rédiger un texte simple en français courant.	• Respect du code grammatical et orthographique. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente des phrases. • Articulation cohérente des paragraphes. • Rédaction d'un texte de 200 mots.

Learning Activities

Discipline:	Français, langue seconde
Weighting:	2-1-3
Credits:	2

Langue seconde (niveau III) Code: 000B

Objective ***Standard***

Statement of the Competency

Communiquer avec aisance en français.

Elements of the Competency	Performance Criteria
1. Produire un texte oral planifié de cinq minutes de complexité moyenne.	• Emploi pertinent du vocabulaire courant. • Adaptation à l'interlocuteur ou à l'interlocutrice • Respect du niveau de langue, du code grammatical et des règles de la prononciation. • Formulation claire et cohérente du propos. • Agencement pertinent des idées.
2. Commenter un texte écrit de complexité moyenne.	• Distinction claire des principaux éléments d'un texte comprenant entre 2 500 et 3 000 mots. • Explication précise du sens des mots dans le texte. • Distinction précise des idées principales et secondaires, des faits et des opinions. • Formulation d'éléments implicites.
3. Rédiger un texte de complexité moyenne.	• Respect du code grammatical et orthographique. • Adaptation au lecteur ou à la lectrice. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente des phrases, dont au moins trois sont complexes. • Articulation cohérente des paragraphes. • Rédaction d'un texte de 350 mots.

Learning Activities

Discipline: Français, langue seconde
Weighting: 2-1-3
Credits: 2

Langue seconde (niveau IV)	Code: 000C

Objective	***Standard***

Statement of the Competency

Traiter d'un sujet culturel et littéraire.

Elements of the Competency	**Performance Criteria**
1. Analyser un texte culturel ou littéraire.	• Formulation personnelle des éléments principaux du texte. • Inventaire des thèmes principaux. • Relevé d'indices qui permettent de situer le texte dans son contexte socioculturel et historique. • Repérage des valeurs véhiculées. • Repérage juste de la structure du texte. • Articulation claire d'un point de vue personnel.
2 Rédiger un texte sur un sujet culturel ou littéraire.	• Respect du sujet. • Respect du code grammatical et orthographique. • Adaptation au lecteur ou à la lectrice. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente d'un texte de 500 mots. • Articulation claire d'un point de vue personnel.

Learning Activities

Discipline:	Français, langue seconde
Weighting:	3-0-3
Credits:	2

Physical Education	Code: 0064

Objective *Standard*

Statement of the Competency

To establish the role that being physically active plays amongst the lifestyle behaviours which promote health.

Elements of the Competency	Performance Criteria
1. To establish a relationship between their lifestyle and their health.	• Appropriate use of documentation • Appropriate connections between their lifestyle and their health
2. To be physically active in a manner that promotes health.	• Observance of the rules involved in physical activities, including safety rules • Respect for their abilities when engaging in physical activities
3. To recognize their needs, abilities and motivational factors with respect to regular physical activity.	• Appropriate use of quantitative and qualitative physical data • Statement of their main physical needs and abilities • Statement of their main motivational factors with respect to regular physical activity
4. To propose physical activities that promote health.	• Appropriate and justified choice of physical activities according to their needs, abilities, and motivational factors

Learning Activities

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

Physical Education	Code: 0065

Objective *Standard*

Statement of the Competency

To improve one's effectiveness when practising a physical activity.

Element of the Competency	Performance Criteria
1. To use a process designed to improve their effectiveness during a physical activity.	• Initial assessment of their skills and attitudes in relation to a physical activity • Statement of their expectations and needs with respect to their ability to carry out the activity • Appropriate formulation of personal objectives • Statement of the means selected to achieve their objectives • Observance of the rules involved in the physical activity, including safety rules • Periodic evaluation of their skills and attitudes in relation to the activity • Meaningful interpretation of the progress achieved and the difficulties experienced during the activity • Appropriate, periodic adjustments of their objectives or the means used to achieve them • Appreciable improvement of the motor skills required by the activity

Learning Activities

Discipline:	Physical Education
Weighting:	0-2-1
Credits:	1

Physical Education	Code: 0066

Objective	***Standard***

Statement of the Competency

To demonstrate one's responsibility for being physically active in a manner which promotes health.

Elements of the Competency	**Performance Criteria**
1. To make physical activity part of a healthy lifestyle.	• Practise of a physical activity while maintaining a balance between effectiveness and the factors promoting health
2. To manage a personal physical activity program.	• Statement of their priorities according to their needs, skills, and motivational factors in relation to regular physical activity • Proper formulation of the objectives for their personal programs • Appropriate choice of activity or activities for their personal programs • Appropriate planning of the conditions in which the activity or activities in their personal programs are carried out • Appropriate choice of criteria for measuring the attainment of their personal programs • Periodic assessment of the time invested and the activities carried out during the program • Meaningful interpretation of the progress achieved and difficulties experienced during the activities • Appropriate, periodic adjustment of their objectives or the means used to attain them

Learning Activities

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

Language of Instruction and Literature	Code: 000L

Objective	***Standard***

Statement of the Competency

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

Elements of the Competency	**Performance Criteria**
1. To 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
2. To recognize the discursive frameworks appropriate to given fields of study.	• Clear and accurate recognition of the main ideas and structure • Appropriate distinction between fact and argument
3. To formulate a discourse.	• Appropriate choice of tone and diction • Correctly developed sentences • Clearly and coherently developed paragraphs • Appropriate use of program-related communication strategies • Formulation of a 1000-word discourse • Thorough revision of form and content

Learning Activities

Discipline:	English
Hours of instruction:	60
Credits:	2

Humanities	Code: 000U

Objective	***Standard***

Statement of the Competency

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

Elements of the Competency	**Performance Criteria**
1. To 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. To explain the major ideas, values, and social implications of ethical issues.	• Adequate description of the salient components of the issues
3. To 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. To debate the ethical issues.	• Adequate development of substantiated argumentation including context and diverse points of view • Clear articulation of an individual point of view

Learning Activities

Discipline:	Humanities
Hours of instruction:	45
Credits:	2

Langue seconde (niveau I)	Code: 0018

Objective	***Standard***

Statement of the Competency

Appliquer des notions fondamentales de la communication en français, liées à un champ d'études.

Elements of the Competency	**Performance Criteria**
1. Dégager le sens d'un message oral simple lié à un champ d'études.	• Repérage précis des difficultés de compréhension du message. • Distinction juste des caractéristiques du message. • Repérage juste du vocabulaire spécialisé. • Utilisation pertinente des techniques d'écoute choisies. • Distinction claire des principaux éléments du message. • Description précise du sens général et des idées essentielles du message.
2. Dégager le sens et les caractéristiques d'un texte lié à un champ d'études.	• Repérage précis des difficultés de compréhension du texte. • Distinction juste des caractéristiques du texte. • Repérage précis du vocabulaire spécialisé. • Utilisation pertinente des techniques de lectures choisies. • Distinction claire des principaux éléments du texte. • Description précise du sens général et des idées essentielles du texte.
3. Émettre un message oral simple lié à un champ d'études.	• Repérage précis des difficultés d'expression orale. • Utilisation pertinente des techniques d'expression orale choisies. • Utilisation pertinente du vocabulaire courant et spécialisé. • Expression intelligible du propos.

Langue seconde (niveau I)	Code: 0018
4. Rédiger un court texte lié à un champ d'études.	• Repérage précis des difficultés d'écrire. • Utilisation pertinente des techniques d'écriture choisies. • Utilisation pertinente du vocabulaire courant et spécialisé. • Formulation claire et cohérente du texte.

Learning Activities

Discipline:	Français, langue seconde
Hours of instruction:	45
Credits:	2

Langue seconde (niveau II)	Code: 000Q

Objective *Standard*

Statement of the Competency

Communiquer en français dans un champ d'études particulier.

Elements of the Competency	Performance Criteria
1. Distinguer les types de textes propres au champ d'études.	• Distinction précise des caractéristiques formelles de chacun des principaux types de textes et des conventions utilisées.
2. Interpréter des textes représentatifs du champ d'études.	• Distinction claire des principaux éléments du texte. • Interprétation claire du vocabulaire spécialisé. • Repérage précis des idées et des sujets traités. • Utilisation pertinente des techniques de lecture et d'écoute.
3. Utiliser des techniques de production de textes appropriées au champ d'études.	• Emploi pertinent du vocabulaire spécialisé et des conventions. • Respect du niveau de langue et du code grammatical. • Formulation claire et cohérente du propos. • Utilisation pertinente des techniques d'expression.

Learning Activities

Discipline:	Français, langue seconde
Hours of instruction:	45
Credits:	2

Langue seconde (niveau III) Code: 000R

Objective	***Standard***

Statement of the Competency

Communiquer avec aisance en français dans un champ d'études particulier.

Elements of the Competency	**Performance Criteria**
1. Commenter des textes propres au champ d'études.	• Distinction précise des caractéristiques formelles des principaux types de textes et des conventions utilisées. • Explication précise du sens des mots dans le texte. • Repérage précis de la structure du texte. • Reformulation juste des idées principales et secondaires, des faits et des opinions. • Emploi juste du vocabulaire spécialisé.
2. Produire un texte sur un sujet lié au champ d'études.	• Respect du sujet. • Emploi pertinent du vocabulaire spécialisé et des conventions. • Respect du niveau de langue et du code grammatical. • Formulation claire et cohérente du propos. • Agencement pertinent des idées. • Adéquation entre forme et fond.

Learning Activities

Discipline:	Français, langue seconde
Hours of instruction:	45
Credits:	2

Langue seconde (niveau IV)	Code: 000S

Objective	***Standard***

Statement of the Competency

Disserter en français sur un sujet lié au champ d'études.

Elements of the Competency	**Performance Criteria**
1. Analyser un texte lié au champ d'études.	• Distinction précise des caractéristiques formelles des types particuliers de textes. • Formulation personnelle des éléments principaux. • Inventaire des thèmes principaux. • Repérage juste de la structure du texte. • Relevé d'indices qui permettent de situer le texte dans son contexte. • Articulation claire d'un point de vue personnel, s'il y a lieu. • Association juste des éléments du texte au sujet traité.
2. Rédiger un texte sur un sujet lié au champ d'études.	• Respect du sujet. • Emploi pertinent du vocabulaire spécialisé et des conventions. • Choix judicieux des principaux éléments du corpus en fonction du type de texte. • Formulation claire et cohérente du texte. • Respect du code grammatical et orthographique. • Articulation claire d'un point de vue personnel, s'il y a lieu.

Learning Activities

Discipline:	Français, langue seconde
Hours of instruction:	45
Credits:	2

Social Sciences	Code: 000V

Objective — *Standard*

Statement of the Competency

To estimate the contribution of the social sciences to an understanding of contemporary issues.

Achievement Context

- 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 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 these 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 emphasizing the interpretation of the social sciences • Illustration of the interaction between certain social changes and the contribution of the social sciences

Learning Activities

Hours of instruction: 45
Credits: 2

Social Sciences	Code: 000W

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To 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 one or more disciplines in the 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. Deal with 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 • Proper determination of appropriate evaluation criteria • Identification of strengths and weaknesses of the conclusions • Broadening of issue studied

Learning Activities

Hours of instruction: 45
Credits: 2

Science and Technology	Code: 000X

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To explain the general nature of science and technology and some of the major contemporary scientific or technological issues.	• Working alone • Given 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 method.	• Brief description of the essential characteristics of scientific thinking, including quantification and demonstration • Organized 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, techniques 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 of several scientific and technological discoveries • List of the main stages of scientific and technological discoveries
4. Deduce different consequences and questions resulting from certain recent scientific and technological innovations.	• 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

Hours of instruction: 45
Credits: 2

Science and Technology	Code: 000Y

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To resolve a simple problem by applying the basic scientific method.	• Working alone or in groups • Given a simple scientific and technological problem that can be resolved by applying the standard scientific method • 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.	• Organized 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

Hours of instruction: 45
Credits: 2

Modern Languages	Code: 000Z

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To communicate with limited skill[1] in a modern language.	• For modern Latin-alphabet languages: – during a conversation consisting of at least eight sentences of dialogue – in a written text consisting of at least eight sentences Or • For non–Latin-alphabet languages: – during a conversation consisting of at least six sentences 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 a verbal message.	Learning a modern language requires becoming aware of the culture of the people who use the language. • Accurate identification of words and idiomatic expressions • Clear recognition of the general meaning of simple messages • Logical connections 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 connections between the various elements of the message

1 This refers to the limited use of the structures, grammar and vocabulary of the language studied. This limitation varies depending on the complexity of the modern language.

Modern Languages	Code: 000Z
3. Express a simple message verbally.	• Appropriate use of language structures in main and subordinate clauses • Appropriate application of grammar rules • Use of verbs in the present indicative • Appropriate use of basic vocabulary and idiomatic expressions • Comprehensible pronunciation • Coherent sequence of simple sentences • Spontaneous, coherent sequence of sentences in a dialogue
4. Write a text on a given subject.	• Appropriate use of language structures in main and subordinate clauses • Appropriate application of basic grammar rules • Use of verbs in the present indicative • Appropriate use of basic vocabulary and idiomatic expressions • Coherent sequence of simple sentences • Acceptable application of graphic rules for writing systems that do not use the Latin alphabet

Learning Activities

Hours of instruction: 45
Credits: 2

Modern Languages	Code: 0010

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To communicate on familiar topics in a modern language.	• During a conversation consisting of at least 15 sentences 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: – situations in everyday life – simple topics from everyday life • Using reference materials
Elements of the Competency	**Performance Criteria**
1. Understand the meaning of a verbal message.	Learning a modern language requires becoming aware of the culture of the people who use the language. • 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 verbally, 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 • Comprehensible pronunciation • Coherent sequence of sentences of average complexity • Coherent dialogue of average complexity

Modern Languages	Code: 0010
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 sequence of sentences of average complexity • Acceptable application of graphic rules for writing systems that do not use the Latin alphabet

Learning Activities

Hours of instruction**:** 45
Credits: 2

Modern Languages — Code: 0067

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To communicate with relative ease in a modern language.	• Working alone • During a conversation consisting of at least 20 sentences 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 sociocultural nature • Using reference materials for the written text
Elements of the Competency	**Performance Criteria**
	Learning a modern language requires being aware of the culture of the people who use the language.
1. Understand the meaning of a verbal 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 about 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

Learning Activities

Hours of instruction: 45
Credits: 2

Mathematics Literacy and Computer Science	Code: 0011

Objective — *Standard*

Statement of the Competency

To recognize the role of mathematics or informatics in contemporary society.

Achievement Context

- Working alone
- In an essay of approximately 750 words
- Using several concrete examples selected by the student demonstrating the competency

Elements of the Competency	Performance Criteria
1. Demonstrate the acquisition of basic general knowledge in mathematics or informatics.	• Identification of basic notions and concepts • Identification of main branches of mathematics or informatics • Appropriate use of terminology
2. Describe the evolution of mathematics or informatics.	• Descriptive summary of several major phases
3. Recognize the contribution of mathematics or informatics 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 informatics applications.	• Presentation of a range of applications in various areas of human activity, using concrete examples
5. Evaluate the impact of mathematics or informatics on individuals and organizations.	• Identification of several major influences • Explanation of the way in which mathematics or informatics have changed certain human and organizational realities • Recognition of the advantages and disadvantages of these influences

Learning Activities

Hours of instruction: 45
Credits: 2

Mathematics Literacy and Computer Science — Code: 0012

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To use various mathematical or computer 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 informatics.	• Brief definition of concepts • Correct execution of basic operations • Appropriate use of terminology
2. Select mathematical or computer tools and procedures on the basis of specific needs.	• List of numerous possibilities available with mathematical and computer tools and procedures • Analysis of concrete situations and recognition of the usefulness of mathematical or computer tools and procedures • Appropriate choice according to needs
3. Use mathematical or computer tools and procedures to carry out tasks and solve problems.	• Planned, 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 computer tools and procedures.	• Accurate interpretation, given the context • Clear, precise formulation of the interpretation

Learning Activities

Hours of instruction: 45
Credits: 2

Art and Aesthetics — Code: 0013

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To consider various forms of art produced by 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 periods, including a modern movement
3. Give a commentary on a work of art.	• Coherent organization of observations, including identification of four basic elements of form and structure related to the language used as well as a justified description of the meaning of the work of art

Learning Activities

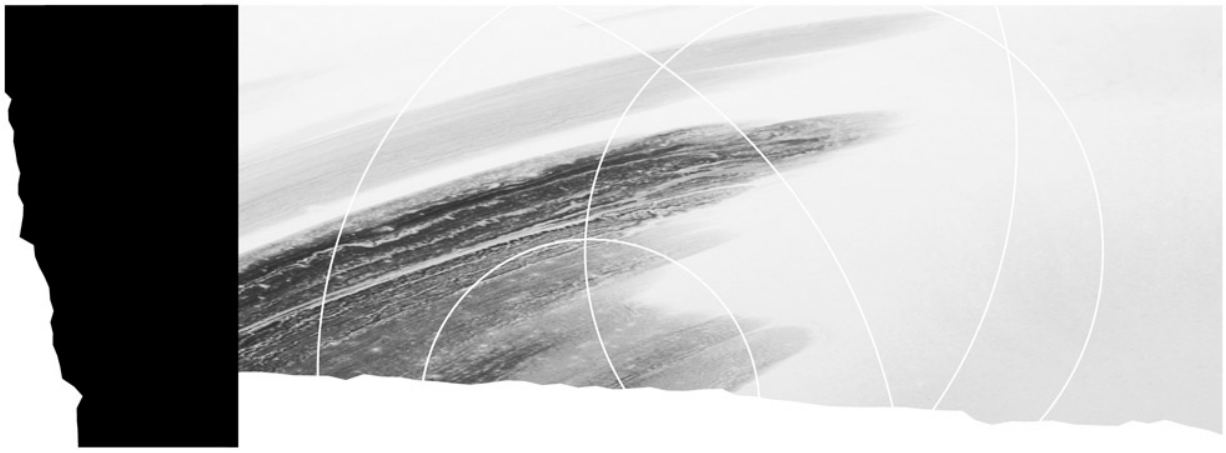
Hours of instruction: 45
Credits: 2

Art and Aesthetics	Code: 0014

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To produce a work of art.	• Working alone • During a practical exercise • In the context of a creation or an interpretation • 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 • Observance of the requirements of the method of production

Learning Activities

Hours of instruction: 45
Credits: 2



Part II

Goals of the Program-Specific Component

Educational Aims of the Program-Specific Component

Grid of Competencies

Harmonization

Objectives and Standards of the Program-Specific Component

Goals of the Program-Specific Component

The aim of the *Industrial Electronics Technology* program is to train candidates to exercise the occupation of industrial electronics technician.

Industrial electronics technicians work for companies in the primary, secondary and tertiary sectors, in the fields of primary metal processing, forestry and pulp and paper, chemistry, plastics, pharmaceuticals, food and drink, the manufacture of transportation equipment and electrical supplies, printing, etc. They also work in the service sector, in companies that distribute energy (gas and electricity) and in engineering consulting firms.

The main tasks of industrial electronics technicians include troubleshooting, preventive maintenance and the installation and start-up of control system components. In collaboration with engineers, they also participate in the design and modification of automated systems and electrical installations. Finally, they are responsible for purchasing materials within a given budget.

Industrial electronics technicians play a crucial role in the event of a breakdown. They are responsible for quickly repairing defective devices such as sensors, conditioners, controllers, motors, drive systems and electrical distribution systems, as well as mechanical components such as valves and pneumatic and hydraulic jacks.

The technological environment in which industrial electronics technicians work is made up of distributed and computerized systems, as well as industrial control systems, such as measuring devices, sensors, programmable controllers, electronic controllers, control networks, valves, variable-speed drives, etc.

This technological environment is constantly changing. Computerized production means that the industry is now implementing integrated computer systems. Traditional tools such as clip-on ammeters, multimeters, pressure gauges and signal generators are now accompanied by protocol testers, portable computers, data acquisition and processing software, etc.

As part of their job, industrial electronics technicians meet with engineers (electrical, computer, mechanical, electronics), chemists, computer specialists, production technicians, process operators, electrical mechanics, electricians and draftspeople.

Depending on the task at hand, industrial electronics technicians can work either individually or in teams. For example, troubleshooting, preventive maintenance, programming and updating documents are usually done individually, while design projects, modifications and production halts generally require the services of a team of industrial electronics technicians.

In accordance with the general goals of technical training, the aims of the program-specific component of the *Industrial Electronics Technology* program 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 work force, 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 of the Program-Specific Component

Educational aims 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.

In the *Industrial Electronics Technology* program, the educational aims in the program-specific component meet two requirements of college education: versatility and proficiency in a technical activity.

Versatility is ensured via the acquisition of general competencies that enable future technologists to carry out their duties in industrial sectors and different technological environments.

Proficiency in a technical activity is ensured via the acquisition of specific competencies directly related to the trade or occupation. Since these competencies cover every facet of the trade or occupation, they foster job mobility.

At the end of their studies, students must demonstrate their ability to work in teams and their openness toward new technologies. More specifically, they are expected to be able to find and interpret technical documentation and apply problem-solving techniques in order to maintain, troubleshoot and design equipment autonomously. The acquisition of these basic competencies is more likely to foster students' integration into the workplace than in-depth knowledge about every type of equipment.

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 (❍) 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.

GRID OF COMPETENCIES

INDUSTRIAL ELECTRONICS TECHNOLOGY

SPECIFIC COMPETENCIES	Competency Number	GENERAL COMPETENCIES													
		To process information about places in which industrial electronics technician work	To do shop work	To manage and use a computer station in an industrial setting	To produce industrial electronics drawings	To plan work activities	To solve mathematical problems in industrial electronics	To verify extra-low voltage signals and power supplies	To inspect power electronics equipment	To analyze the operation of a process	To operate control systems	To program control units	To adjust the devices in the measuring chain	To adjust the final controlling elements	To program a supervisory system
Competency Number		1	2	3	4	5	7	8	9	10	11	12	13	14	15
To install devices in a control system	6	O	O	O	O	O	O	O	O						
To help start up a control system	16	O	O	O	O	O	O	O	O	O	O	O	O	O	O
To do preventive maintenance on control system equipment	17	O	O	O		O	O	O	O	O	O	O	O	O	O
To troubleshoot a control system	18	O	O	O		O	O	O	O	O	O	O	O	O	O
To participate in the design of a control project	19	O		O	O	O	O			O		O			O

Harmonization

The Ministère de l'Éducation, du Loisir et du Sport harmonizes its 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 *Industrial Electronics Technology* 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 de l'électronique industrielle.*

Program-Specific Glossary

This program contains a glossary of educational terms on page 5. The following is a list of terms specific to industrial electronics technology.

Adjust

To ensure that a device, a mechanism, a machine, etc. functions correctly under the desired conditions

Block diagram

Representation of the roles or functions of different elements of the control loop and the signals linking them

Calibrate

To check or graduate (a measurement, a measuring instrument) against a standard

Command

Action making it possible to operate a system, machine or process

Conduction

Transmission of electrical current through matter, corresponding to the movement of current carriers

Configure

To establish the nature, number and basic characteristics of the main components of an assembly (in this case, a computer system)

Control

Ability to ensure the proper functioning of a machine or process through the acquisition and collection of relevant data

Control system

Means that enables an operator or automated system to ensure the functioning of devices or processes by sending commands to actuators. Control systems enable the operator to regulate certain parameters, or automated sequences, using a human-machine interface. Because numerical control systems are based on the use of local networks between controllers, all of the operating parameters can be configured.

Device

Parts assembled to form an object or machine used to perform certain tasks, take measurements, observe phenomena, etc.

Equipment

All of the machines, devices, etc. necessary to carry out an activity

Extra-low voltage

Voltage up to and including 30 volts (*Québec Electrical Code*, section 0)

Final controlling element

Assembly including the signal conditioner, the actuator or the servo-actuator and the modulator

Flow diagram

Representation of the circulation of fluids and the movement of objects or substances through equipment and work

Install

To set up components in a permanent manner so that they function: install cable in a house, install a telephone

Low voltage

31 to 750 volts (*Québec Electrical Code*, section 0)

Measuring chain

Sensor (primary element) and transmitter

Mechanism

Assembly of parts intended to function as a whole

Parameter

Variable whose value is set only at the time of execution: parameters of a function, passing a parameter value

Pay out

To run through in a continuous manner

Process

Series of operations intended to achieve an objective or industrial production

Program

To render (a computer) capable of performing a specific task by providing the necessary data and instructions

Soldering

Procedure in which metal parts are joined by means of a filler metal having a melting temperature lower than that of the parts to be joined

Specifications

Detailed account of the work to be done accompanied by a cost estimate. *Technical specifications:* detailed account of the work to be done, the nature of the materials, and the timeframe. *Cost estimate:* evaluation of costs

Substance

Matter with characteristic properties

Code: 042Y

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To process information about places in which industrial electronics technicians work.	• Referring to recent documentation • Referring to laws and regulations currently in effect
Elements of the Competency	**Performance Criteria**
1. Find information about the occupation and about the places in which industrial electronics technicians work.	• Appropriate selection of reference sources • Reliability and variety of information gathered • Appropriate use of research tools
2. Analyze the information about the workplace.	• Accurate distinction between the types of companies and institutions • Recognition of the occupations practised in the workplace • Recognition of the related professional associations and unions • Accurate interpretation of the importance of technological development and its characteristics • Accurate distinction between the types of work organization in the company and worldwide • Accurate identification of the characteristics of the products and services produced by the companies or institutions
3. Analyze the information about the occupation.	• Accurate distinction between the different specialties • Detailed examination of the tasks and responsibilities of industrial electronics technicians • Accurate identification of the knowledge and skills required to practise the occupation • Accurate interpretation of standards and conventions related to professional ethics • Accurate identification of the limitations of the occupation
4. Summarize the information.	• Appropriate classification of information • Accurate summary of information

Code: 042Z

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To do shop work.	• Referring to manufacturing and assembly drawings • Referring to circuit diagrams • Using measuring and marking-out instruments • Using hand tools • Using machine tools such as a shearing machine, a drill press and a bending machine • Working at soldering and tack-welding stations
Elements of the Competency	**Performance Criteria**
1. Make and assemble mechanical parts.	• Accurate interpretation of manufacturing and assembly drawings • Appropriate selection of material • Appropriate use of marking-out instruments • Appropriate use of cutting and shaping techniques • Appropriate use of gluing, welding and riveting techniques • Appropriate use of deburring techniques • Appropriate use of drilling, tapping and threading techniques • Appropriate use of machine tools • Observance of tolerances • Observance of occupational health and safety rules
2. Solder and unsolder electronic components.	• Accurate interpretation of assembly drawings and circuit diagrams • Appropriate selection of tools and components • Accurate positioning of components • Accurate and solid joining of components • Proper use of soldering and unsoldering techniques • No cold junctions or burrs • Appropriate use of measuring instruments • Integrity of circuits and components • Observance of occupational health and safety rules

	Code: 042Z
3. Assemble connectors.	• Accurate interpretation of assembly drawings and circuit diagrams • Appropriate selection of connector • Selection and use of the appropriate tools given the type of connector • Appropriate use of crimping or splicing technique • Proper identification of connectors • Proper conduction, insulation and solidity of connector
4. Replace mechanical components in an industrial electronics device.	• Accurate interpretation of assembly drawings • Recognition of defective components • Appropriate selection of components • Appropriate selection and use of tools for disassembling and reassembling the device • Correct sequence of operations • Proper disassembly and reassembly of components • Proper adjustment of components • Observance of occupational health and safety rules
5. Organize the shop.	• Up-to-date inventory of tools and materials • Meticulous maintenance and storage of tools • Careful cleaning of work area • Observance of occupational health and safety rules

Code: 0431

Objective — *Standard*

Statement of the Competency	**Achievement Context**
To manage and use a computer station in an industrial setting.	• Using an operating system and office and industrial electronics software • Using the peripherals used in control systems • Referring to technical documentation

Elements of the Competency	**Performance Criteria**
1. Configure a computer station.	• Appropriate use of technical documentation • Proper formatting of data media • Appropriate selection of operating parameters • Proper installation of operating system • Appropriate use of configuration software • Proper use of access rights • Appropriate inspection of the workstation • Full backup of installation • Observance of the limitations of the occupation
2. Organize data.	• Appropriate use of technical documentation • Appropriate selection and use of operating system commands • Proper creation of directories • Methodical filing of data • Proper use of access rights • Observance of the rules for naming directories
3. Install and configure industrial electronics software.	• Appropriate use of technical documentation • Proper determination of installation needs • Appropriate selection of operating parameters • Proper configuration of communication links between software and hardware • Accurate configuration of inputs and outputs • Appropriate inspection of software • Full backup of data and programs
4. Share information in a network.	• Effective use of search tools • Appropriate selection of reference sources • Appropriate selection of file formats • Proper determination of file integrity • Appropriate use of data compression and encryption software • Proper transfer of data and programs • Observance of information exchange conventions

	Code: 0431
5. Produce tables and graphs.	• Appropriate selection of representation mode • Appropriate use of basic software functions • Observance of standards for creating tables or graphs • Tables and graphs properly saved and printed
6. Configure and consult a database.	• Appropriate use of basic software functions • Proper creation of links with an industrial production network • Appropriate use of search tools • Reports properly saved and printed
7. Write reports.	• Appropriate use of basic word processing functions • Proper incorporation of drawings, tables and graphs • Observance of presentation standards • Proper spelling, grammar, syntax and punctuation • Reports properly saved and printed
8. Maintain the computer station.	• Appropriate use of technical documentation • Appropriate selection of backup medium • Appropriate use of backup software • Appropriate selection and use of diagnostic software • Appropriate correction of operating problems • Proper upgrading of software

Code: 0432

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To produce industrial electronics drawings.	• Referring to sketches • Referring to manufacturers' technical documentation • Referring to manuals produced by manufacturers of electrical, hydraulic and pneumatic equipment • Referring to standards for producing industrial electronics drawings • Using computer-aided design software • In accordance with the field of activity as defined by current laws and regulations
Elements of the Competency	**Performance Criteria**
1. Prepare the layout.	• Accurate interpretation of sketch • Appropriate selection of paper size • Appropriate selection of scales
2. Structure the drawing file.	• Proper use of seat file, bank of symbols or base plan • Proper personalization of graphic interface • Adjustment of parameters of design software in accordance with the data and company standards • Proper creation of missing symbols and attributes • Appropriate use of software • Observance of standards for producing electrical, hydraulic and pneumatic drawings
3. Create symbolic and effective representations.	• Proper application of standards for symbolic and effective representations • Appropriate use of manufacturers' manuals • Appropriate use of technical documentation • Appropriate use of software • Appropriate use of cross references • Drawing in conformity with initial information • Observance of rules of legibility • Observance of standards for producing electrical, hydraulic and pneumatic drawings

	Code: 0432
4. Populate the drawing.	• Complete dimensioning adapted to the requirements for producing drawings • Proper, clear indication of annotations • Proper production of title block • Appropriate use of software • Observance of rules of legibility • Correct spelling • Observance of standards for producing electrical, hydraulic and pneumatic drawings
5. Format and print the drawing and list of materials.	• Proper arrangement of views, frame and title block • Proper adjustment of printing parameters • Appropriate use of software and peripherals

Code: 0433

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To plan work activities.	• Referring to the company's operations and procedures manual • Referring to the *Act respecting occupational health and safety*, information about hazardous materials and controlled products, the safety code and the *Québec Electrical Code:* classification of hazardous areas • Referring to prevention plans • Using work management and planning software • In collaboration with resource people and construction tradespeople
Elements of the Competency	**Performance Criteria**
1. Analyze the work to be done.	• Appropriate consultation of construction tradespeople • Correct estimate of the different tasks and the sequence of operations • Proper determination of priorities • Appropriate use of management and planning software
2. Recognize situations that pose an occupational health and safety risk and evaluate the potential consequences.	• Identification of risks related to chemicals, heat stress, electrical equipment, machines, tools, radiation and heights • Accurate interpretation of information about hazardous materials and controlled products • Accurate interpretation of laws, standards and regulations • Accurate interpretation of prevention plan • Accurate evaluation of potential consequences for occupational health and safety
3. Make a list of the equipment needed.	• Appropriate use of technical documentation • Proper determination of all the tools, instruments and materials needed • Appropriate verification of the availability of tools, instruments and materials • Appropriate use of management and planning software

	Code: 0433
4. Estimate the time needed.	• Appropriate consultation of resource people • Proper determination of workers needed • Proper determination of the time needed for each task • Appropriate use of management and planning software
5. Write a planning report.	• Detailed presentation of information • Clear occupational health and safety recommendations • Report in conformity with requirements

Code: 0434

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To install devices in a control system.	• Referring to drawings, diagrams and technical documentation • Referring to the *Québec Electrical Code* and installation standards • Using hand tools and machine tools • In accordance with the field of activity as defined by current laws and regulations
Elements of the Competency	**Performance Criteria**
1. Assemble the control panel.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of components • Appropriate selection and use of tools • Proper identification of components and cables • Accurate positioning of components • Connections in conformity with drawings • Proper installation of control panel • Use of an appropriate inspection method • Observance of the *Québec Electrical Code* and installation standards • Observance of occupational health and safety rules
2. Install electrical, pneumatic and hydraulic power supplies.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of components • Appropriate selection and use of tools • Proper installation and connection of cables and fluid lines • Proper identification of cables and fluid lines • Proper conduction and insulation of cables and electrical connections • Leaktightness of pneumatic and hydraulic lines and connections • Use of an appropriate inspection method • Observance of the *Québec Electrical Code* and installation standards • Observance of occupational health and safety rules

	Code: 0434
3. Install electrical protectors.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of protectors • Appropriate selection and use of tools • Proper installation of electrical protectors • Proper connection of cables • Proper identification of cables and electrical protectors • Use of an appropriate inspection method • Observance of the *Québec Electrical Code* and installation standards • Observance of occupational health and safety rules
4. Install elements of a measuring chain.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of sensors and transmitters • Appropriate selection and use of tools • Accurate positioning and proper installation of sensors and transmitters • Proper connection of sensors and transmitters to the electrical and pneumatic power supplies • Proper connection of communication and control cables • Proper identification of sensors and transmitters • Use of an appropriate inspection method • Observance of the *Québec Electrical Code* and installation standards • Observance of occupational health and safety rules
5. Install the final controlling elements.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of converters and actuators • Appropriate selection and use of tools • Accurate positioning and proper installation of converters and actuators • Proper connection of electrical, pneumatic and hydraulic power supplies • Proper connection of communication and control cables • Proper identification of converters and actuators • Use of an appropriate inspection method • Observance of the *Québec Electrical Code* and installation standards • Observance of occupational health and safety rules

	Code: 0434
6. Install expansion boards and plug-ins.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of boards and plug-ins • Appropriate selection and use of tools • Proper configuration of boards and plug-ins • Proper insertion and connection of boards and plug-ins • Use of an appropriate inspection method • Observance of installation standards
7. Record the information.	• Clear, complete recording of the work done • Proper updating of drawings

Code: 0435

Objective

To solve mathematical problems in industrial electronics.

Standard

Achievement Context

- Referring to operating information about devices, processes and circuits
- Using a calculator
- Using software

Elements of the Competency	Performance Criteria
1. Analyze the elements of an industrial electronics problem.	• Accurate interpretation of information • Proper determination of operations to be performed • Accurate interpretation of units of measurement
2. Solve linear equations with two variables.	• Proper use of analytical, iterative and graphic problem-solving methods • Algebraic manipulations in conformity with rules • Accurate calculations
3. Solve trigonometric problems.	• Recognition of types of triangles • Appropriate selection and use of formulas • Appropriate use of trigonometric circle • Accurate calculation of distances, angles and areas • Accurate conversion of units of measurement
4. Calculate the values of exponential and logarithmic functions.	• Proper graphic representation of functions • Proper use of calculation methods • Algebraic manipulations in conformity with rules • Accurate calculations
5. Apply operations on vectors.	• Proper graphic representation of vectors in a drawing • Proper use of methods for adding and resolving vectors • Appropriate use of scalar product • Algebraic manipulations in conformity with rules • Accurate calculations

	Code: 0435
6. Apply operations on complex numbers.	• Proper graphic representation of complex numbers • Proper and appropriate use of polar and rectangular representation • Proper use of methods for adding and multiplying complex number • Accurate calculations
7. Calculate the values of sine and temporal functions.	• Proper use of methods for adding functions • Algebraic manipulations in conformity with rules • Proper graphic representation of temporal and frequency functions • Accurate calculations
8. Present the results and explain the problem-solving approach.	• Appropriate use of terminology and conventions • Assessment of plausibility of results

Code: 0436

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To verify extra-low voltage signals and power supplies.	• In the shop or on the job site • Referring to drawings, diagrams and technical documentation • Using devices such as measuring instruments, signal generators, signal simulators and data sinks • Using software • Using measurement standards
Elements of the Competency	**Performance Criteria**
1. Prepare to take measurements or perform data acquisition.	• Accurate interpretation of drawings, diagrams and technical documentation • Accurate interpretation of the characteristics of power supplies and signals • Determination of the appropriate measuring points • Proper determination of the frequency and duration of readings • Appropriate selection of data acquisition software • Accurate estimate of values • Appropriate selection of devices • Proper inspection and calibration of devices
2. Take the measurements or perform data acquisition.	• Proper connection of measuring devices • Accurate, thorough measurement of power supplies and signals • Appropriate use of measuring devices • Data properly saved • Observance of occupational health and safety rules
3. Analyze the data.	• Accurate interpretation of drawings, diagrams and technical documentation • Clear, precise graphic representations • Appropriate use of software • Proper determination of average, median and standard deviation • Results properly saved • Assessment of plausibility of results • Proper determination of conformity of signals and power supplies

	Code: 0436
4. Record the information.	• Use of appropriate vocabulary • Clear presentation of the method used and the results obtained • Observance of rules of presentation

Code: 0437

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To inspect power electronics equipment.	• Referring to drawings, diagrams and technical documentation • Referring to the appropriate safety codes • Using devices such as measuring instruments, signal generators, signal and load simulators and data sinks • Using software • Using measurement standards
Elements of the Competency	**Performance Criteria**
1. Prepare to take measurements or perform data acquisition.	• Accurate interpretation of drawings, diagrams and technical documentation • Accurate interpretation of the electrical and mechanical characteristics of power electronics equipment • Determination of the appropriate measuring points • Proper determination of the frequency and duration of readings • Appropriate selection of data acquisition software • Accurate estimate of values • Appropriate selection of devices • Proper inspection and calibration of devices
2. Take the measurements or perform data acquisition.	• Accurate interpretation of safety code • Thorough inspection of grounds • Proper, safe installation of measuring devices • Accurate, thorough measurement of waveforms • Appropriate use of measuring devices • Data properly saved

	Code: 0437
3. Analyze the data.	• Accurate interpretation of drawings, diagrams and technical documentation • Precise tracing of wave shapes • Accurate interpretation of the characteristics of the harmonics • Accurate analysis of the coordination of electrical protectors • Accurate analysis of the operation of the power electronics components • Accurate analysis of electrical phenomena in transient and continuous output conditions • Proper determination of average, median and standard deviation • Appropriate use of software • Results properly saved • Assessment of plausibility of results • Accurate assessment of conformity of equipment
4. Write a non-conformance report.	• Use of appropriate vocabulary • Clear presentation of the method used and the results obtained • Observance of rules of presentation

Code: 0438

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To analyze the operation of a process.	• Referring to the block diagram of the process • Referring to drawings or readings of mechanisms • Given operating data • Given information about hazardous materials and controlled products
Elements of the Competency	**Performance Criteria**
1. Develop a flow diagram of a process.	• Accurate interpretation of block diagram • Accurate interpretation of operating data • Identification of the devices in the measuring chain and the final controlling elements • Accurate analysis of the circulation of fluids and the movement of objects or substances • Proper application of the standards related to symbolic representation • Clear diagram
2. Describe the operation of mechanisms in a process.	• Accurate analysis of the operation of safety devices • Accurate analysis of the forces and movements involved • Proper determination of physical dimensions • Clear description of the action of the mechanisms
3. Indicate the physical and chemical transformations involved in a process.	• Accurate interpretation of the physical and chemical properties of substances • Accurate interpretation of the information concerning hazardous materials and controlled products • Accurate analysis of the operation of the safety devices • Clear description of the effects of the substances on the devices in the process • Proper determination of physical dimensions • Proper determination of the states of matter

Code: 0439

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To operate control systems.	• Referring to flow diagrams • Using control software
Elements of the Competency	**Performance Criteria**
1. Analyze the operation of the control system.	• Accurate interpretation of flow diagram • Accurate positioning of elements in the measuring chain • Accurate positioning of final controlling elements • Accurate location of control units • Accurate identification of the control algorithm used • Accurate analysis of the technology used in the control units • Accurate analysis of the function of each element of the control system
2. Operate the control system.	• Appropriate use of manufacturer's technical documentation • Accurate interpretation of operating data • Accurate interpretation of the information transmitted by the indicators and other permanent instruments • Accurate analysis of the effects of a disturbance • Appropriate use of control software • Proper adjustment of operating parameters • Observance of occupational health and safety rules
3. Check the process response.	• Accurate interpretation of operating data • Proper determination of control system malfunctions

Code: 043A

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To program control units.	• In the shop or on the job site • Referring to technical documentation and reference materials • Using flow charts and other means of representing programs • Using control software • Using communication drivers • Using programming and configuration software
Elements of the Competency	**Performance Criteria**
1. Establish communication with the control unit.	• Accurate interpretation of technical documentation • Appropriate selection of communication protocols between the computer and the control unit • Proper connection of control unit to computer • Appropriate use of programming and configuration software • Proper configuration of control unit modules
2. Configure the field network.	• Accurate analysis of communication needs • Accurate interpretation of technical documentation • Appropriate consultation of resource people • Accurate analysis of the topology of the field networks • Proper determination of communication protocols • Proper configuration of communication modules and field network elements • Appropriate use of configuration software • Thorough inspection of field network elements

	Code: 043A
3. Test the programs.	• Complete transfer of programs and data • Proper determination of variables to be tested • Appropriate selection and use of diagnostic software • Accurate interpretation of flow charts and other means of representing programs • Accurate interpretation of programming languages • Accurate interpretation of control strategies • Accurate analysis of program flow • Proper determination of malfunctions • Observance of occupational health and safety rules
4. Make the necessary corrections to the programs.	• Accurate interpretation of the technical documentation and reference materials • Proper determination of modifications to be made to programs and data • Appropriate selection and use of control unit operating modes • Appropriate use of programming languages • Proper functioning of program • Appropriate modification of program documentation • Full backup of data and programs

Code: 043B

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To adjust the devices in the measuring chain.	• In the shop and on the job site • Referring to technical documentation • Using measuring instruments • Using software • Using measurement standards • Using hand tools
Elements of the Competency	**Performance Criteria**
1. Analyze the operation of the sensor and transmitter.	• Accurate interpretation of technical documentation • Accurate distinction between the different types of signals and their functions • Accurate identification of the field of application of the technology • Correct estimate of the value of the output signal for a given input
2. Configure the sensor and transmitter.	• Appropriate use of test bench • Accurate interpretation of operating data • Appropriate selection and use of measuring instruments, software and hand tools • Proper determination of options and operating parameters for the sensor and transmitter • Proper functioning of sensor and transmitter
3. Calibrate the sensor and transmitter.	• Accurate interpretation of operating data • Appropriate selection and use of calibration procedure • Accurate interpretation of calibration curve • Appropriate selection and use of measuring instruments, software and hand tools • Successful simulation of input signals • Proper adjustment of sensor and transmitter • Clear, detailed notes on adjustments made • Observance of occupational health and safety rules
4. Inspect the measuring chain.	• Accurate interpretation of technical documentation • Accurate interpretation of operating data • Proper determination of malfunctions • Observance of occupational health and safety rules

Code: 043C

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To adjust the final controlling elements.	• In the shop and on the job site • Referring to technical documentation • Using measuring instruments and load simulators • Using software • Using measurement standards • Using hand tools
Elements of the Competency	**Performance Criteria**
1. Analyze the operation of the converter and actuator.	• Accurate interpretation of technical documentation • Accurate distinction between the different types of signals and their functions • Accurate identification of the field of application of the technology • Correct estimate of the value of the output signal for a given input
2. Configure the converter and actuator.	• Appropriate use of test bench • Accurate interpretation of operating data • Appropriate selection and use of measuring instruments, load simulators, software and hand tools • Proper determination of options and operating parameters for the converter and actuator • Proper functioning of converter and actuator
3. Calibrate the final controlling element.	• Accurate interpretation of operating data • Appropriate selection and use of calibration procedure • Accurate interpretation of calibration curve • Appropriate selection and use of measuring instruments, load simulators, software and hand tools • Successful simulation of input signals • Proper adjustment of converter and actuator • Clear, detailed notes on adjustments made • Observance of occupational health and safety rules

	Code: 043C
4. Inspect the final controlling element.	• Proper use of technical documentation • Accurate interpretation of operating data • Proper determination of malfunctions • Observance of occupational health and safety rules

Code: 043D

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To program a supervisory system.	• Referring to sketches and diagrams • Referring to technical documentation • Referring to manufacturers' manuals • Using communication drivers • Using configuration and programming software
Elements of the Competency	**Performance Criteria**
1. Configure the control network and its connections with the supervisory system.	• Accurate interpretation of technical documentation • Accurate analysis of communication needs • Proper determination of data to be shared by the control units • Proper configuration of communication links between the control units • Proper configuration of communication links between the supervisory system and the control network • Proper creation of the supervisory system's reading and writing points • Proper use of access rights • Appropriate use of software • Appropriate verification and adjustment of data transfer parameters
2. Configure the communication links between the information network and the supervisory system.	• Accurate interpretation of technical documentation • Accurate analysis of communication needs • Proper determination of data to be exchanged with the information system • Proper configuration of the supervisory system's modules and communication software • Proper use of access rights • Appropriate use of software • Appropriate verification and adjustment of data transfer parameters

	Code: 043D
3. Produce the graphics pages.	• Accurate interpretation of sketches and diagrams • Appropriate selection and use of banks of symbols • Proper application of standards of presentation • Proper programming of trend windows and alarms • Proper creation of links between objects and the database • Proper arrangement of help and troubleshooting commands for the user • Proper use of access rights • Observance of programming standards • Appropriate use of macro commands • Appropriate use of software
4. Write the user's guide.	• Clear description of the configuration of the networks • Clear description of the operation of the operator interface • Use of appropriate vocabulary • Observance of rules of presentation

Code: 043E

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To help start up a control system.	• Working in teams • Referring to flow diagrams and drawings • Using flow charts and other means of representing programs • Referring to program documentation • Using measuring instruments and signal generators • Using hand tools • Using software
Elements of the Competency	**Performance Criteria**
1. Prepare for start-up.	• Accurate interpretation of emergency plan • Accurate interpretation of flow diagrams and drawings • Appropriate consultation of construction tradespeople and production staff • Verification and clearing of work space • Proper application of locking procedures • Proper planning
2. Do power-off tests.	• Accurate interpretation of drawings • Appropriate selection and use of measuring instruments and signal generators • Methodical verification of the positioning and identification of control system cables, lines and devices • Accurate measurement of the conduction and insulation of cables • Appropriate inspection of electromechanical components and safety devices • Appropriate corrections made • Observance of occupational health and safety rules

	Code: 043E
3. Start up the control unit.	• Accurate interpretation of drawings, flow charts and program documentation • Appropriate verification of extra-low voltage signals and power supplies • Appropriate verification of the functioning of networks • Appropriate verification of the functioning of operator interfaces • Proper operation of control unit in manual mode • Appropriate verification of the functioning of control unit in normal run mode • Appropriate verification of the functioning of emergency stop sequences • Appropriate corrections made
4. Start up the control system.	• Proper application of power-up procedure • Appropriate testing for leaks in the fluid lines • Appropriate verification of the functioning of power electronics equipment • Appropriate verification of electrical protection circuits and safety devices • Appropriate verification of backup and recovery system • Appropriate corrections made • Observance of occupational health and safety rules
5. Optimize the functioning of the process.	• Accurate analysis of the functioning of the process in normal run mode • Appropriate and accurate modifications made to the programs • Appropriate and accurate adjustments made to the control system • Appropriate and accurate adjustments made to the electric protectors
6. Fill out the documentation.	• Clear description of problems encountered and solutions applied • Appropriate correction of drawings • Clear recording of operating instructions • Use of appropriate vocabulary
7. Train staff.	• Relevant information given to production and maintenance staff • Performance of appropriate practical exercises • Clarity • Willingness to listen

Code: 043F

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To do preventive maintenance on control system equipment.	• Working in teams • Referring to preventive maintenance procedures • Referring to drawings and technical documentation • Using devices such as measuring instruments, signal generators and signal and load simulators • Using software • Using hand tools • In accordance with the field of activity as defined by current laws and regulations
Elements of the Competency	**Performance Criteria**
1. Participate in the planning of maintenance work.	• Accurate interpretation of preventive maintenance procedure • Recognition of situations posing occupational health and safety risks • Proper determination of equipment needed • Proper coordination with maintenance and production staff
2. Maintain power electronics equipment.	• Accurate interpretation of drawings and technical documentation • Appropriate selection and use of devices • Thorough inspection of grounds • Careful cleaning of equipment • Appropriate inspection of electrical protectors • Full thermographic analysis • Proper verification of insulation and leakage currents • Appropriate inspection of power electronics elements • Appropriate verification of the functioning of indicators and permanent instruments • Proper use of replacement and adjustment procedures • Observance of occupational health and safety rules

	Code: 043F
3. Maintain control system devices.	• Accurate interpretation of drawings and technical documentation • Appropriate selection and use of devices • Thorough inspection of grounds • Appropriate inspection of devices • Appropriate verification of configurations of hardware and programs and of the value of operating parameters • Appropriate inspection of calibration and configuration of devices • Appropriate verification of the functioning of indicators and permanent instruments • Proper use of replacement and adjustment procedures • Careful cleaning of devices • Observance of occupational health and safety rules
4. Maintain pneumatic, hydraulic and electromechanical systems.	• Accurate interpretation of drawings and technical documentation • Appropriate inspection of components • Appropriate replacement of filters and lubricants • Appropriate verification and adjustment of fluid pressure • Proper replacement of components • Careful cleaning of systems • Observance of occupational health and safety rules
5. Start up the process.	• Clear work area • Proper application of start-up procedures • Accurate analysis of the functioning of the procedure in transitional or continuous output conditions • Effective collaboration with production staff • Observance of occupational health and safety rules
6. Repair defective devices.	• Accurate interpretation of drawings and technical documentation • Appropriate consultation of resource people • Appropriate selection and use of measuring instruments • Proper determination of the nature and cause of the malfunction • Accurate evaluation of the importance of repairing the device • Proper application of replacement and adjustment procedures • Proper updating of device log

	Code: 043F
7. Write a maintenance report.	• Clear, thorough recording of the work done • Clear formulation of recommended modifications to preventive maintenance procedures • Proper updating of inventory • Observance of rules of presentation

Code: 043G

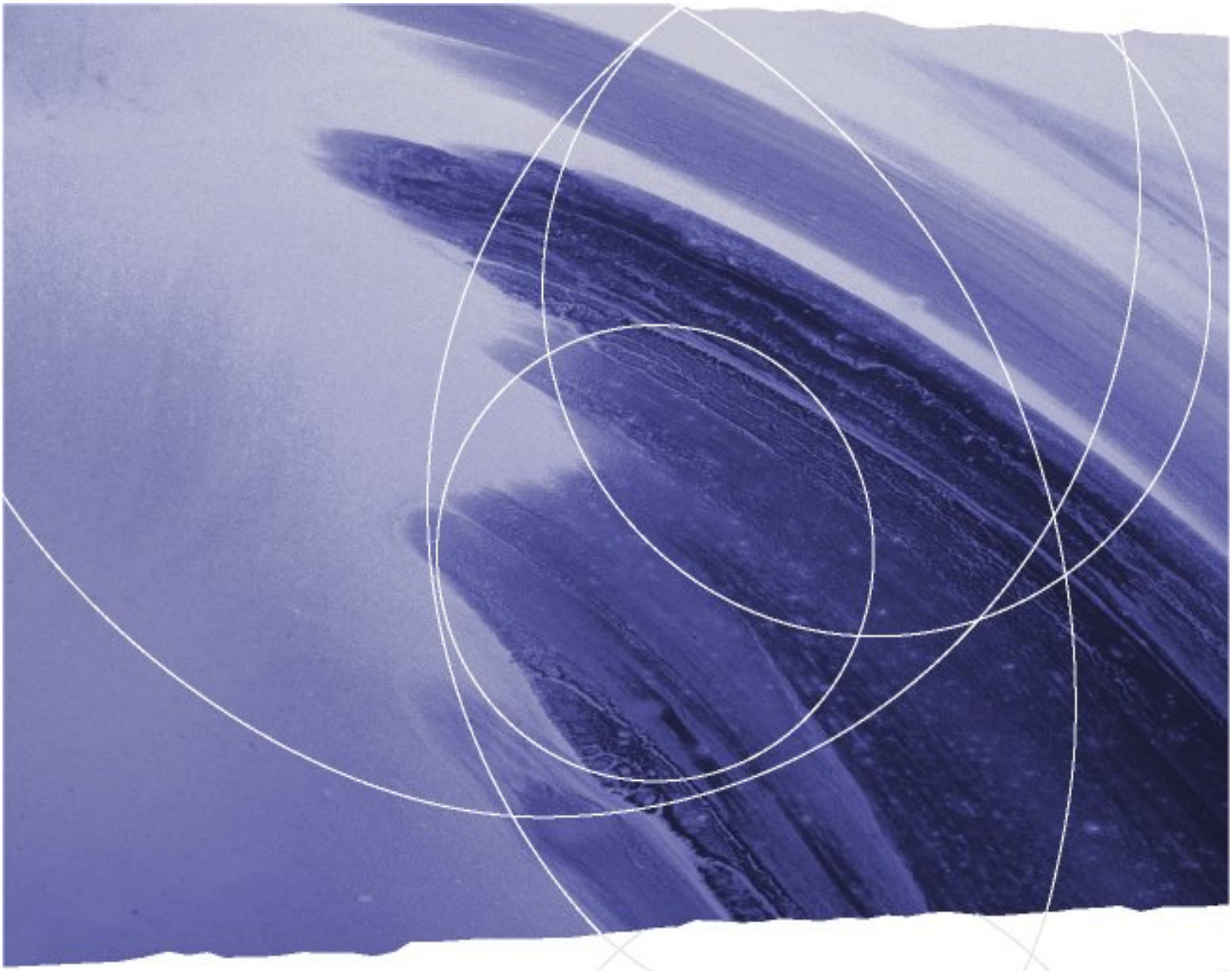
Objective	***Standard***
Statement of the Competency	**Achievement Context**
To troubleshoot a control system.	• Following a service call • Referring to drawings, diagrams, troubleshooting guides and technical documentation • Using devices such as measuring instruments, signal generators, signal and load simulators and data sinks • Using hand tools • Using software
Elements of the Competency	**Performance Criteria**
1. Gather and analyze information about the malfunction.	• Accurate interpretation of service call • Appropriate collaboration with production and maintenance staff • Appropriate use of failure log • Proper determination of emergencies and priorities
2. Diagnose the malfunction.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection and use of measuring instruments • Appropriate inspection of components • Accurate analysis of the functioning of the process • Appropriate verification of the functioning of power electronics equipment, control unit, devices in the measuring chain, final controlling elements and networks • Appropriate use of troubleshooting guide • Appropriate use of software troubleshooting commands • Proper determination of the nature and cause of the malfunction • Observance of occupational health and safety rules

	Code: 043G
3. Replace defective components or devices.	• Accurate interpretation of drawings, diagrams and technical documentation • Appropriate selection of components or devices • Appropriate selection and use of tools • Proper installation of components or devices • Observance of occupational health and safety rules
4. Make the necessary adjustments.	• Accurate interpretation of drawings and technical documentation • Appropriate selection and use of measuring instruments and tools • Appropriate and precise adjustments made to devices in the measuring chain and final controlling elements • Appropriate modifications made to the programs and network configurations • Appropriate use of software • Observance of occupational health and safety rules
5. Restart the control system.	• Proper application of start-up procedure • Appropriate verification of the functioning of the process • Appropriate instructions given to production staff • Observance of occupational health and safety rules
6. Follow up.	• Proper updating of failure log • Clear formulation of recommendations for preventing a recurrent failure • Production of a service report in conformity with requirements

Code: 043H

Objective	*Standard*
Statement of the Competency	**Achievement Context**
To participate in the design of a control project.	• In collaboration with resource people • Referring to technical documentation • Using software • Using simulators • In accordance with the field of activity as defined in current laws and regulations
Elements of the Competency	**Performance Criteria**
1. Analyze the request.	• Identification of the budget • Accurate analysis of company work methods • Proper determination of needs • Proper determination of applicable standards • Adequate planning of project development stages
2. Determine the control strategies to be used.	• Accurate interpretation of technical documentation • Accurate analysis of the functioning of the process • Accurate analysis of the level of integration of production • Accurate analysis of the characteristics of the control systems • Consideration of safety requirements • Consideration of the competency of existing staff and the required technical support • Consideration of maintenance requirements for the control system • Clear sketches and diagrams • Proper, justified selection of control strategies • Observance of budget constraints

	Code: 043H
3. Determine material needs.	• Accurate interpretation of technical documentation • Appropriate consultation of resource people • Appropriate use of research tools • Appropriate use of test bench • Proper, justified selection of electrical distribution supplies • Proper, justified selection of control units, devices in the measuring chain and final controlling elements • Observance of budget constraints
4. Develop control programs.	• Accurate interpretation of technical documentation • Appropriate consultation of resource people • Appropriate use of program development tools • Successful simulation of the functioning of programs • Observance of programming standards • Production of appropriate program documentation • Programs in conformity with control strategies
5. Develop the operator interface.	• Accurate interpretation of technical documentation • Appropriate consultation of resource people • Accurate analysis of the functioning of the process • Accurate analysis of data acquisition, visualization and operation needs • Proper determination of the components of the operator interface • Proper programming of operator interface • Proper simulation of the functioning of the operator interface
6. Finalize the drawings and specifications and have them approved.	• Complete detailed list of materials • Proper determination of the stages in the process • Realistic cost estimate • Use of appropriate vocabulary • Clear drawings and specifications • Observance of rules of presentation • Observance of deadlines • Appropriate correction of drawings and specifications



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