Technical Training Program

243.A0

Computerized Systems Technology

Training Sector

9

Electrotechnology

Québec

Technical Training Program

243.A0

Computerized Systems Technology

Training Sector 9 Electrotechnology

Formation professionnelle et technique
et formation continue

Direction générale de la formation
professionnelle et technique

Development Team

Coordination

Benoît Huot
Coordinator, Vocational training
Direction générale des programmes et du développement
Ministère de l'Éducation, du Loisir et du Sport

Jean Gaudreau
Coordinator, Vocational training engineering
Direction générale des programmes et du développement
Ministère de l'Éducation, du Loisir et du Sport

Nora Desrochers
Coordinator, Sectorial training
Direction générale des programmes et du développement
Ministère de l'Éducation, du Loisir et du Sport

René Brisson
Coordinator, Vocational training engineering
Direction générale des programmes et du développement
Ministère de l'Éducation, du Loisir et du Sport

Design and Development

Gilles Deschênes, Eng.
Teacher, Computerized Systems Technology
Cégep Lionel-Groulx

Pierre Cloutier
Program development consultant

English Version
Direction de la production en langue anglaise
Secteur des services à la communauté Anglophone
Ministère de l'Éducation, du Loisir et du Sport

Technical Editing

Benoît Huot
Cégep Limoilou

ISBN 978-2-550-52850-0 (Printed version)
ISBN 978-2-550-52851-7 (PDF)

Legal Deposit – Bibliothèque et Archives nationales du Québec, 2008

Acknowledgments

The Ministère de l'Éducation, du Loisir et du Sport would like to thank the many people working in the field and in the education community who helped in the development of this technical program, in particular the following individuals:

Representatives Employed in the Field

Jean Anderson
Lab-Volt

Guy Beauvais
Superintendent
Automation and instrumentation
Smurfit-Stone Container

Cécile Collinge
Consultant
Commission de la santé et de la sécurité du travail

Charles Côté
Groupe Cadec Automation

Sossie Der Stepanian
Consultant
Comité sectoriel de la main-d'œuvre de l'industrie des produits électriques et électroniques

Jonathan Dumaresq
R&D technician
Centre des technologies des systèmes ordinés

Benoît Guénette
Team leader
Applications Engineering
Teknor Applicom Inc.

Alain Lachance
M2S

Guy Lavoie
Process engineering technician
RD Tech

Alexandre Lefebvre
Programmer
Electromed Imaging

Steve Lemay
Programmer
STR Solutions Temps Réel

Robert Loiselle
Representative
Ordre des ingénieurs du Québec

Diane Montour
Representative
Ordre des technologues professionnels du Québec

Romain Ouellet
Technician
Mégatech Électro inc.

Jean-Yves Paquin
Research technician
Hydro-Québec Inc.

Martin Pilote
Application designer
Domosys Corporation

Pierre Quirion
Programmer
HTRC Paper Technologies Inc.

José Tremblay
R&D technician
Gentec Inc.

Dominic Wong Fortin
R&D technician
Alcatel-Innovative Fibers

Representatives Employed in Education

Gilles Bellemare
Teacher
Cégep Limoilou

Gilles Colette
Teacher
Institut Teccart

Yves Filion
Teacher
Cégep Lionel-Groulx

Raymond Genest
Directeur des études de liaison
Cégep de Sherbrooke

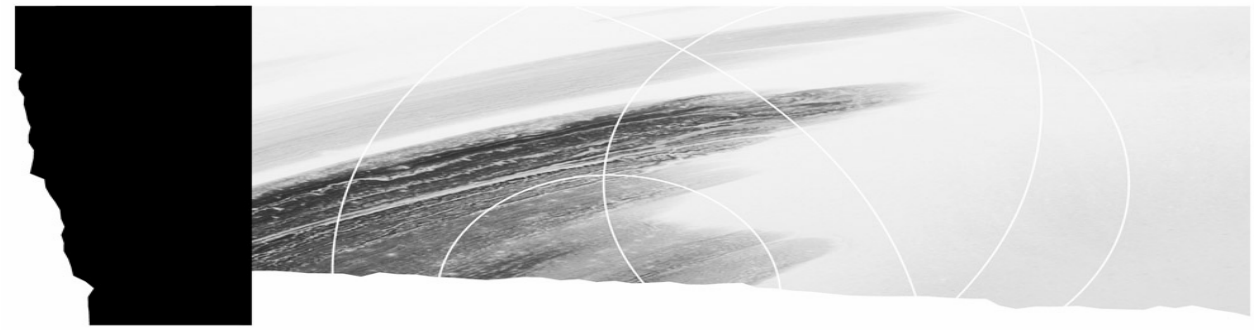
Marcel Hébert
Consultant
University representative
ETS – Université du Québec

Yves Lafond
Teacher
Cégep de Sherbrooke

Jean-François Nadeau
Teacher
Cégep de l'Outaouais

Christian Riopel
Teacher and Coordinator
Institut Teccart

Table of Contents



243.A0 **Computerized Systems Technology**

Year of approval: 2007

Certification:	Diploma of College Studies
Number of credits:	91 2/3 credits
Total duration:	2 790 hours of instruction

General education components:	660	hours of instruction
Program-specific component:	2 130	hours of instruction

Admission Requirements:

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

- Mathematics 436
- Physical Science 436

Introduction to the Program

The *Computerized Systems 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 *Computerized Systems 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 training. 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)**

037B To process information about working in the field of computerized systems technology.
037C To process technical information.
037D To solve mathematical problems associated with computerized systems technology.
037E To diagnose an analog electronics problem.
037F To diagnose a digital electronics problem.
037G To diagnose a problem affecting a circuit containing a microprocessor.
037H To diagnose a problem affecting a computerized systems network.
037J To troubleshoot a computerized system.
037K To communicate in the workplace.
037L To draw electronic schematic diagrams.
037M To plan a computerized system project.
037N To design printed circuits.
037P To produce a computerized system prototype.
037Q To integrate and install computerized system components.
037R To write computerized system procedures.
037S To program computerized systems.
037T To modify computerized system programming.
037U To perform activities related to optimizing a computerized system.
037V To perform activities related to designing a computerized system.

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 training 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.

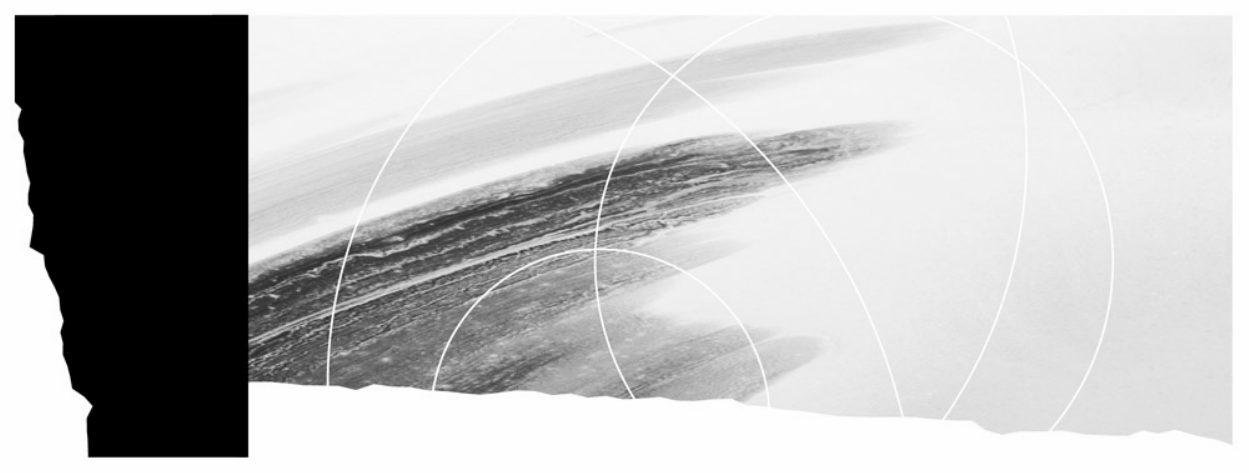
In the general education components, the performance criteria define the requirements for recognition of the attainment of the standard.

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 training 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 literacy.

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.	• Practice 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 links 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	**Achievement Context**
To estimate the contribution of the social sciences to an understanding of contemporary issues.	• Working alone • In an essay of approximately 750 words on the contribution of the social sciences to an understanding of contemporary issues • Using documents and data from the 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 • 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**
	Learning a modern language requires becoming aware of the culture of the people who use the language.
1. Understand the meaning of a verbal 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
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
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

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
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	**Achievement Context**
To recognize the role of mathematics or informatics in contemporary society.	• 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

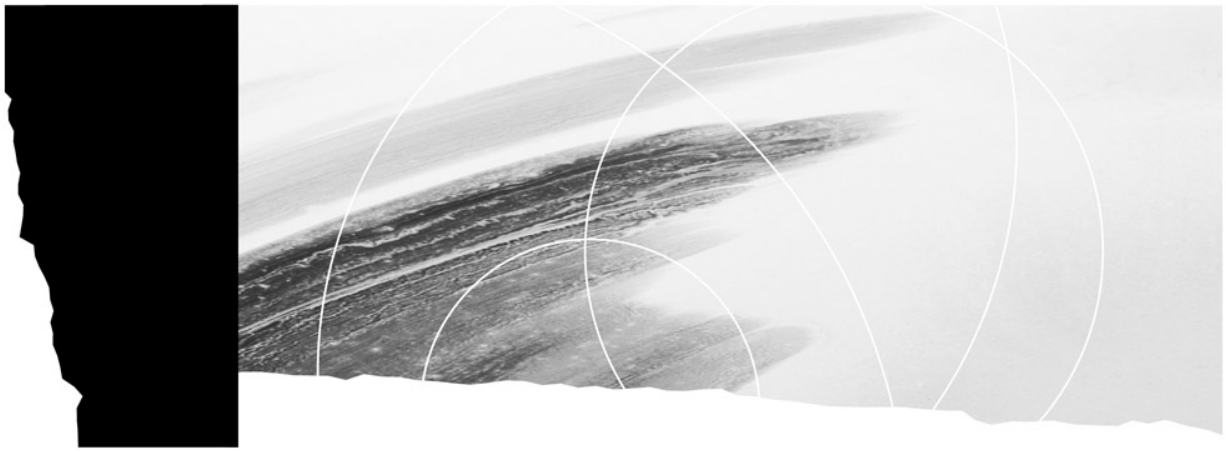
Hours of instruction: 45
Credits: 2

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

Subject-specific glossary

Objectives and Standards of the Program-Specific Component

Goals of the Program-Specific Component

The aim of the *Computerized Systems Technology* program is to prepare students to practise the occupation of computerized systems technologist.

Computerized systems technologists are employed by companies active in production, technical support and research involving computerized systems. Although this description applies primarily to manufacturers, computerized systems technologists can also work for consulting firms or research laboratories. Their principal tasks are analyzing problems and situations, developing and building design projects, writing technical documentation, programming and coding systems, conducting tests and providing technical support.

In the exercise of their occupation, computerized systems technologists primarily use microcomputers and computers, software, computer networks, interfaces and peripherals, electronic components, printed circuits, circuit boards, mechanical products and components, electronic equipment, computerized systems and technical documentation.

As part of their job, computerized systems technologists may work with engineers, other technicians, operators, assemblers, clients and other individuals performing administrative or marketing tasks.

The goals of the program-specific component of the *Computerized Systems Technology* program are based on the general goals of vocational and technical training. These goals are:

- To help students develop effectiveness in the practice of a trade or occupation, that is:
  - to teach students to perform roles, functions, tasks and activities associated with the trade or occupation upon entry into the job market
  - to prepare students to progress satisfactorily on the job (which implies having the necessary technical and technological knowledge and skills in such areas as communication, problem solving, decision making, ethics and health and safety)

- To help students integrate into the work force, that is:
  - to familiarize students with the job market in general as well as 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 instil 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.

The *Computerized Systems Technology* program reconciles two requirements of college education: versatility and the acquisition of the expertise needed to perform occupational tasks upon entry into the job market. Versatility is ensured through the acquisition of general competencies that will allow students to adapt to various technologies, find information in French and English documentation, process this information, diagnose and solve problems, communicate in the workplace, draw diagrams and design circuits. The acquisition of the expertise needed to perform these tasks is ensured primarily through the specific competencies of the program of study.

The program-specific component also aims to encourage students to develop the habit of striving above all for quality in their work for clients and to recognize a range of needs when carrying out work activities that can affect an entire computerized system, certain system components and subassemblies.

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

COMPUTERIZED SYSTEMS TECHNOLOGY

SPECIFIC COMPETENCIES	Number of the Competency	GENERAL COMPETENCIES: To process information about working in the field of computerized systems technology	To process technical information	To solve mathematical problems associated with computerized systems technology	To diagnose an analog electronics problem	To diagnose a digital electronics problem	To diagnose a problem affecting a circuit containing a microprocessor	To diagnose a problem affecting a computerized systems network	To communicate in the workplace	To draw electronic schematic diagrams	To design printed circuits
Number of the Competency		1	2	3	4	5	6	7	9	10	12
To troubleshoot a computerized system	8	O	O	O	O	O	O	O	O	O	O
To plan a computerized system project	11	O	O	O	O	O	O	O	O	O	O
To produce a computerized system prototype	13	O	O	O	O	O	O	O	O	O	O
To integrate and install computerized system components	14	O	O	O	O	O	O	O	O	O	O
To write computerized system procedures	15	O	O	O	O	O	O	O	O	O	O
To program computerized systems	16	O	O	O	O	O	O	O	O	O	O
To modify computerized system programming	17	O	O	O	O	O	O	O	O	O	O
To perform activities related to optimizing a computerized system	18	O	O	O	O	O	O	O	O	O	O
To perform activities related to designing a computerized system	19	O	O	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 *Computerized Systems 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 systèmes ordinés.*

Subject-specific glossary

To facilitate understanding, this program includes a glossary of the terms used. In addition to these general terms, the following glossary defines more specific terms from the *Computerized Systems Technology* program.

Adjust

To carefully fit one thing to another.

Analog

A way to represent data by means of continuously variable quantities, as well as the processes and devices that make use of such data.

Calibrate

To physically set the position of reference points (eventually only main reference points need be done) of a measuring instrument in accordance with the corresponding values of the unit to be measured.

Note: Calibrate is not the same thing as gauge, which means to check or adjust the graduations of a device or instrument by correlating its performance with a standard.

Component

In technology, a permanently installed or attached element of a system, a device or an electronic or electric circuit.

Computerized system

A computerized system is a system comprised of electronic assemblies, made up of one or more microprocessors. They are used to control, command, monitor or assist the operation of a device, machine or process.

Configure

To set up the software or hardware of a computer by specifying the parameters.

Digital

A way to represent data using discrete, countable pulses of fixed size, as well as the processes and devices that make use of such data.

Electric circuit and electronic circuit

An arrangement of any of various conductors through which electric current can flow from a supply current.

Note: Generally speaking, electric circuit is the term used. Electronic circuits have small amplitude currents.

Equipment (hardware)

The collection of machines, components and devices needed to run an installation in a given location (office, shop, plant, workstation, building, operation, etc.) or perform a specific activity.

Note: Equipment is the more general term, while hardware refers specifically to the physical components of a computerized system, as compared to software.

Logic circuit

An electronic circuit that is an arrangement of switches used to calculate operations in Boolean algebra (AND, OR, NOT, NAND, NOR).

Measuring instrument

Device or tool used to compare the size of something to a referenced unit of measurement.
Note: The terms “measuring device” and “measuring instrument” are essentially synonymous.

Microcontroller

A microprocessor that includes set elements and elements customized for an application.

Microprocessor

An electronic computer central processing unit (CPU) that performs arithmetic, logic and control operations (also called micro-instructions) and is made from miniaturized transistors and other circuit elements on a single semiconductor integrated circuit.
Note: A microcontroller is a dedicated microprocessor.

Network

A collection of interconnected elements or equipment, considered as a whole and represented by branches and nodes.

Parameterize

To set the parameters of a software program so that it may perform processes specific to the environment in which it is intended to be used.
To program (a complex device) by defining the parameters that will ensure optimal operation.
To set the values of certain parameters in software designed for this purpose.

Program

To design, write and develop computer programs.

Sensor

A device that detects a change in a physical stimulus and turns it into a signal (usually electric) which can be measured or recorded.

System

A set of interdependent elements constituted to achieve a given objective by performing a specified function (e.g. a computer system).

Tune

To assign a predetermined value to an active or passive circuit that affects the operation of a device. To adjust a machine or mechanism for better functioning.

Code: 037B

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To process information about working in the field of computerized systems technology.	• Using recent documentation and laws and regulations in effect
Elements of the Competency	**Performance Criteria**
1. Gather information on workplaces and the occupation.	• Appropriate selection of information sources • Reliability and diversity of the information gathered • Appropriate use of search tools
2. Analyze the information on workplaces.	• Accurate identification of the types of businesses and establishments • Identification of occupations practised in the field • Identification of professional associations and unions active in the field • Accurate interpretation of the importance and characteristics of technological development • Accurate identification of the types of work organization • Accurate identification of the characteristics of products and services offered by businesses and establishments
3. Analyze the information on the occupation.	• Accurate identification of job specializations • Detailed examination of the tasks and responsibilities of the occupation • Identification of hazards to occupational health and safety • Accurate identification of the knowledge and skills required to practise the occupation • Accurate interpretation of the standards and conventions governing professional ethics • Accurate identification of the limits of the occupation
4. Summarize the information.	• Proper sorting of information • Accurate summary of the information

Code: 037C

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To process technical information.	• Processing information related to current and new technologies • Working with standards, data sheets, specifications, diagrams and manufacturers' recommendations • Using appropriate French and English technical documentation, a networked computer and appropriate software
Elements of the Competency	**Performance Criteria**
1. Gather technical information.	• Accurate determination of the information sought • Appropriate use of the computer, software and search tools • Reliability and variety of information sources • Clarity of communications when consulting resource people • Relevance and completeness of information gathered
2. Organize the information.	• Accurate interpretation of the information gathered • Proper sorting of information • Accurate comparison of data • Careful and coherent organization of data
3. Record the information.	• Correct observance of spelling and grammar rules • Correct observance of writing standards • Appropriate use of software programs
4. Present the information.	• Suitable preparation of the presentation • Appropriate selection of software programs • Appropriate use of software programs • Clear and organized presentation of the information • Consideration of the reader's interest level

Code: 037D

Objective — *Standard*

Statement of the Competency

To solve mathematical problems associated with computerized systems technology.

Achievement Context

- Working with workplace situations and activities
- Using reference documents, data sheets, tables and diagrams, measuring instruments, a calculator, software and a math library

Elements of the Competency	Performance Criteria
1. Perform calculations and make drawings associated with electronic circuits.	• Correct observance of applicable laws and theorems • Proper use of physical values • Appropriate selection and use of the following functions: – elementary – algebraic – logarithmic – exponential – trigonometric • Accurate graphic representation of functions • Accuracy of calculations
2. Draw vector representations of phenomena associated with computerized systems.	• Appropriate selection of representation method, given the phenomenon • Proper execution of the vector analysis and operations • Appropriate use and representation of complex numbers • Accuracy of calculations
3. Determine variation rates.	• Accurate interpretation of the desired objectives • Appropriate selection of a calculation method • Proper use of functions and systems of equations • Accurate calculation of variation rates
4. Solve systems of equations with two or three variables.	• Proper use of problem-solving methods • Accuracy of calculations
5. Assess the results obtained.	• Methodical check of results • Review of plausibility • Accuracy of corrections made
6. Present the results obtained.	• Clear, careful presentation of: – the method used – the results

Code: 037E

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To diagnose an analog electronics problem.	• Working with various analog circuits, analog circuit schematic diagrams and equipment with an analog electronic defect • Following procedures • Using appropriate French and English technical documentation, measuring instruments and tools, antistatic equipment, a networked computer, diagnostic tools and simulation software • In conformity with occupational health and safety rules
Elements of the Competency	**Performance Criteria**
1. Become familiar with the problem and specifications.	• Accurate interpretation of the problem to be diagnosed • Accurate interpretation of: – the circuits and their diagrams – standards – check methods
2. Identify anomalies.	• Systematic check of components' conformity with schematic diagrams • Visual inspection of all components • Proper recording of inspection results
3. Take measurements.	• Appropriate selection and use of measuring instruments • Correct observance of procedure • Accuracy of measurements, considering the effects of the instruments • Proper recording of results
4. Analyze the results.	• Accurate interpretation of check results • Accurate determination of calculations to be made in accordance with: – applicable laws, concepts and theorems – the circuits involved • Accuracy of calculations • Logical processing of results

	Code: 037E
5. Determine the cause or causes of the problem.	• Accurate interpretation of deviations observed • Correct observance of steps in the diagnostic process • Relevance of hypotheses • Accuracy of diagnosis
6. Write a report.	• Clarity and accuracy of information • Use of appropriate terminology

Code: 037F

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To diagnose a digital electronics problem.	• Working with various digital circuits, storage devices and data acquisition systems, digital circuit diagrams and equipment with a digital electronic defect • Following procedures • Using appropriate French and English technical documentation, measuring instruments and tools, antistatic equipment, a networked computer, diagnostic tools and simulation software • In conformity with occupational health and safety rules
Elements of the Competency	**Performance Criteria**
1. Become familiar with the problem and specifications.	• Accurate interpretation of the problem to be diagnosed • Accurate interpretation of: – the circuits and their schematic diagrams – standards – check methods
2. Identify anomalies.	• Systematic check of components' conformity with schematic diagrams • Visual inspection of all components • Proper recording of inspection results
3. Take measurements.	• Appropriate selection and use of measuring instruments • Observance of procedure • Accuracy of measurements, considering the effects of the instruments • Proper recording of results
4. Analyze the results.	• Accurate interpretation of check results • Accurate determination of calculations to be made in accordance with: – applicable laws, concepts and theorems – the circuits involved • Accuracy of calculations • Logical processing of results

	Code: 037F
5. Determine the cause or causes of the problem.	• Accurate interpretation of deviations observed • Observance of steps in the diagnostic process • Relevance of hypotheses • Accuracy of diagnosis
6. Write a report.	• Clarity and accuracy of information • Use of appropriate terminology

Code: 037G

Objective — *Standard*

Statement of the Competency

To diagnose a problem affecting a circuit containing a microprocessor.

Achievement Context

- Working with a system containing a microprocessor with some operational parts, data sheets, circuit schematic diagrams, a standard check-out procedure and instructions
- Using measuring instruments and test sets, simulation and emulation software, a microcomputer, software for which they have the source codes to be modified and completed, a software test bench associated with the microprocessor type and appropriate French and English technical documentation
- In a design, development and prototyping environment

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate identification of: – the problem to solve – components to check – expected circuit behaviour • Accurate interpretation of: – the microprocessor's technical features – interfaces – circuit schematic diagrams – documentation – the standard check-out procedure
2. Install a microprocessor.	• Accurate interpretation of circuit schematic diagrams • Operational installation of: – the microprocessor – software • Proper configuration of entire system

	Code: 037G
3. Conduct tests.	• Observance of the standard check-out procedure • Appropriate selection and proper tuning of audit software • Effective use of a simulation and emulation environment for software tests • Appropriate selection of test points • Appropriate use of measuring instruments and test sets • Accuracy of the various signal measurements • Proper recording of results • Proper identification of anomalies
4. Determine the cause or causes of the problem.	• Accurate interpretation of deviations observed • Relevance of hypotheses • Logical diagnostic process
5. Write a report.	• Methodical reporting of tests conducted and anomalies identified • Clarity and accuracy of information • Use of appropriate terminology

Code: 037H

Objective — *Standard*

Statement of the Competency

To diagnose a problem affecting a computerized systems network.

Achievement Context

- Working with a system containing a microprocessor with some functional sub-systems, data sheets, circuit schematic diagrams, a standard check-out procedure and instructions
- Using measuring instruments and test sets, a protocol analyzer, a microcomputer, diagnostic tools and software, communications software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation and advice from network specialists

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate identification of: – the problem to solve – network architecture – hardware and software components • Accurate interpretation of: – the network's technical features – interfaces – circuit schematic diagrams – documentation – the standard check-out procedure
2. Test the hardware.	• Proper check of the set-up • Systematic operational check of: – communication interfaces – the physical communication standard – transmission signals – the transmission media of cables and connectors • Appropriate selection and use of measuring instruments and test sets • Observance of the standard check-out procedure • Appropriate selection of test points • Accuracy of the various signal measurements • Identification of all anomalies • Proper recording of results

	Code: 037H
3. Check the software.	• Observance of the standard check-out procedure • Proper operational check of the communications software • Proper tuning of the communications software
4. Determine the cause or causes of the problem.	• Accurate interpretation of results • Relevance of hypotheses • Logical diagnostic process • Accurate identification of the hardware or software causing the problem • Precise directions for the corrective actions suggested
5. Record the information.	• Methodical reporting of tests conducted and anomalies identified • Clarity and accuracy of information • Use of appropriate terminology

Code: 037J

Objective — *Standard*

Statement of the Competency

To troubleshoot a computerized system.

Achievement Context

- Working with specifications, circuit schematic diagrams, standards in effect and instructions
- Using preventive maintenance procedures, troubleshooting methods, check procedures, appropriate French and English technical documentation, measuring instruments and test sets, test benches, simulation and emulation software, diagnostic tools and software and a software test bench associated with the microprocessor type
- In conformity with occupational health and safety rules

Elements of the Competency	Performance Criteria
1. Run a preventive maintenance routine.	• Observance of standards and rules in effect • Accurate interpretation of: – preventive maintenance procedure – maintenance schedule • Accuracy of measurements • Accurate recording of results
2. Use a troubleshooting method.	• Appropriate use of measuring instruments and test sets • Accuracy of measurements • Appropriate selection of: – simulation and emulation software – diagnostic tools and software • Proper identification of anomalies • Detailed diagnosis of the causes behind the hardware and software defects and anomalies
3. Take the necessary corrective actions.	• Appropriate selection of repair or replacement activities, given the diagnosis • Accuracy of corrective actions taken • Corrective actions in conformity with the system's technical specifications, procedure and standards
4. Check the system's operation.	• Observance of the check-out procedure • Methodical check of the system's specifications, integrity and expected operation • Proper recording of results

Code:	037J

5. Write a report.	• Clarity, accuracy and concision of report • Clear presentation of: – information gathered to identify problems – analyses and tests conducted – corrective actions taken

Code: 037K

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To communicate in the workplace.	• In various situations involving communication where an individual must listen to client requests, question a client, suggest solutions, negotiate with a client, work in a team and convey technical information in everyday terms • Using various communication methods • In an environment conducive to effective communication and respect for others
Elements of the Competency	**Performance Criteria**
1. Use verbal and written communication techniques specific to the workplace.	• Accurate identification of the basics of good communication • Demonstration of attitudes encouraging harmonious interpersonal relations • Demonstration of tolerance • Adaptation of their approach to the other person and the situation • Demonstration of behaviours that conform with professional ethics • Adaptation of their level of language • Proper use of communication techniques
2. Receive and transmit information.	• Accurate interpretation of verbal and nonverbal messages • Active listening skills • Clear expression of their ideas • Use of appropriate terminology • Appropriate explanation of technical information in everyday terms
3. Use teamwork techniques.	• Accurate identification of: – the roles and responsibilities of team members – their own responsibilities within the team – factors affecting group dynamics
4. Assess the quality of their communications.	• Accurate identification of their strengths and weaknesses with regard to verbal and written communications and their ability to function in a group • Identification of improvement goals • Search for ways to achieve these goals

Code: 037L

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To draw electronic schematic diagrams.	• Working with specifications, circuit schematic diagrams and drawings, standards in effect and instructions • Using catalogues and parts libraries, appropriate French and English technical documentation, a networked computer and electronic circuit drawing software
Elements of the Competency	**Performance Criteria**
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – conventions – electrical and electronic symbols – circuit topologies • Appropriate use of: – technical documentation – catalogues and parts libraries
2. Plan the work.	• Appropriate selection of parts to draw • Visualization of all diagrams • Proper location of components in the schematic diagrams
3. Modify existing schematic diagrams.	• Accurate drafting of new parts • Appropriate integration of parts in the library • Observance of specifications • Appropriate use of drawing software
4. Draw new schematic diagrams.	• Observance of specifications • Appropriate use of drawing software • Proper execution of diagrams
5. Finalize the schematic diagrams.	• Relevance of the layout • Observance of drawing conventions and symbols • Strict application of technical standards in effect • Clarity and accuracy of diagrams
6. Transmit the information.	• Clarity and accuracy of the parts list • Careful presentation of schematic diagrams • Relevance and clarity of explanatory notes

Code: 037M

Objective — *Standard*

Statement of the Competency

To plan a computerized system project.

Achievement Context

- Working with specifications, standards in effect and instructions
- Using information from suppliers, experts and distributors
- Using appropriate French and English technical documentation and a networked computer

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – objectives – desired technological features • Appropriate use of technical documentation
2. Look for information.	• Appropriate use of search tools • Search for all the technologies, parts and components available • Methodical sorting of the information gathered
3. Evaluate possible solutions.	• Mapping of various solutions • Analysis of each solution's advantages and disadvantages • Accurate estimate of the feasibility of each solution with regard to: – completion time – cost – steps involved and degree of difficulty – necessary available resources
4. Contribute to the selection process.	• Clear presentation of analyses performed • Appropriate selection of parts and components • Compatibility of system hardware and software • Relevance of their contribution with regard to feasibility and compliance with specifications
5. Present the project.	• Clarity and concision of information • Clear description of system hardware and software • Thorough presentation of: – types of data – software functions to be supported – variables to support – data structures • Use of appropriate terminology

Code: 037N

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To design printed circuits.	• Working with specifications, standards in effect and instructions • Using suppliers' specifications, catalogues and parts libraries, appropriate French and English technical documentation, a networked computer and printed circuit board design software • In conformity with the area of expertise defined by laws and regulations in effect
Elements of the Competency	**Performance Criteria**
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – circuit schematic diagrams – standards to observe when tracing printed circuits • Appropriate use of: – technical documentation – catalogues and parts libraries
2. Develop the design.	• Accurate depiction of circuits • Proper identification of component characteristics • Determination of hardware requirements and constraints • Exact location of components
3. Diagram the circuits.	• Proper entry of necessary diagrams • Appropriate selection of electronic component package • Accommodation of printed circuit characteristics • Appropriate selection of circuit building techniques • Proper use of printed circuit board design software • Proper development of circuit routing • Meticulous tracing of circuits
4. Validate the design.	• Careful quality inspection of the printed circuit board • Check of part and component integrity • Relevance of tests conducted • Systematic identification of anomalies • Accuracy of corrective actions taken

Code: 037N

5. Document the design.	• Clarity, accuracy and concision of the information • Production of various files needed to build circuits • Use of appropriate terminology

Code: 037P

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To produce a computerized system prototype.	• Working with specifications, data sheets, circuit schematic diagrams, mechanical plans, standards in effect, a standard check-out procedure and instructions • Using catalogues of parts, circuits and components • Using handheld and power tools to mount components onto printed circuit boards, measure, drill, saw and bend • Using antistatic equipment, measuring instruments and test sets, simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation and a networked computer • In a design, development and prototyping environment • In conformity with occupational health and safety rules
Elements of the Competency	**Performance Criteria**
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – circuit schematic diagrams – assembly plans and drawings – safety and protective measures – standards to observe – the steps involved in building a prototype – manufacturers' specifications • Clear identification of hardware and software components • Appropriate use of: – technical documentation – parts catalogues

Code: 037P

2. Assemble the prototype.	• Exact location of the components to be mounted on the printed circuit board • Proper identification of assembly techniques • Appropriate selection of: – tools and accessories – products • Meticulous preparation of equipment • Observance of assembly techniques and procedures • Systematic check of the components' conformity with circuit diagrams • Proper assembly of the prototype casing
3. Make all internal and external connections.	• Proper installation of connectors • Proper use of fasteners, gluing and riveting • Proper use of handheld power tools • Proper installation of cables and connectors in the package • Proper connection of peripherals and interfaces • Conformity of connections with specifications
4. Install the software.	• Proper application of the installation procedure • Careful integration of software modules • Proper configuration of overall system • Accurate interpretation of algorithms • Efficient use of the environment's compilation functions • Identification of compilation errors • Correction of compilation errors • Efficient use of the environment's execution and debugging functions • Proper preparation of test routines needed to check the program's operation
5. Test the prototype.	• Appropriate selection and use of: – measuring instruments and test sets – simulation and emulation software • Relevance of tests conducted • Observance of the standard check-out procedure • Systematic identification of anomalies • Accuracy of measurements • Proper recording of results

	Code: 037P
6. Take the necessary corrective actions.	• Appropriate selection of: – repair or replacement activities, given the hardware diagnosis – software tuning steps • Accuracy of corrective actions taken and tuning performed • Conformity of corrective actions and tuning with the system's technical specifications, the procedure and standards in effect
7. Document the prototype.	• Clarity, accuracy and concision of the information • Accuracy of the information on the work done • Use of appropriate terminology

Code: 037Q

Objective

Statement of the Competency

To integrate and install computerized system components.

Standard

Achievement Context

- Working with specifications, data sheets, circuit schematic diagrams, mechanical plans, standards in effect, a standard check-out procedure, instructions, interfaces and peripherals
- Using catalogues of parts, circuits and components, antistatic equipment, measuring instruments and test sets, simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation and a networked computer
- In an upgrading and development environment
- In conformity with occupational health and safety rules

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – circuit schematic diagrams – assembly plans and drawings – safety and protective measures – standards to observe – the steps in the installation process – manufacturers' specifications • Clear identification of the desired results • Appropriate use of: – technical documentation – parts catalogues
2. Analyze the planned system.	• Accurate identification of the system's: – functions – parameters – configuration – hardware – software

	Code: 037Q
3. Plan the integration and installation process.	• Proper analysis of the request • Accurate identification of the operations to be performed • Appropriate selection of the necessary hardware and equipment • Meticulous preparation of: – technical documentation – equipment – software – measuring instruments and test sets • Proper recording of planning
4. Assemble the system.	• Correct observance of hardware and software installation techniques and procedures • Strict application of installation procedures • Meticulous check of the electrical and software compatibility of control units, interfaces and peripherals • Functional set-up of control units, interfaces and peripherals • Proper configuration of hardware installed • Connections in conformity with specifications • Strict application of safety standards
5. Integrate the software.	• Proper application of the installation procedure • Careful integration of software modules • Accurate interpretation of algorithms • Efficient use of the environment's compilation functions • Efficient use of the environment's execution and debugging functions • Proper preparation of test routines needed to check the program's operation
6. Test the system.	• Appropriate selection and use of: – measuring instruments and test sets – simulation and emulation software • Relevance of tests conducted • Proper configuration of overall system • Observance of the standard check-out procedure • Systematic identification of anomalies • Accuracy of measurements • Proper recording of results

	Code: 037Q
7. Take the necessary corrective actions.	• Appropriate selection of: – repair or replacement activities, given the hardware diagnosis – software tuning activities • Careful tuning of system • Accuracy of corrective actions taken • Conformity of corrective actions and tuning performed with the system's technical specifications, the procedure and standards in effect • Meticulous final inspection
8. Document the system.	• Clarity, accuracy and concision of the information • Accuracy of the information on the work done • Use of appropriate terminology

Code: 037R

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To write computerized system procedures.	• Working with specifications, data sheets, circuit schematic diagrams, mechanical plans, standards in effect and instructions • Using measuring instruments and test sets, appropriate French and English technical documentation and a networked computer • In conformity with occupational health and safety rules • Writing assembly, calibration, start-up and test procedures • In accordance with the area of expertise defined by laws and regulations in effect
Elements of the Competency	**Performance Criteria**
1. Focus on the desired results.	• Accurate interpretation of: – specifications – circuit schematic diagrams – assembly plans and drawings – safety and protective measures – standards to observe – the steps in the installation process – manufacturers' specifications • Accurate depiction of a computerized system • Proper identification of command and control parameters • Proper identification of procedure functions
2. Determine work strategies.	• Appropriate selection of techniques and devices • Proper identification of the sequence of operations • Observance of standards in effect and specifications • Strict application of occupational health and safety rules • Relevance of strategies selected, given the desired results

	Code: 037R
3. Check the effectiveness of the strategies selected.	• Appropriate selection of measuring instruments and test sets • Conformity of the test environment with the procedures to be checked • Meticulous execution of tests • Accurate interpretation of results • Accuracy of corrective actions taken
4. Produce the final version.	• Clarity, accuracy and concision of procedures • Relevance of information, given the desired results • Use of appropriate terminology

Code: 037S

Objective — *Standard*

Statement of the Competency

To program computerized systems.

Achievement Context

- Working with specifications, standards in effect, a standard check-out procedure and instructions
- Using simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation, a networked computer and an operating system
- In various types of software development environments
- In various programming languages

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – standards to observe • Comparison of the options and characteristics of various languages, with regard to the desired results • Appropriate selection of the language, using strict criteria • Preliminary study of the proposed software environment • Proper identification of: – system hardware and software – input and output data – the system's functions – desired results • Appropriate use of technical documentation
2. Define algorithms.	• Proper identification of the variables to support • Appropriate selection of optimal data structures • Accurate definition of the type of processing • Proper identification of the algorithm performance conditions • Mode selected to represent algorithm in conformity with standards in effect • Identification of a logical sequence of operations • Identification of processing structures appropriate for each operation • Strict application of rules of syntax characteristic of the selected mode of representation • Presence of all information needed for interpreting the algorithm

	Code: 037S
3. Customize the environment.	• Efficient use of the environment's resources • Efficient file management during application development • Successful customization of the environment, given the application's standards and characteristics • Proficient construction of a personal library
4. Code the program.	• Strict approach when applying algorithms • Application of rules of syntax and semantics characteristic of the language used • Strict application of codification standards • Proper application of the principles of structured programming • Recording of relevant comments that conform with the standards in effect • Accurate definition of functions and their parameters • Sufficient documentation of the sources produced
5. Perform compilation exercises.	• Efficient use of the environment's compilation functions • Identification of compilation errors • Correction of compilation errors
6. Conduct tests.	• Efficient use of: – execution functions – debugging functions – a simulator – an emulator • Preparation of sets of tests needed to check the program's operation • Accurate interpretation of results • Appropriate debugging of the program according to the algorithm • Proficient running of tests on software modules • Relevance of tests conducted • Observance of the standard check-out procedure • Systematic identification of anomalies • Proper recording of results
7. Optimize the code.	• Successful final tuning with operational parts • Thorough check of entire system • Satisfactory demonstration of software's operation
8. Document the program.	• Coherent organization of information in the modules • Relevance and quality of comments • Accuracy of information on the work done • Use of appropriate terminology

Code: 037T

Objective — *Standard*

Statement of the Competency

To modify computerized system programming.

Achievement Context

- Working with specifications, programs, standards in effect, a standard check-out procedure and instructions
- Using simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation and a networked computer
- In various types of software development environments
- In various programming languages

Elements of the Competency	Performance Criteria
1. Become familiar with the specifications.	• Accurate interpretation of: – specifications – standards to observe – desired modifications • Proper identification of: – system hardware and software – input and output data – the system's functions – desired results – languages used • Appropriate use of technical documentation
2. Analyze the existing programs.	• Reconstitution of programs in the appropriate environment and under the original conditions • Methodical formulation of hypotheses aimed at modifying the program • Appropriate use of debugging, simulation and emulation tools to check the hypotheses
3. Plan the work.	• Detailed planning of analyses, coding and compilations • Realistic planning of: – the organization of the modified program components – program documentation – tests and checks

	Code: 037T
4. Modify programming.	• Accuracy of program documentation, compilations and coding • Proper implementation of modifications • Appropriate use of debugging, simulation and emulation tools
5. Conduct tests.	• Observance of test procedures • Appropriate use of simulators and emulators • Proper check of the system's operating parameters • Proper check of the modifications' effects on the system • Accurate validation of the modifications' relevance • Accurate interpretation of results
6. Write an analysis report.	• Meticulous recording of all information on the modifications • Clarity, accuracy and concision of report • Accuracy of information on the work done • Use of appropriate terminology

Code: 037U

Objective	***Standard***
Statement of the Competency	**Achievement Context**
To perform activities related to optimizing a computerized system.	• Working with specifications, technical specifications, standards, electronic schematic diagrams and a system history • Using catalogues of parts, circuits and components, measuring instruments and test sets, simulation and emulation software, a software test bench associated with the microprocessor type, appropriate French and English technical documentation and a networked computer • In conformity with the area of expertise defined by laws and regulations in effect
Elements of the Competency	**Performance Criteria**
1. Analyze the existing system's performance and characteristics.	• Proper identification of the system's hardware, software and functions • Accurate interpretation of the system history • Appropriate selection and proper execution of checks and tests
2. Identify the hardware and software modifications to be made.	• Accurate interpretation of: – specifications – technical specifications – standards – desired objectives • Accurate search for the necessary information • Appropriate documentation of the work to be done • Proper identification of the modifications to be made • Accurate diagramming of the optimization
3. Modify the system.	• Proper modification of electronic schematic diagrams • Replacement of appropriate components • Coherent organization of the information in modules • Observance of coding conventions • Relevance and quality of comments

	Code: 037U
4. Check the system's operation.	• Appropriate selection and proper execution of performance tests • Accurate interpretation of results • Tuning of system in accordance with specifications and check results
5. Document the optimization.	• Clarity, accuracy and concision of the information on the work done • Accuracy of the information transmitted in the form of documentation and computer files • Use of appropriate terminology

Code: 037V

Objective

Standard

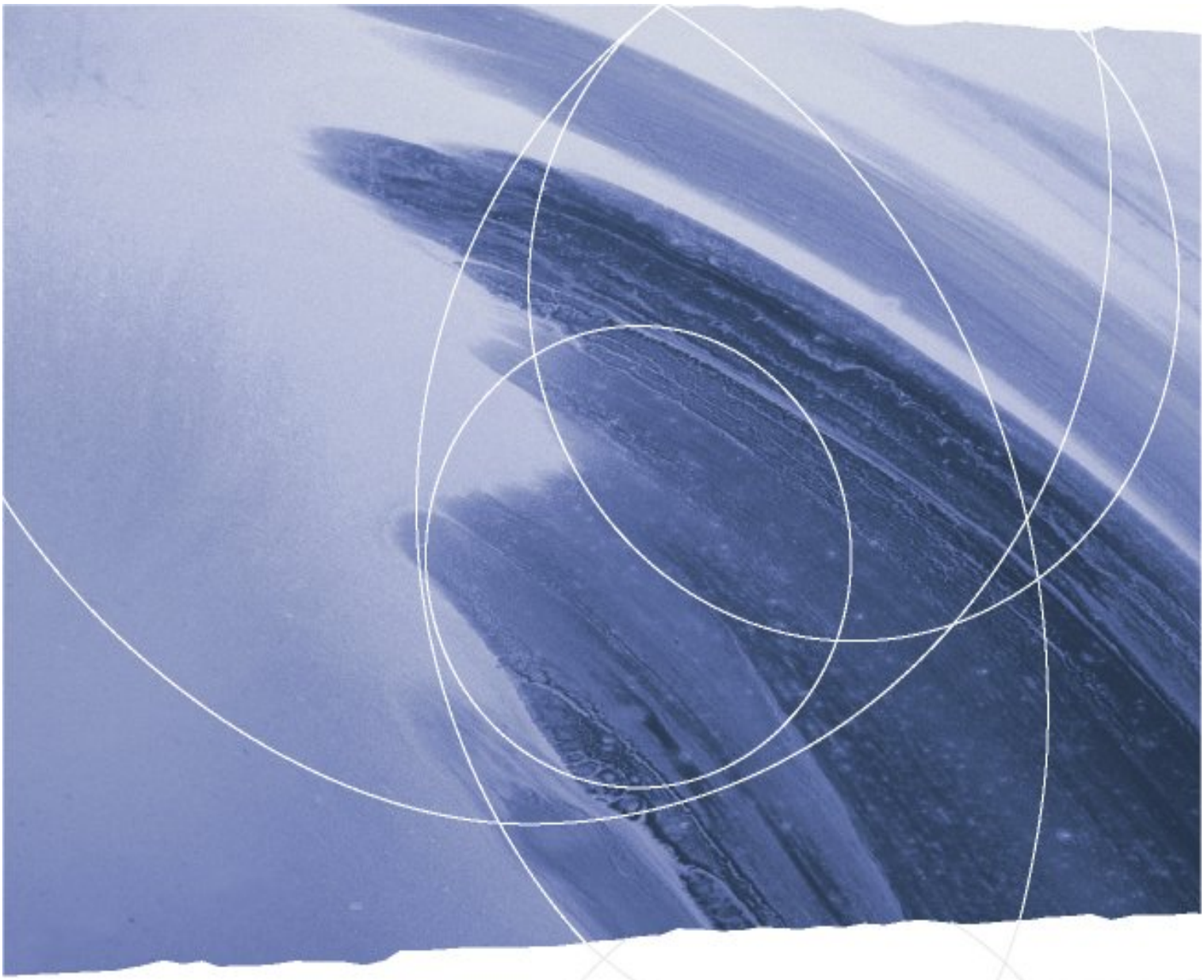
Statement of the Competency

To perform activities related to designing a computerized system.

Achievement Context

- Working with specifications, technical specifications and standards
- Using measuring instruments and test sets, planning and drawing software, a networked computer and technical documentation related to the project
- In a design, development and prototyping environment
- In conformity with the area of expertise defined by laws and regulations in effect

Elements of the Competency	Performance Criteria
1. Focus on the desired objectives.	• Proper identification of the planned computerized system's characteristics and functions • Accurate interpretation of specifications, standards and technical specifications
2. Look for information.	• Appropriate selection and use of a research method • Research and identification of relevant technologies, parts and components
3. Develop the design.	• Relevance of preliminary plans and diagrams • Appropriate selection of technologies • Coherence of formatting plan
4. Validate the design.	• Appropriate circuit design • Meticulous assembly of prototype • Appropriate selection and proper execution of tests • Compatibility check of software with hardware • Accurate interpretation of results • Accuracy of corrective actions taken, given the validation results • Thorough check of the system's conformity with specifications
5. Document the project.	• Clarity of drawings and schematic diagrams • Complete list of parts and components • Accuracy of the information transmitted in the form of documentation and computer files • Use of appropriate terminology



Éducation,
Loisir et Sport
Québec

17-0959-01A