Computer Science Technology (420.B0)

College program

Sector 1 – Administration, Commerce and Computer Technology

College Education Program

Québec

This document was produced by the
Ministère de l'Éducation et de l'Enseignement supérieur

Coordination and writing
Direction des programmes de formation collégiale
Direction générale des affaires collégiale
Secteur de l'enseignement supérieur

Title of original document
Techniques de l'informatique (420.B0), Programme d'études techniques

English translation
Direction des services à la communauté anglophone – Services langagiers
Services aux anglophones, aux autochtones et à la diversité culturelle
Ministère de l'Éducation et de l'Enseignement supérieur

Technical Editing
Jaya Nilakantan
Computer science technology teacher
Dawson College

For additional information, contact:
General Information
Direction des communications
Ministère de l'Éducation et de l'Enseignement supérieur
1035, rue De La Chevrotière, 28e étage
Québec (Québec) G1R 5A5
Telephone: 418-643-7095
Toll-free: 1-866-747-6626

© Gouvernement du Québec
Ministère de l'Éducation et de l'Enseignement supérieur, 2018

ISBN 978-2-550-80473-4 (PDF)

Legal Deposit – Bibliothèque et Archives nationales du Québec, 2018

Table of Contents

420.B0	Computer Science Technology

Type of certification:	Diploma of College Studies
Number of credits:	91 ⅔ credits
Number of periods of instruction:	2 670 hours of instruction

General education component:	660 26 ⅔	periods of instruction credits
Program-specific component :	2 010	periods of instruction
13 compulsory objectives and standards		32 to 35 credits
6 or 7 objectives and standards selected by the educational institutions		30 to 33 credits

The *Computer Science Technology* program consists of 13 compulsory objectives and standards as well as a list of 15 objectives and standards selected by the educational institutions.

The compulsory objectives and standards contribute to the student's acquisition of broad and core competencies that allow him or her to be versatile and to transfer knowledge and skills to a variety of work settings. Their aim is to ensure the comparability of training.

The objectives and standards selected by the educational institutions enable the student to acquire specialized competencies that will allow him or her to develop field- and task-specific knowledge and skills. They were established to encourage educational institutions to cultivate industry experts and are meant to supplement the compulsory objectives and standards.

Admission Requirements:

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

Mathematics:

Secondary IV, Technical and Scientific option OR Secondary IV, Science option OR Secondary V, Cultural, Social and Technical option

College-Level Programs

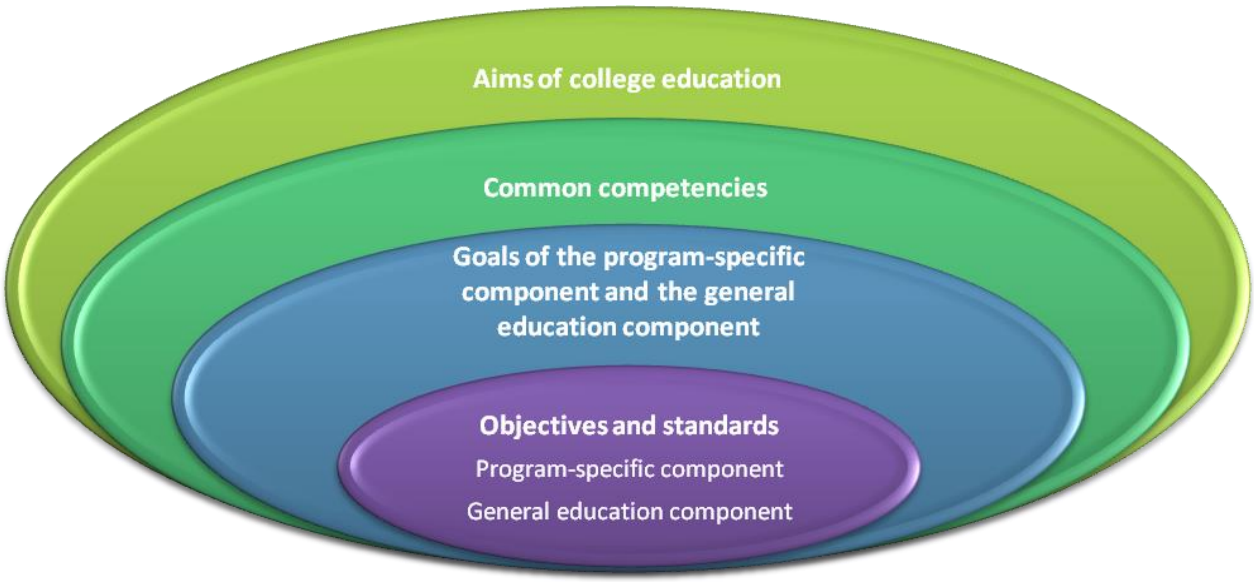
In Québec, college is the next stage after the compulsory years of schooling (elementary and secondary school). College graduates enter the labour market directly or proceed to university studies. The Minister establishes the programs of study, while individual colleges ensure their implementation.

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

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

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

Figure 1 – Elements of a College-Level Program



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

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

Aims of College Education

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

To educate students to live responsibly in society

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

To help students integrate cultural knowledge into their studies

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

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

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

Common Competencies of College Education

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

Solve problems

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

Use creativity

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

Adapt to new situations

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

Exercise a sense of responsibility

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

Communicate

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

Implementation of College-Level Programs

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

The *Computer Science Technology* Program

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

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

The program-specific component consists of 65 credits.

The general education component that is common to all programs consists of 16⅔ credits:

- Language of Instruction and Literature: 7⅓ credits
- Philosophy or Humanities: 4⅓ credits
- Physical Education: 3 credits
- Second Language: 2 credits

The general education component that is specific to the program consists of 6 credits:

- Language of Instruction and Literature: 2 credits
- Philosophy or Humanities: 2 credits
- Second Language: 2 credits

The complementary general education component, which aims to expose students to subject areas outside their program of study, consists of 4 credits and includes courses in the following areas:

- Social Sciences
- Science and Technology
- Modern Language
- Mathematics Literacy and Computer Science
- Art and Aesthetics
- Contemporary Issues

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

Goals of the Program

Program-Specific Component

The goals of the program-specific component of the *Computer Science 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, health and safety)

- To help students integrate into the workforce, that is:
  - to familiarize students with the job market in general and the context surrounding the occupation they have chosen
  - to familiarize students with their rights and responsibilities as workers

- To foster students' personal development and acquisition of occupational knowledge, skills, perceptions and attitudes, that is:
  - to help students develop their autonomy and the desire to learn, and acquire effective work methods
  - to help students understand the principles underlying the techniques and the technology used in the trade or occupation
  - to help students develop self-expression, creativity, initiative and entrepreneurial spirit
  - to help students adopt the attitudes required to successfully practise the trade or occupation, and instill in them a sense of responsibility and a concern for excellence

- To promote job mobility, that is:
  - to help students develop positive attitudes toward change
  - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

Educational Aims

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

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

The following is a description of the aims of the program-specific component of the *Computer Science Technology* program:

- Develop autonomy and foster versatility
- Develop the ability to think abstractly
- Promote values of equity with regard to access to computer technologies

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

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

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

English, Language of Instruction and Literature

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

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

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

Humanities

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

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

- determination to continue learning

French as a Second Language

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

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

Physical Education

Students who have achieved the general education objectives in physical education

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

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

Complementary General Education Component

Social Sciences

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

Science and Technology

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

Modern Language

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

Mathematics Literacy and Computer Science

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

Art and Aesthetics

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

Contemporary Issues

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

Goals of the Program-Specific Component

The *Computer Science Technology* program prepares students to practise the occupation of computer science technician in the applications development and computer network administration fields.

In the applications development field, technicians participate in the design of applications operating on different platforms and carry out development and maintenance activities. A large number and variety of applications are developed and used in nearly all industries.

In the computer network administration field, technicians participate in the design of computer networks and carry out installation, management and security activities on networks, servers and computing devices. Their duties consist of ensuring the efficient operation of Internet and intranet services associated with the network, such as the sharing of resources, communications, hosting, telephony, etc.

Technicians also provide technical support to users.

Depending on the scale of the project, the work may be carried out individually or in collaboration with various specialists: other computer technicians, analysts, network or data architecture consultants, project managers, persons responsible for quality assurance, suppliers, etc.

The work environment can vary greatly. It is often made up of cutting-edge hardware and software, and sometimes includes previous generations of components. The work therefore requires a significant ability to adapt, the continuous upgrading of knowledge, excellent reasoning skills, the application of a structured approach, flexibility and an open mind.

Objectives

Statements of the Competency

Program-Specific Component

The program-specific component of the *Computer Science Technology* program consists of 13 compulsory objectives and standards and a list of 15 objectives and standards from which the educational institutions can choose. In order to comply with the guidelines established to clearly distinguish between the two sets of competencies, a compulsory objective and an optional objective cannot be assigned to the same course.

The following competencies are compulsory and are developed through training that varies between 32 and 35 credits:

0000 Analyze information about working in the field of computer science technology

00Q1 Install and manage computers

00Q2 Use programming languages

00Q3 Solve computer-related problems using mathematics

00Q4 Use office productivity software

00Q5 Deploy a local computer network

00Q6 Use an object-oriented development approach

00Q7 Use a database management system

00Q8 Carry out prevention operations with regard to information security

00SE Interact in a professional setting

00SF Evaluate software and hardware components

00SG Provide users with technical support

00SH Adapt to information technologies

In addition to the compulsory competencies, the educational institution selects 6 or 7 competencies, which are the subject of training that varies between 30 and 33 credits:

00SJ Deploy intranet servers

00SK Deploy Internet servers

00SL Deploy database servers

00SM Deploy computer internetworking devices

00SN Automate computer network management tasks

00SP Monitor computer networks

00SQ Collaborate on the design of a computer network

00SR Develop native applications without a database

00SS Develop native applications with a database

00ST Develop non-transactional Web applications

00SU Develop transactional Web applications

00SV Develop data exchange services

00SW Develop gaming or simulation applications

00SX Develop applications for connected objects

00SY Collaborate on the design of applications

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

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

English, Language of Instruction and Literature

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

Humanities

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

French as a Second Language

One objective to be met from the following:

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

One objective to be met from the following:

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

Physical Education

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

Complementary General Education Component

4 credits, 90 periods of instruction

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

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

Grid of Competencies

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

The grid of competencies includes:

- the general competencies of the program-specific component, which deal with work-related activities common to various tasks or situations. These competencies are compulsory and are listed in order of complexity.
- the specific competencies, which deal with tasks directly related to the practice of the trade or occupation. These competencies are selected by each educational institution and are not listed in order of complexity, since they may be acquired at various points throughout the program.

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

COMPUTER SCIENCE TECHNOLOGY

SPECIFIC COMPETENCIES	Competency Number	GENERAL COMPETENCIES												
		Analyze information about working in the field of computer science technology	Install and manage computers	Use programming languages	Solve computer-related problems using mathematics	Use office automation software	Deploy a local computer network	Use an object-oriented develoment approach	Use a database management system	Carry out prevention operations with regard to information security	Interact in a professional setting	Evaluate software and hardware components	Provide users with technical support	Adapt to information technologies
Competency Number		0000	00Q1	00Q2	00Q3	00Q4	00Q5	00Q6	00Q7	00Q8	00SE	00SF	00SG	00SH
Deploy intranet servers	00SJ	○	○		○	○	○			○	○		○	○
Deploy Internet servers	00SK	○			○	○	○			○	○		○	○
Deploy database servers	00SL	○	○		○	○	○		○	○	○		○	○
Deploy computer internetworking devices	00SM	○			○	○	○			○	○		○	○
Automate computer network management tasks	00SN	○		○	○	○		○	○	○	○		○	○
Monitor computer networks	00SP	○			○	○			○	○	○		○	○
Collaborate on the design of a computer network	00SQ	○			○	○				○	○	○		○
Develop native applications without a database	00SR	○	○	○	○	○		○		○	○		○	○
Develop native applications with a database	00SS	○	○	○	○	○		○	○	○	○		○	○
Develop non-transactional Web applications	00ST	○	○	○	○	○	○	○	○	○	○		○	○
Develop transactional Web applications	00SU	○	○	○	○	○	○	○	○	○	○		○	○
Develop data exchange services	00SV	○	○	○	○	○	○	○	○	○	○		○	○
Develop gaming or simulation applications	00SW	○	○	○	○	○		○	○	○	○		○	○
Develop applications for connected objects	00SX	○	○	○	○	○	○	○	○	○	○		○	○
Collaborate on the design of applications	00SY	○			○	○				○	○	○		○

Program-Specific Component — Compulsory Competencies

Code: 0000

Objective — *Standard*

Statement of the Competency	Achievement Context
Analyze information about working in the field of computer science technology.	• Using reference materials and research tools

Elements of the Competency	Performance Criteria
1. Gather information on occupations and workplaces in computer science technology.	• Appropriate choice of sources of information • Reliability and diversity of information gathered • Appropriate use of research tools
2. Analyze information on the companies and establishments that hire computer science technicians.	• Accurate distinction of the main characteristics of the fields of applications development and network management • Accurate distinction of the features of the products and services offered by the companies and establishments • Accurate distinction of the different occupations • Appropriate identification of the professional associations and unions concerned • Appropriate identification of the sources and levels of risk with regard to occupational health and safety
3. Analyze information about the occupation of computer science technician.	• Detailed review of the tasks and responsibilities related to the occupation • Accurate distinction of the knowledge, behaviours, attitudes and skills required to practise the occupation • Accurate distinction of the limits of the scope of practice of the occupation

Code: 00Q1

Objective *Standard*

Statement of the Competency	Achievement Context
Install and manage computers.	• For different operating systems • Based on a request • Using computers, peripheral devices, removable internal components, etc. • Using technical documents • Using operating systems, applications, utilities, drivers, plug-ins, etc.

Elements of the Competency	Performance Criteria
1. Prepare the computer.	• Accurate interpretation of the request • Accurate interpretation of the computer equipment specifications • Correct addition of removable components • Proper connection of peripheral devices • Ergonomic set-up of the computer and its peripheral devices
2. Install the operating system.	• Appropriate use of file system preparation utilities • Proper installation of the operating systems and drivers • Proper configuration of the operating system and drivers • Customization of the operating system based on user needs
3. Install the applications.	• Correct application of the procedure for installing the applications and plug-ins • Correct configuration of the applications and plug-ins • Customization of the applications and plug-ins based on user needs • Proper performance of the applications
4. Perform operating system management tasks.	• Functional organization of the structure of files and directories • Appropriate use of archiving and compression software • Proper creation of user accounts and groups • Proper assignment of access rights • Appropriate management of processes, memory and disk space • Correct writing of scripts

Code: 00Q2

Objective *Standard*

Statement of the Competency	Achievement Context
Use programming languages.	• For problems that are easily solved • Using basic algorithms • Using a debugger and a functional test plan

Elements of the Competency	Performance Criteria
1. Analyze the problem.	• Correct breakdown of the problem • Proper identification of input and output data and of the nature of the processes • Appropriate choice and adaptation of the algorithm
2. Translate the algorithm into a programming language.	• Appropriate choice of instructions and types of elementary data • Efficient modularization of code • Logical organization of instructions • Compliance with the language syntax • Computer code consistent with the algorithm
3. Debug the code.	• Efficient use of the debugger • Identification of all errors • Astute choice of debugging strategies • Relevance of the corrective actions • Clear record of solutions to the problems encountered
4. Implement the functional test plan.	• Attitudes and behaviours that demonstrate thoroughness • Identification of all operational errors • Relevance of the corrective actions • Proper functioning of the program • Clear record of information concerning tests and their results

Code: 00Q3

Objective *Standard*

Statement of the Competency	Achievement Context
Solve computer-related problems using mathematics.	• Based on situational problems • Using quantitative data

Elements of the Competency	Performance Criteria
1. Process numbers as they are represented in the computer memory.	• Accurate representation of numbers in different base systems • Accurate conversion of numbers from one base to another • Accurate interpretation of the ranges of numeric types • Accurate interpretation of the precision of numeric types • Appropriate choice of the numeric type
2. Represent two-dimensional geometric figures in the form of digital images.	• Correct identification of the size, dimensions and resolution of the image • Accurate representation of points and lines • Correct application of translation equations, rotation equations and homothetic equations • Consistency of geometric figures with their graphic representation
3. Model multi-variable logical reasoning.	• Correct formulation of logical functions • Efficient simplification of logical functions • Appropriate use of Boolean algebra • Accurate production of truth tables • Appropriate verification of logical functions
4. Process quantitative data using descriptive statistics.	• Precise calculation of the average, median, variance and standard deviation • Clarity and accuracy of the graphic representation of data • Accurate analysis of results

Code: 00Q4

Objective *Standard*

Statement of the Competency	Achievement Context
Use office productivity software.	• Using word processing software, spreadsheet software, design software, presentation software and collaborative software • Using images, sounds and videos • Using presentation standards

Elements of the Competency	Performance Criteria
1. Produce reports.	• Proper customizing of the word processing interface • Accurate data entry • Proper integration of images • Appropriate use and modification of styles and templates • Proper insertion of an automatic table of contents • Efficient use of the spelling and grammar check • Compliance with presentation standards
2. Produce tables and graphs.	• Proper customizing of the spreadsheet interface • Appropriate choice of the type of table and graph to be produced • Appropriate choice and use of search, logic and calculation functions • Development of appropriate mathematical formulas • Compliance with presentation standards
3. Produce diagrams or plans.	• Proper customizing of the drawing software interface • Choice of scale and format based on representation requirements • Accurate representation of geometric elements • Use of a symbol collection in accordance with representation requirements • Proper and clear drafting of the annotations and title block • Compliance with presentation standards
4. Produce presentation documents.	• Proper customizing of the presentation software interface • Appropriate choice of the display resolution and format • Appropriate integration of images, sounds and videos • Presentation readability • Compliance with spelling and grammar rules • Compliance with presentation standards

Elements of the Competency	Performance Criteria
5. Share and synchronize documents.	• Proper customizing of the collaborative software interface • Appropriate conversion of file formats • Appropriate classification of documents • Correct assignment of access to shared documents • Efficient management of conflicts between versions

Code: 00Q5

Objective *Standard*

Statement of the Competency	Achievement Context
Deploy a local computer network.	• For local wired and wireless computer networks • Based on a request • Using computers, interconnection devices and cabling • Using technical documentation

Elements of the Competency	Performance Criteria
1. Define the features of the local computer network.	• Accurate interpretation of the request • Proper identification of the services to be installed • Appropriate choice of interconnection devices to be installed • Architecture diagram of the local network that meets the requirements
2. Install local network interconnection devices.	• Proper set-up and connection of the interconnection devices • Proper configuration of the interconnection devices • Clear record of the configurations carried out
3. Connect the computers to the local network.	• Connection of the computers to the computer network according to the architecture diagram • Proper configuration of access to the network • Clear record of the configurations carried out
4. Install shared resource services.	• Strict application of the procedure for installing services • Proper configuration of the services • Clear record of the configurations carried out
5. Enable the local network.	• Strict application of test plans • Relevance of the corrective actions • Optimal functioning of the network

Code: 00Q6

Objective *Standard*

Statement of the Competency	Achievement Context
Use an object-oriented development approach.	• Based on a problem • Using nomenclature and coding rules

Elements of the Competency	Performance Criteria
1. Analyze the problem.	• Breakdown of the problem based on the requirements of an object-oriented approach • Proper identification of input and output data and the nature of the processes • Accurate identification of the classes to be modelled • Proper identification of the algorithms to be created
2. Model the classes.	• Proper identification of class attributes and methods • Proper application of encapsulation and inheritance principles • Proper graphic representation of the classes and their relationships • Compliance with nomenclature rules
3. Produce the algorithms for the methods.	• Appropriate identification of the operations necessary for each method • Proper identification of a logical sequence of operations • Appropriate verification of algorithm correctness • Accurate representation of algorithms
4. Create the graphic interface.	• Appropriate choice of graphic elements for display and data input • Proper layout of graphic elements • Proper set-up of graphic elements
5. Program the classes.	• Appropriate choice of instructions, types of primitive data and data structures • Logical organization of the instructions • Proper programming of messages to be displayed for the user • Proper integration of the classes into the program • Proper program performance • Compliance with the language syntax • Compliance with coding rules
6. Document the code.	• Clear comments in the computer code • Clear record of the programming support documentation • Appropriate use of the documentation generators

Elements of the Competency	Performance Criteria
7. Apply the procedure for managing versions of the programs.	• Proper configuration of the version control system • Systematic submission of the modified code • Sound management of branches and conflicts

Code: 00Q7

Objective *Standard*

Statement of the Competency	Achievement Context
Use a database management system.	• For a relational or other type of database management system • Based on the data model and specifications of the database management system

Elements of the Competency	Performance Criteria
1. Create the database.	• Accurate analysis of the data model • Accurate analysis of the specifications of the database management system • Appropriate coding of the instructions for creating the database
2. Formulate read requests, insertion requests, modification requests and deletion requests.	• Accurate identification of the types of requests to be formulated • Appropriate use of clauses, operators, commands and parameters • Appropriate use of regular expressions • Proper performance of requests
3. Ensure data confidentiality and consistency.	• Accurate identification of the techniques to be used • Proper management of authorizations • Appropriate data encryption • Appropriate use of referential integrity constraints, triggers and transactions
4. Program automated data processing operations.	• Accurate identification of data processing operations to be automated • Appropriate creation of stored procedures and scripts • Clear record of programming support documentation
5. Save and restore the database.	• Astute choice of techniques to be used for saving and restoring • Appropriate use of techniques for saving and restoring the database • Compliance with the procedure and frequency for saving the database

Code: 00Q8

Objective *Standard*

Statement of the Competency	Achievement Context
Carry out preventive measures with regard to information security.	• Using recognized security measures • Using information security software and encryption libraries

Elements of the Competency	Performance Criteria
1. Analyze information security risks.	• Accurate inventory of the computing equipment and applications installed • Proper inventory of potential threats and vulnerabilities • Accurate identification of the impacts on security • Appropriate choice of security measures to be applied
2. Apply recognized security measures to protect the network.	• Appropriate use of backup strategies • Appropriate use of strategies for assigning access rights • Proper configuration and customizing of anti-virus and firewall software • Appropriate use of encryption utilities
3. Apply recognized security measures to protect an application.	• Appropriate use of strategies to secure data entered by users • Appropriate use of error control and exception management techniques • Appropriate use of secure authentication and authorizations mechanisms • Appropriate use of encryption libraries

Code: 00SE

Objective	*Standard*

Statement of the Competency	**Achievement Context**
Interact in a professional setting.	• In various types of work settings • Using application programming and network management standards, methods and best practices • Using laws, code of ethics and corporate policies

Elements of the Competency	**Performance Criteria**
1. Establish professional relationships with users and clients.	• Attitudes and behaviours that demonstrate the ability to listen • Adaptation of the level of language to the situation • Observance of rules of politeness and common courtesy • Observance of the client-based approach
2. Work within a multidisciplinary team.	• Attitudes and behaviours that demonstrate respect, openness and a collaborative spirit • Effective communication with all team members • Proper performance of assigned tasks • Compliance with rules for optimal team function • Respect for the corporate culture • Compliance with application programming and network management standards, methods and best practices • Observance of the limits of the scope of professional intervention and respect for the expertise of team members in other occupations • Adherence to deadlines
3. Become familiar with the legal obligations and rules of professional ethics.	• Accurate listing of the main offences and criminal acts in information technology • Accurate listing of the main breaches of intellectual property rights in information technology • Accurate assessment of the consequences of offences, criminal acts and breaches of intellectual property • Determination of the measures appropriate to the situation • Compliance with laws, codes of ethics and corporate policies

Code: 00SF

Objective	*Standard*

Statement of the Competency	**Achievement Context**
Evaluate software and hardware components.	• Using information sources • Based on functional specifications and architecture diagrams • Using technical documentation

Elements of the Competency	**Performance Criteria**
1. Pinpoint the technical requirements of a development or deployment project.	• Accurate analysis of functional specifications • Accurate analysis of the software architecture and the computer network architecture • Identification of all technical requirements for the project
2. Research software and hardware components.	• Appropriate choice of information sources • Accurate inventory of the available software and hardware components
3. Provide advice on software and hardware components.	• Accurate analysis of the features of the platforms, applications and programming tools • Accurate analysis of the features of the computing devices, interconnection devices and peripheral devices • Accurate analysis of the features of the wired and wireless communications protocols • Relevance of advice on component compatibility • Relevance of advice on component longevity, efficiency and maintainability

Code: 00SG

Objective *Standard*

Statement of the Competency	Achievement Context
Provide users with technical support.	• Based on an incident, problem or request • Using documentation and a knowledge base • Using presentation standards

Elements of the Competency	Performance Criteria
1. Identify user needs.	• Accurate analysis of the incident, problem or request • Appropriate consultation of the knowledge base • Accurate identification of the level of priority • Apt choice of action to perform or forwarding of information to the appropriate person or service • Observance of the limits of the scope of professional intervention
2. Assist users in the operation of a computer and software.	• Attitudes and behaviours that promote a relationship of trust • Identification of key actions taken by the users • Suitability of recommendations • Relevance and effectiveness of demonstrations • Use of an appropriate level of language • Attitudes and behaviours that demonstrate patience
3. Prepare user support documents.	• Accurate analysis of the existing documentation • Accurate identification of the users' level of knowledge • Production of documents aligned with user needs • Use of appropriate vocabulary • Compliance with documentation standards • Compliance with spelling and grammar rules
4. Follow up on the support provided.	• Appropriate verification of user satisfaction • Proper identification of the extent to which the action meets the need • Clear formulation of recommendations to prevent the recurrence of malfunctions • Clear recording of the action taken in the knowledge base

Code: 00SH

Objective *Standard*

Statement of the Competency	Achievement Context
Adapt to information technologies.	• Using information sources • Using computer applications and equipment

Elements of the Competency	Performance Criteria
1. Monitor technological developments.	• Effective search for information sources • Appropriate use of monitoring tools • Accurate analysis of the information collected • Accurate identification of the technologies to test
2. Test software and hardware technology.	• Proper connection of computer equipment and the necessary peripheral devices • Proper installation of the necessary programming applications or tools • Adequate testing of the technology • Attitudes and behaviours that demonstrate self-reliance and open-mindedness
3. Draw up technological opinions.	• Active participation in discussions • Satisfactory justification of the technology's potential

Code: 00SJ

Objective *Standard*

Statement of the Competency	Achievement Context
Deploy intranet servers.	• For different types of intranet servers: physical, virtual, redundant, distributed, etc. • For different services: authentication, directory, printing, file sharing, telephony, DHCP, etc. • Based on design documents • Using technical documentation

Elements of the Competency	Performance Criteria
1. Analyze the deployment project.	• Accurate analysis of design documents • Accurate analysis of the technical characteristics of the intranet services to be installed • Proper identification of the tasks to be carried out
2. Set up the intranet servers.	• Placement and connection of the servers and peripheral devices in compliance with the plans • Proper installation of the operating system(s) • Proper connection of the servers to the network • Proper identification of the servers, peripheral devices and cabling • Compliance with procedures for connecting structured cabling and with the applicable electrical regulations • Compliance with occupational health and safety regulations
3. Install the intranet services.	• Proper application of the intranet service installation procedures • Proper configuration of the intranet services • Proper application of intranet service activation procedures
4. Reinforce security.	• Proper configuration and customizing of anti-virus software and firewalls • Secure organization of the file and directory structures • Sound management of access rights • Suitable updating of backup procedures
5. Participate in the deployment of the intranet servers.	• Precise application of test plans • Relevance of the corrective actions • Optimal running of the servers
6. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SK

Objective *Standard*

Statement of the Competency	Achievement Context
Deploy Internet servers.	• For different types of Internet servers: physical, virtual, redundant, distributed, etc. • For different services: email, Web, videoconferencing, cloud computing, etc. • Based on design documents • Using technical documentation

Elements of the Competency	Performance Criteria
1. Analyze the deployment project.	• Accurate analysis of the design documents • Accurate analysis of the technical characteristics of the Internet services to be installed • Proper identification of the tasks to be carried out
2. Set up the Internet servers.	• Placement and connection of the servers and peripheral devices in compliance with the plans • Proper installation of the operating system(s) • Proper connection of the servers to the network • Proper identification of the servers, peripheral devices and cabling • Compliance with procedures for connecting structured cabling and with the applicable electrical regulations • Compliance with occupational health and safety regulations
3. Install the Internet servers.	• Proper application of Internet service installation procedures • Proper configuration of Internet services • Proper application of Internet service activation procedures
4. Reinforce security.	• Proper configuration and customizing of anti-virus software and firewalls • Secure organization of file and directory structures • Sound management of access rights • Suitable updating of backup procedures
5. Participate in the deployment of the Internet servers.	• Precise application of the test plans • Relevance of the corrective actions • Optimal running of the servers
6. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SL

Objective	*Standard*
Statement of the Competency	**Achievement Context**
Deploy database servers.	• For different types of database servers: physical, virtual, redundant, distributed, etc. • For relational or other types of database management systems • Based on design documents • Using technical documentation
Elements of the Competency	**Performance Criteria**
1. Analyze the deployment project.	• Accurate analysis of design documents • Accurate analysis of the technical characteristics of the database management systems to be installed • Proper identification of the tasks to be carried out
2. Set up the database servers.	• Placement and connection of the servers and peripheral devices in compliance with the plans • Proper installation of the operating system(s) • Proper connection of the servers to the network • Proper identification of the servers, peripheral devices and cabling • Compliance with procedures for connecting structured cabling and with the applicable electrical regulations • Compliance with occupational health and safety regulations
3. Install the database management systems.	• Proper application of the procedures for installing database management systems and extension modules • Proper configuration of the database management systems and extension modules • Creation and migration of the databases based on user needs • Proper application of database management system activation procedure
4. Reinforce security.	• Proper configuration and customizing of anti-virus software and firewalls • Secure organization of file and directory structures • Sound management of access rights • Suitable updating of the backup procedures
5. Participate in the deployment of the database servers.	• Precise application of the test plans • Relevance of the corrective actions • Optimal running of the servers
6. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SM

Objective *Standard*

Statement of the Competency	Achievement Context
Deploy network interconnecting devices.	• For various interconnection devices: switches, routers, wireless access points, firewalls, etc. • On various local, metropolitan and global computer network infrastructure technologies • Based on design documents • Using technical documentation

Elements of the Competency	Performance Criteria
1. Analyze the deployment project.	• Accurate analysis of design documents • Accurate analysis of the technical properties of the interconnection devices to be installed • Proper identification of the tasks to be carried out
2. Set up the interconnection devices.	• Placement and connection of the interconnection devices in compliance with the plans • Proper identification of the interconnection devices and cabling • Compliance with procedures for connecting structured cabling and with the applicable electrical regulations • Compliance with occupational health and safety regulations
3. Install the interconnection devices.	• Proper application of the firmware installation and update procedure • Proper configuration of the devices • Sound management of access rights • Proper backup of configurations • Compliance with security measures
4. Participate in the deployment of the interconnection devices.	• Precise application of the test plans • Relevance of the corrective actions • Optimal running of the network
5. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SN

Objective *Standard*

Statement of the Competency	Achievement Context
Automate computer network management tasks.	• For different operating systems • Based on recurring network management tasks

Elements of the Competency	Performance Criteria
1. Prepare the automation tools.	• Accurate analysis of recurrent tasks and of the computer environment • Sound choice of the programming language or configuration to be used • Proper installation of automation software
2. Translate the task into a computer language.	• Accurate writing of scripts and configurations • Compliance with automation processes
3. Carry out testing on the scripts and configurations.	• Accurate writing of test plans • Precise application of test plans • Proper performance of scripts and configurations
4. Automate the tasks.	• Proper execution of scripts and proper application of configurations • Efficiency of the automated tasks
5. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SP

Objective	*Standard*
Statement of the Competency	**Achievement Context**
Monitor computer networks.	• For different types of monitoring: intrusion detection, vulnerability detection, performance analysis, availability analysis, etc. • On various local, metropolitan and global computer network technology infrastructure • Using technical documentation, intervention procedures and security measures • Using a knowledge base
Elements of the Competency	**Performance Criteria**
1. Define the monitoring needs.	• Accurate analysis of the network architecture diagram • Accurate analysis of existing security measures and intervention procedures • Accurate analysis of the advantages and disadvantages of existing monitoring software • Proper identification of the monitoring software to be installed
2. Install the monitoring software.	• Proper application of the monitoring software installation procedure • Proper configuration and customizing of the monitoring software
3. Carry out monitoring activities.	• Accurate analysis of log files, of information conveyed by the monitoring software or of the service call • Proper and prompt detection of vulnerabilities and cyberattacks • Appropriate consultation of the knowledge base • Proper identification of the root cause of the operational or security issue • Proper identification of the level of priority of the interventions
4. Carry out the interventions.	• Precise application of the intervention procedures • Compliance with security measures, legal obligations and professional rules of ethics • Suitability of the information provided to the person responsible
5. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the interventions recorded in the knowledge base • Clear formulation of recommendations of changes to be made to intervention procedures and security measures

Code: 00SQ

Objective	*Standard*
Statement of the Competency	**Achievement Context**
Collaborate on the design of a computer network.	• Based on the client's request and requirements • Using technical documentation • Following network management standards, methods and best practices

Elements of the Competency	**Performance Criteria**
1. Participate in the development of functional specifications.	• Accurate analysis of the client's request and requirements • Accurate analysis of the features of the computer equipment and applications used by the client • Appropriateness of the recommendations regarding the nature of the request • Appropriateness of the recommendations regarding the standards, methods and best practices to follow in network management
2. Participate in the overall design of the network.	• Appropriateness of the recommendations regarding the computer network architecture to be implemented or modified • Appropriateness of the recommendations regarding the services to be implemented or modified • Sound assessment of the software and hardware components to be used • Appropriateness of the recommendations regarding the security measures and intervention procedures to be implemented • Appropriateness of the recommendations regarding the feasibility of the computing solution
3. Carry out the detailed design.	• Careful establishment of IP nomenclature and IP addresses • Astute choice of the computer applications and equipment to be used
4. Produce the design documents.	• Proper and detailed listing of the required applications and computer equipment • Accurate production of architecture diagrams, cabling plans and server room layout plans • Active participation in the design review • Use of appropriate vocabulary • Compliance with the limits of professional intervention
5. Take steps to launch the project.	• Proper preparation of calls for tenders • Realistic estimate of costs • Clear formulation of recommendations on the choice of suppliers

Code: 00SR

Objective *Standard*

Statement of the Competency	Achievement Context
Develop native applications without a database.	• For different target platforms: tablets, smartphones, desktop computers, etc. • For new applications and applications to be modified • Based on design documents • Using a compiler designed for the target platform, a cross compiler or an interpreter • Using an emulator on the development platform • Using images, sounds and videos • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of software and libraries on the development platform • Proper configuration of the target platform • Proper configuration of the version control system • Proper importing of the source code
3. Generate or program the graphical interface.	• Appropriate choice and use of graphic elements for display and input • Proper integration of images • Adaptation of the interface based on the display format and resolution
4. Program the application logic.	• Proper programming of interactions between the graphical user interface and the user • Proper programming of communications between the peripheral devices and the software functions of the target platform • Effective use of execution threads • Proper integration of sounds and videos • Proper application of internationalization techniques • Precise application of secure coding techniques
5. Control the quality of the application.	• Precise application of test plans in the emulator and on the target platform • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents

Elements of the Competency	Performance Criteria
6. Participate in the deployment of the application.	• Appropriate preparation of the application in view of its deployment or installation • Proper deployment or installation of the application
7. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SS

Objective *Standard*

Statement of the Competency	Achievement Context
Develop native applications with a database.	• For different target platforms: tablets, smartphones, desktop computers, etc. • For new applications and applications to be modified • Based on design documents • Using a compiler designed for the target platform, a cross compiler or an interpreter • Using an emulator on the development platform • Using images • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of software and libraries on the development platform • Proper configuration of the target platform • Proper configuration of the version control system • Proper importing of the source code
3. Prepare the database(s).	• Proper creation or adaptation of the local or remote database • Proper insertion of initial or test data • Compliance with the data model
4. Generate or program the graphical user interface.	• Appropriate choice and use of graphic elements for display and input • Proper integration of images • Adaptation of the interface based on the display format and resolution
5. Program the application logic.	• Proper programming or integration of authentication and authorization mechanisms • Proper programming of interactions between the graphical user interface and the user • Appropriate choice of clauses, operators, commands or parameters in database queries • Correct handling of database data • Proper programming of data synchronization • Appropriate use of data exchange services • Proper application of internationalization techniques • Precise application of secure programming techniques

Elements of the Competency	Performance Criteria
6. Control the quality of the application.	• Precise application of test plans in the emulator and on the target platform • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with the design documents
7. Participate in the deployment of the application.	• Appropriate preparation of the application in view of its deployment or installation • Proper deployment or installation of the application
8. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00ST

Objective *Standard*

Statement of the Competency	Achievement Context
Develop non-transactional Web applications.	• For Web applications associated with information delivery, marketing, etc. • For new applications and applications to be modified • Based on design documents • Using images • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of the Web development platform and the development database management system • Proper installation of software and libraries • Appropriate configuration of the version control system • Proper importing of the source code
3. Prepare the database.	• Suitable creation or adaptation of the database • Proper insertion of initial or test data • Compliance with the data model
4. Program the Web interface.	• Appropriate use of markup language • Suitable creation and use of style sheets • Proper integration of images • Adaptation of the interface based on the display format and resolution
5. Program the server-side application logic.	• Appropriate choice of clauses, operators, commands or parameters in database queries • Correct handling of database data • Proper programming of the conversion of data into information • Proper application of internationalization techniques • Precise application of secure programming techniques
6. Program the client-side application logic.	• Correct manipulation of DOM objects • Proper programming of interactions between the Web interface and the user • Proper programming and integration of animations and widgets

Elements of the Competency	Performance Criteria
7. Control the quality of the application.	• Precise application of test plans • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents
8. Participate in the deployment of the application on a Web host.	• Accurate identification of the domain name • Appropriate configuration of the application on the Web host • Proper application of the procedure for migrating the service onto the Web host • Precise application of security measures • Compliance with search engine indexing requirements
9. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SU

Objective *Standard*

Statement of the Competency	Achievement Context
Develop transactional Web applications.	• For transactional Web applications: reservations, registrations, collaboration, inventory management, e-commerce, etc. • For new applications and applications to be modified • Based on design documents • Using images • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of the Web development platform and the development database management system • Proper installation of software and libraries • Appropriate configuration of the version control system • Proper importing of the source code
3. Prepare the database.	• Suitable creation or adaptation of the database • Proper insertion of initial or test data • Compliance with the data model
4. Program the Web interface.	• Appropriate use of markup language • Suitable creation and use of style sheets • Proper integration of images • Suitable creation of Web forms • Adaptation of the interface based on the display format and resolution
5. Program the server-side application logic.	• Proper programming or integration of authentication and authorization mechanisms • Proper programming of interactions between the Web interface and the user • Appropriate choice of clauses, operators, commands or parameters in database queries • Correct handling of database data • Appropriate use of data exchange services • Proper application of internationalization techniques • Precise application of secure programming techniques

Elements of the Competency	Performance Criteria
6. Program the client-side application logic.	• Correct manipulation of DOM objects • Proper programming of asynchronous calls • Proper programming of interactions between the Web interface and the user • Systematic use of Web form data validation techniques • Web forms in compliance with usability requirements
7. Control the quality of the application.	• Precise application of test plans • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents
8. Participate in the deployment of the application on the Web host.	• Accurate identification of the domain name • Appropriate configuration of the application on the Web host • Proper application of the procedure for migrating the service onto the Web host • Precise application of security measures • Compliance with search engine indexing requirements
9. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SV

Objective *Standard*

Statement of the Competency	Achievement Context
Develop data exchange services.	• For data exchange services used by native or Web applications or connected objects • For new applications and applications to be modified • Based on design documents • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of the development platform and development database management system • Proper installation of software and libraries • Appropriate configuration of the version control system • Proper importing of the source code
3. Prepare the database.	• Suitable creation or adaptation of the database • Proper insertion of initial or test data • Compliance with the data model
4. Program the application logic for the service.	• Proper programming or integration of authentication, authorization or secure connection establishment mechanisms • Proper programming of the reception of input data • Appropriate choice of clauses, operators, commands or parameters in database queries • Correct handling of database data • Proper programming of the response of output data • Precise application of secure programming techniques • Compliance with communication protocols and data exchange formats
5. Program a test application using the service.	• Precise retrieval of the service interface • Appropriate use of the service • Proper conversion of the data provided by the service into run data using a test application
6. Control the quality of the service.	• Precise application of test plans • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents

Elements of the Competency	Performance Criteria
7. Participate in the deployment of the service.	• Proper application of the procedure for migrating the service onto the server • Precise application of security measures
8. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SW

Objective *Standard*

Statement of the Competency	Achievement Context
Develop gaming or simulation applications.	• For different games or simulations: action games, role-playing games, flight simulators, industrial process simulators, etc. • For new applications and applications to be modified • Based on design documents • Using game or simulation engines • Using sounds and 2D and 3D images • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment.	• Proper installation of software and libraries • Appropriate configuration of the version control system • Proper importing of the source code
3. Generate real or virtual world representations.	• Appropriate choice and use of graphic elements for display and input • Proper integration of 2D and 3D images • Adaptation of the interface based on the display format and resolution
4. Program the game or simulation logic.	• Proper programming of behaviours of graphic elements and peripheral devices • Proper programming of visual effects • Accurate integration of sounds • Proper programming of interactions • Proper application of internationalization techniques • Precise application of secure programming techniques • Appropriate use of game or simulation engines
5. Control the quality of the application.	• Precise application of test plans • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents
6. Participate in the deployment of the application.	• Appropriate preparation of the application in view of its deployment, export or installation • Proper deployment, export or installation of the application
7. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SX

Objective *Standard*

Statement of the Competency	Achievement Context
Develop applications for connected objects.	• For applications associated with wearable devices, home automation, building automation, robotics, process monitoring, etc. • For new applications and applications to be modified • Based on design documents • Using issue tracking and version control procedures

Elements of the Competency	Performance Criteria
1. Analyze the application development project.	• Accurate analysis of the design documents • Proper identification of the tasks to be carried out
2. Prepare the computer development environment and the test bed.	• Proper installation of software and libraries • Correct placement and attachment of objects in the simulation environment • Proper connection of objects to the development computer, network or other objects • Proper updating of the object firmware • Appropriate configuration of the version control system • Proper importing of the source code
3. Generate or program the user interface.	• Appropriate choice and use of graphic elements for display and input • Proper integration of images • Adaptation of the interface based on the display format and resolution
4. Program the object's application logic and the control or monitoring application logic.	• Proper programming of data gathering, processing and transmission instructions • Proper programming of interactions between the interface and the user • Appropriate use of data exchange services • Proper application of internationalization techniques • Precise application of secure programming techniques • Proper transfer of the application onto the connected object • Compliance with time constraints
5. Control the quality of the application.	• Precise application of test plans • Thorough reviews of code and security • Relevance of the corrective actions • Compliance with issue tracking and version control procedures • Compliance with design documents

Elements of the Competency	Performance Criteria
6. Participate in the deployment of the application.	• Appropriate preparation of the application in view of its deployment or installation • Proper deployment or installation of the application • Proper execution of pre-operational tests • Suitability of the information transmitted to users regarding the operation and security of the application
7. Produce the documentation.	• Proper identification of the information to be written up • Clear record of the work carried out

Code: 00SY

Objective *Standard*

Statement of the Competency	Achievement Context
Collaborate on the design of applications.	• Based on the client's requests and requirements • Using application development standards, methods and best practices

Elements of the Competency	Performance Criteria
1. Participate in the development of the functional specifications.	• Accurate analysis of the client's request and requirements • Accurate analysis of the features of the computer equipment and applications used by the client • Appropriateness of the recommendations regarding the nature of the requirements • Appropriateness of the recommendations regarding application development standards, methods and best practices
2. Participate in the overall design of the applications.	• Appropriateness of the recommendations regarding the choice of software architecture • Sound assessment of the software and hardware components to be used • Appropriateness of the recommendations regarding security measures to be implemented • Appropriateness of the recommendations regarding test strategies to be used • Appropriateness of the recommendations regarding the feasibility of the computing solution
3. Develop the detailed design.	• Modelling of a database aligned with user needs • Clear identification of the initial data in the database • Clear description of the application logic and interface to generate or program • Object-oriented modelling compliant with principles of encapsulation, inheritance, composition and polymorphism • Proper choice or production of algorithms • Compliance with nomenclature rules
4. Produce design documents.	• Accurate graphical representation of the different models • Accurate drafting of unit, integration, functional or acceptance test plans • Active participation in the design review • Use of appropriate vocabulary • Compliance with application development standards, methods and best practices

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

English, Language of Instruction and Literature	Code: 4EA0

Objective ***Standard***

Statement of the Competency
Analyze and produce various forms of discourse.

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

Learning Activities	
Discipline:	English, Language of Instruction and Literature
Weighting:	2-2-4 or 1-3-4
Credits:	2⅔

English, Language of Instruction and Literature	Code: 4EA1

Objective ***Standard***

Statement of the Competency
Apply an analytical approach to literary genres.

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

Learning Activities	
Discipline:	English, Language of Instruction and Literature
Weighting:	2-2-3
Credits:	2⅓

English, Language of Instruction and Literature	Code: 4EA2

Objective ***Standard***

Statement of the Competency
Apply an analytical approach to a literary theme.

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

Learning Activities	
Discipline:	English, Language of Instruction and Literature
Weighting:	2-2-3
Credits:	2⅓

English, Language of Instruction and Literature	Code: 4EAP

Objective ***Standard***

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

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

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

Humanities	Code: 4HU0

Objective ***Standard***

Statement of the Competency
Apply a logical analytical process to how knowledge is organized and used.

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

Learning Activities	
Discipline:	Humanities
Weighting:	3-1-3
Credits:	2⅓

Humanities	Code: 4HU1

Objective ***Standard***

Statement of the Competency
Apply a critical thought process to world views.

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

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

Humanities	Code: 4HUP

Objective ***Standard***

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

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

Learning Activities	
Discipline:	Humanities
Periods of instruction:	45
Credits:	2

French as a Second Language (Level I)	Code: 4SF0

Objective ***Standard***

Statement of the Competency
Apply basic concepts for communicating in standard French.

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

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

French as a Second Language (Level II)	Code: 4SF1

Objective ***Standard***

Statement of the Competency
Communicate in standard French with some ease.

Elements of the Competency	**Performance Criteria**
1. Write and revise a simple text.	• Writing of a text of about 350 words • Respect for grammar and spelling rules • Appropriate use of the main elements of the corpus • Clear, coherent formulation of sentences • Coherent organization of paragraphs • Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors
2. Interpret a written text.	• Accurate identification of the main ideas and structure of a text of 700 to 1 000 words • Accurate identification of the main elements of the text • Accurate explanation of the meaning of the words of the text
3. Produce a planned oral text.	• Clear and coherent formulation of an oral presentation of at least five minutes • Appropriate use of standard vocabulary • Respect for the level of language and rules of grammar and pronunciation
4. Interpret a simple oral text.	• Accurate identification of the main elements of an oral text of at least five minutes • Accurate identification of the ideas and subjects dealt with in the text • Accurate explanation of the meaning of the words of the text

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

French as a Second Language (Level III)	Code: 4SF2

Objective ***Standard***

Statement of the Competency
Communicate with ease in standard French.

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

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

French as a Second Language (Level IV)	Code: 4SF3

Objective ***Standard***

Statement of the Competency
Explore a cultural and literary topic.

Elements of the Competency	**Performance Criteria**
1. Write a text on a cultural or literary topic.	• Clear and coherent formulation of a text of about 550 words • Respect for the topic • Respect for grammar and spelling rules • Adaptation to the intended audience • Appropriate use of the main elements of the corpus • Clear articulation of a personal point of view
2. Revise and correct a text on a cultural or literary topic.	• Appropriate use of revision strategies • Appropriate revision of the text
3. Analyze a cultural or literary text.	• Personal formulation of the main elements of the text • Identification of the main themes • Identification of clues that help situate the text in its sociocultural and historical context • Accurate identification of the values expressed • Accurate identification of the structure of the text • Clear articulation of a personal point of view

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

French as a Second Language (Level I)	Code: 4SFP

Objective ***Standard***

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

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

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

French as a Second Language (Level II)	Code: 4SFQ

Objective ***Standard***

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

Elements of the Competency	**Performance Criteria**
1. Write a text related to the student's field of study.	• Appropriate use of specialized vocabulary and of conventions specific to different types of texts • Respect for the level of language and rules of grammar and spelling • Clear and coherent formulation of the text • Appropriate use of writing techniques
2. Revise and correct a text on a topic related to the student's field of study.	• Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors
3. Differentiate the types of texts specific to the student's field of study.	• Accurate identification of the formal characteristics of each of the main types of texts and the conventions used
4. Analyze texts representative of the student's field of study.	• Accurate identification of the main elements of the text • Accurate interpretation of specialized vocabulary • Accurate identification of the ideas and subjects dealt with • Appropriate use of reading and listening techniques

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

French, Second Language (Level III)	Code: 4SFR

Objective ***Standard***

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

Elements of the Competency	**Performance Criteria**
1. Produce a text on a topic related to the student's field of study.	• Respect for the topic • Appropriate use of specialized vocabulary and the conventions specific to different types of texts • Respect for the level of language and rules of grammar and spelling • Clear and coherent formulation of the text • Appropriate sequencing of ideas • Appropriate form for the content
2. Revise and correct a text on a topic related to the student's field of study.	• Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors
3. Comment on texts specific to the student's field of study.	• Accurate identification of the formal characteristics of the main types of texts and the conventions used • Accurate explanation of the meaning of the words in the text • Accurate identification of the structure of the text • Accurate reformulation of the main and secondary ideas, of the facts and opinions • Accurate use of specialized vocabulary

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

French as a Second Language (Level IV)	Code: 4SFS

Objective ***Standard***

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

Elements of the Competency	**Performance Criteria**
1. Write a text on a topic related to the student's field of study.	• Respect for the topic • Appropriate use of specialized vocabulary and the conventions specific to different types of texts • Appropriate choice of the main elements of the corpus based on the type of text • Clear and coherent formulation of the text • Respect for the level of language and rules of grammar and spelling • Clear articulation of a personal point of view
2. Revise and correct a text on a topic related to the student's field of study.	• Appropriate use of revision strategies • Satisfactory correction of spelling and grammatical errors
3. Analyze a text related to the student's field of study.	• Precise differentiation of the formal characteristics of specific types of texts • Personal formulation of the main elements • Listing of the main themes • Accurate identification of the structure of the text • Identification of clues that help situate the text in its context • Clear articulation of a personal point of view • Accurate association of elements of the text with the topic

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

Physical Education	Code: 4EP0

Objective ***Standard***

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

Elements of the Competency	**Performance Criteria**
1. Establish the relationship between one's lifestyle habits and health.	• Proper use of documentation from scientific research or the media • Recognition of the influence of social and cultural factors on the practice of physical activity • Pertinent links made between one's lifestyle habits and the impact they have on health
2. Be physically active in a manner that promotes one's health.	• Respect for the rules specific to the physical activity practised • Respect for codes of ethics, safety rules and regulations when being physically active • Respect for one's abilities when practising physical activities
3. Recognize one's needs, abilities and motivational factors with respect to regular and sufficient physical activity.	• Appropriate use of strategies for the quantitative and qualitative evaluation of one's physical condition • Overall assessment of one's needs and abilities in terms of physical activity • Overall assessment of one's motivational factors with respect to being sufficiently active on a regular basis
4. Propose physical activities that promote one's health.	• Appropriate choice of physical activities according to one's needs, abilities and motivational factors • Use of clear reasoning to explain the choice of physical activity

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

Physical Education	Code: 4EP1

Objective ***Standard***

Statement of the Competency
Improve one's effectiveness when practising a physical activity.

Elements of the Competency	**Performance Criteria**
1. Plan an approach to improve one's effectiveness when practising a physical activity.	• Initial assessment of one's abilities and attitudes when practising a physical activity • Statement of one's expectations and needs with respect to the ability to practise the activity • Appropriate formulation of personal objectives • Appropriate choice of the means to achieve one's objectives • Use of clear reasoning to explain the choice of physical activity
2. Use a planned approach to improve one's effectiveness when practising a physical activity.	• Respect for the rules and regulations of the physical activity • Respect for codes of ethics, safety rules and regulations when being physically active • Appropriate use of strategies for the quantitative and qualitative evaluation of one's motor skills • Periodic assessment of one's abilities and attitudes when practising a physical activity • Meaningful interpretation of progress made and the difficulties encountered in the practice of physical activity • Pertinent, periodic and proper adjustments of one's objectives or means • Appreciable improvement in one's motor skills, techniques or complex strategies required by the physical activity

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

Physical Education	Code: 4EP2

Objective ***Standard***

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

Elements of the Competency	**Performance Criteria**
1. Plan a personal physical activity program.	• Mention of priorities according to one's needs, abilities, and motivational factors with respect to being sufficiently active on a regular basis • Proper and appropriate formulation of personal objectives • Appropriate choice of physical activity or activities to achieve personal objectives • Appropriate planning of the conditions for performing the physical activity or activities in personal program
2. Combine the elements of a regular and sufficient practice of physical activity as part of a healthy lifestyle.	• Respect for the rules and regulations of the physical activity • Respect for codes of ethics, safety rules and regulations when being physically active • Regular and sufficient practice of a physical activity while maintaining a balance between effectiveness and health-promoting factors
3. Manage a personal physical activity program.	• Appropriate choice of criteria for measuring the attainment of program objectives • Appropriate use of strategies for the quantitative and qualitative evaluation of one's physical activity • Periodic assessment of the time invested and activities practised during the program • Appropriate, periodic and proper adjustment of personal objectives or means used • Meaningful interpretation of the progress made and difficulties encountered in the practice of physical activities • Recognition of the effect of physical activity on one's lifestyle

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

Complementary General Education Component

Social Sciences	Code: 000V

Objective — *Standard*

Statement of the Competency	**Achievement Context**
Estimate the contribution of the social sciences to an understanding of contemporary issues.	• Working alone • In an essay of approximately 750 words on the contribution of the social sciences to an understanding of contemporary issues • Using documents and data from the field of social sciences

Elements of the Competency	**Performance Criteria**
1. Recognize the focus of one or more of the social sciences and their main approaches.	• Formulation of the focus specific to one or more of the social sciences • Description of the main approaches used in the social sciences
2. Identify some of the issues currently under study in the social sciences.	• Association of issues with the pertinent areas of research in the social sciences
3. Demonstrate the contribution of one or more of the social sciences to an understanding of contemporary issues.	• Presentation of contemporary issues by highlighting the interpretation of the social sciences • Illustration of the interaction between certain social changes and the contribution of the social sciences

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 300 or 400 series of codes (except codes 300 and 360) to link a course to objective 000V. Use code 305 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Social Sciences	Code: 000W

Objective — *Standard*

Statement of the Competency	Achievement Context
Analyze one of the major problems of our time using one or more social scientific approaches.	• Working alone • In an essay of approximately 750 words on a topic related to human existence • Using reference materials from the field of social sciences

Elements of the Competency	Performance Criteria
1. Formulate a problem using one or more social scientific approaches.	• Presentation of the background to the problem • Use of appropriate concepts and language • Brief description of individual, collective, spatio-temporal and cultural aspects of the problem
2. Address an issue using one or more social scientific approaches.	• Clear formulation of an issue • Selection of pertinent reference materials • Brief description of historical, experimental and survey methods
3. Draw conclusions.	• Appropriate use of the selected method • Determination of appropriate evaluation criteria • Identification of strengths and weaknesses of the conclusions • Broadening of the issue analyzed

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 300 or 400 series of codes (except codes 300 and 360) to link a course to objective 000W. Use code 305 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Science and Technology	Code: 000X

Objective — *Standard*

Statement of the Competency	**Achievement Context**
Explain the general nature of science and technology and some of the major contemporary scientific or technological issues.	• Working alone • Using a written commentary on a scientific discovery or technological development • In an essay of approximately 750 words

Elements of the Competency	**Performance Criteria**
1. Describe scientific thinking and the standard scientific method.	• Brief description of the essential characteristics of scientific thinking, including quantification and demonstration • Ordered list and brief description of the essential characteristics of the main steps in the standard scientific method
2. Demonstrate how science and technology are complementary.	• Definition of terms and description of the primary ways in which science and technology are interrelated: logical and temporal connections, and mutual contributions
3. Explain the context and the stages related to several scientific and technological discoveries.	• Pertinent and coherent explanation of the relationship between the determining contexts related to several scientific and technological discoveries • Listing of the main stages of scientific and technological discoveries
4. Deduce different consequences and questions resulting from certain recent scientific and technological developments.	• Brief description of important consequences (of different types) and the current major challenges resulting from several scientific and technological discoveries • Formulation of relevant questions and credibility of responses to the questions formulated

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 100 or 200 series of codes to link a course to objective 000X. Use code 105 for a multidisciplinary course. Codes 109, 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Science and Technology	000Y

Objective — *Standard*

Statement of the Competency	**Achievement Context**
Resolve a simple problem by applying the basic scientific method.	• Working alone or in groups • Applying the standard scientific method to a given, simple scientific and technological problem • Using common scientific instruments and reference materials (written or other)

Elements of the Competency	**Performance Criteria**
1. Describe the main steps of the standard scientific method.	• Ordered list and brief description of the characteristics of the steps of the standard scientific method
2. Formulate a hypothesis designed to solve a simple scientific and technological problem.	• Clear, precise description of the problem • Observance of the principles for formulating a hypothesis (observable and measurable nature of data, credibility, etc.)
3. Verify a hypothesis by applying the fundamental principles of the basic experimental method.	• Pertinence, reliability and validity of the experimental method used • Observance of established experimental method • Appropriate choice and use of instruments • Clear, satisfactory presentation of results • Validity of the connections established between the hypothesis, the verification and the conclusion

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 100 or 200 series of codes to link a course to objective 000Y. Use code 105 for a multidisciplinary course. Codes 109, 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Modern Language	Code: 000Z

Objective *Standard*

Statement of the Competency	**Achievement Context**

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

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

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

Modern Language	Code: 0010

Objective *Standard*

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

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

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

Modern Language	Code: 0067

Objective — *Standard*

Statement of the Competency	Achievement Context
Communicate with relative ease in a modern language.	• Working alone • During a conversation consisting of at least 20 lines of dialogue • In a written text of medium length (at least 25 sentences for Latin-alphabet languages and 15 sentences for other languages) • Given documents of a sociocultural nature • Using reference materials for the written text

Elements of the Competency	Performance Criteria
1. Understand the meaning of an oral message in everyday language.	• Accurate explanation of the general meaning and essential ideas of the message • Clear identification of structural elements of the language
2. Understand the meaning of a text of average complexity.	• Accurate explanation of the general meaning and essential ideas of the text • Clear identification of structural elements of the language
3. Have a conversation on a subject.	• Appropriate use of the structural elements of the language according to the message to be expressed • Appropriate use of everyday vocabulary • Accurate pronunciation and intonation • Normal flow in a conversation in everyday language • Coherence of the message expressed • Pertinent responses to questions
4. Write a text of average complexity.	• Appropriate use of the structural elements of the language according to the text to be written • Accurate vocabulary • Coherence of the text as a whole • Observance of presentation and writing rules applicable to the text

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	The acquisition of a modern language requires an awareness of the culture of its native speakers. Use the 600 series of codes to link a course to objective 0067, with the exception of codes 601, 602, 603 and 604.

Mathematics Literacy and Computer Science	Code: 0011

Objective — *Standard*

Statement of the Competency	Achievement Context
Recognize the role of mathematics or computer science in contemporary society.	• Working alone • In an essay of approximately 750 words • Using different personally selected concrete examples

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

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Only the following codes can be used to link a course to objective 0011: 105, 201, 204, 420. Use code 204 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Mathematics Literacy and Computer Science	Code: 0012

Objective — *Standard*

Statement of the Competency	Achievement Context
Use various mathematical or computer science concepts, procedures and tools for common tasks.	• Working alone • While carrying out a task or solving a problem based on everyday needs • Using familiar tools and reference materials

Elements of the Competency	Performance Criteria
1. Demonstrate the acquisition of basic functional knowledge in mathematics or computer science.	• Brief definition of concepts • Correct execution of basic operations • Appropriate use of terminology
2. Select mathematical or computing tools and procedures on the basis of specific needs.	• Listing of numerous possibilities available through the use of mathematical and computing tools and procedures • Analysis of concrete situations and recognition of the usefulness of mathematical or computing tools and procedures • Appropriate choice according to needs
3. Use mathematical or computing tools and procedures to carry out tasks and solve problems.	• Use of a planned and methodical process • Correct use of tools and procedures • Satisfactory results, given the context • Appropriate use of terminology specific to a tool or procedure
4. Interpret the quantitative data or results obtained using mathematical or computing tools and procedures.	• Accurate interpretation, given the context • Clear, precise formulation of the interpretation

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Only the following codes can be used to link a course to objective 0012: 105, 201, 204 and 420. Use code 204 for a multidisciplinary course. Codes 340 and 345 may be used, provided the courses are not related to the objectives of common or specific general education.

Art and Aesthetics	Code: 0013

Objective — *Standard*

Statement of the Competency	Achievement Context
Consider various forms of art produced according to aesthetic practices.	• Working alone • Given a specified work of art • In a written commentary of approximately 750 words

Elements of the Competency	Performance Criteria
1. Develop an appreciation for the dynamics of the imagination in art.	• Precise explanation of a creative process connected to the construction of an imaginary universe
2. Describe art movements.	• Descriptive list of the main characteristics of three art movements from different eras, including a modern movement
3. Give a commentary on a work of art.	• Coherent organization of observations, including identification of four fundamental elements of form and structure related to the language used as well as a reasoned description of the meaning of the work of art

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 500 series of codes (except 502) to link a course to objective 0013. Use code 504 for a multidisciplinary course. Codes 340, 345, 601, 602, 603 and 604 may be used, provided the courses are not related to the objectives of common or specific general education.

Art and Aesthetics	Code: 0014

Objective — *Standard*

Statement of the Competency	Achievement Context
Produce a work of art.	• Working alone • During a practical exercise • In the context of creating or interpreting a work of art • Using the basic elements of the language and techniques specific to the medium selected

Elements of the Competency	Performance Criteria
1. Recognize the primary forms of expression of an artistic medium.	• Identification of specific features: originality, essential qualities, means of communication, styles, genres
2. Use the medium.	• Personal, coherent use of elements of language • Satisfactory application of artistic techniques • Compliance with the requirements of the method of production

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	Use the 500 series of codes to link a course to objective 0014, with the exception of code 502. Use code 504 for a multidisciplinary course. Codes 340, 345, 601, 602, 603 and 604 may be used, provided the courses are not related to the objectives of common or specific general education.

Contemporary Issues	Code: 021L

Objective — *Standard*

Statement of the Competency	Achievement Context
Consider contemporary issues from a transdisciplinary perspective.	• Individually or in groups • Drawing on different fields of knowledge • Using documents and data from various disciplines

Elements of the Competency	Performance Criteria
1. Identify major contemporary issues.	• Exploration of various contemporary issues • Description of the main perspectives concerning these issues • Clear formulation of objects to study related to these issues
2. Recognize the specific role of several disciplines in the understanding of an issue.	• Identification of some of the theories used in analyzing the issue • Clear description of the concepts and methods used
3. Demonstrate the contribution of several disciplines to the understanding of an issue.	• Clear formulation of the perspectives of the issue • Precise description of the main contributions of the disciplines • Pertinent explanation of the interaction among various disciplines • Appropriate use of language and concepts from the disciplines

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	This objective lends itself to teaching by one or more teachers. Use code 365 to link a course to objective 021L in order to maintain the transdisciplinary nature of the competency.

Contemporary Issues	Code: 021M

Objective — *Standard*

Statement of the Competency	Achievement Context
Explore a contemporary issue from a transdisciplinary perspective.	• Individually or in groups • Drawing on different fields of knowledge • Using documents and data from various disciplines

Elements of the Competency	Performance Criteria
1. Present a research problem.	• Justification of the choice of research problem • Brief description of the main issues involved in the problem • Clear formulation of the main dimensions of the problem • Appropriate use of language and concepts from the disciplines • Clear formulation of the research question
2. Analyze the research problem.	• Relevant description of a research approach or method • Appropriate selection of research data • Proper application of the approach or method used • Appropriate use of an analytical framework
3. Propose solutions.	• Clear description of the main contributions from the disciplines • Pertinent explanation of the interaction among various disciplines • Justification of solutions proposed • Assessment of the strengths and weaknesses of the proposed solutions

Learning Activities	
Periods of instruction:	45
Credits:	2
Note:	This objective lends itself to teaching by one or more teachers. Use code 365 to link a course to objective 021M in order to maintain the transdisciplinary nature of the competency.

Additional Information

Vocabulary Used in Technical Programs

Program

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

Competency

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

Objective

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

Statement of the Competency

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

Elements of the Competency

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

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

Standard

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

Performance Criteria

In the program-specific component of a technical program, the performance criteria define 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. 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.

In both components, all the criteria must be respected for the objective to be recognized as having been attained.

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.

Learning Activities

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

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

Glossary

The *Computer Science Technology* program includes a glossary whose purpose is to facilitate the comprehension of certain terms used when formulating objectives and standards.

The main sources of information used to develop the glossary are the *Grand dictionnaire terminologique* by the Office québécois de la langue française and *TERMIUM Plus*, the Government of Canada's terminology and linguistic data bank.

Algorithm

A set of operating rules specific to calculations or data processing, defined in order to achieve a determined outcome.

So-called *basic* algorithms consist of operating rules of limited complexity, for example, a simple iteration containing a condition, a series of operating rules that allow for the extraction of data from a database or a series of operating rules that make it possible to validate data entered into a form[1].

Application or software

A set of programs making it possible to carry out a given process on a computer.

Computer

A programmable information processing machine controlled by programs stored in memory and that accepts structured data, processes it according to a defined set of rules and automatically outputs a result. Tablets, smartphones, gaming consoles, multimedia streaming devices, desktop computers and mainframe computers are all examples of computers.

Cyber attack

An attempt to breach computer network security.

Computer network

A network comprising a set of computers and peripheral devices connected by physical resources and software.

Software testing

An operation intended to validate the proper execution of a program as a whole. Various strategies may be used, such as unit tests, integration tests, functional tests or acceptance tests. A plan outlines the objectives and means of carrying out each strategy. The plan also includes test records on which the sequence of operations to be carried out, the test data and their results are noted.

Design documents

Documents detailing the different steps in the design of an application or computer network (functional specifications, overall design and detailed design).

[1] There exists a number of standardized and rather complex algorithms, such as sorting, encryption or decision support computer algorithms, that do not fall within the scope of a computer technician's tasks.

Development tool

A software tool used in the development of an application. The programming language, libraries, frameworks, integrated development environment, database management system and version control system are all examples of development tools.

Native application

An application developed specifically for a target platform. The source code of the native application may be compiled or interpreted.

Knowledge base

A store of information constituting the knowledge acquired within a particular field and organized to facilitate access by experts in the field.

Peripheral device

A hardware device distinct from the central processing unit of the computer to which it is connected and that ensures the input and output of data. A peripheral device may be internal or external. Monitors, printers, connected objects and their sensors (camera, accelerometer, proximity beacons, temperature sensor, etc.) and actuators (engine, radiator, switch, etc.) are all examples of peripheral devices.

Platform

A collection of hardware and software resources that make it possible to use an application.

Plug-in

A software component added on to an application to extend the scope of its features.

Redundancy

The duplication of a component essential to the normal functioning of the computer system so as to mitigate the potential failure of said component, thereby ensuring the continuity of the computer function.

Server

A computer or software intended to provide a specific service to other computers or to users connected to a computer network.

Software architecture

The logical organization of the application detailing the various structural components and their relationships. Software architecture possibilities do not encompass the choice of programming language, libraries or database management system, which are primarily a matter of which software components to use.

Threat

A dreaded potential event with non-zero probability that is likely to compromise computer security.

Virtualization

A set of software or hardware techniques for aggregating computer resources onto a single physical medium to allow them to each perform specific tasks, as though they were carried out on distinct physical media.

Vulnerability

A weakness in a system resulting in partial inability of the system to respond to the threats it faces.

Harmonization

The Ministère 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 *Computer Science 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, Techniques de l'informatique.*

Occupational Health and Safety Hazards

This section expands on the risks associated with the competencies in the *Computer Science Technology* program.

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

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

- Chemical hazards or dangers:
  - Form of substance (solid, liquid, aerosol, gas, etc.) and exposure (inhalation, absorption through the skin, ingestion, etc.).

- Physical hazards or dangers:
  - Electrical hazards
  - Thermal hazards
  - Noise
  - Vibration
  - Other physical hazards

- Biological hazards or dangers:
  - Form of substance (dust, mist, fluid, etc.) and exposure (inhalation, absorption through the skin, ingestion, cuts, etc.).

- Ergonomic hazards or dangers:
  - Constrained postures
  - Excessive effort
  - Repetitive movements

- Safety hazards or dangers:
  - Hazards related to general mechanical phenomena
  - Hazards related to moving parts, tools or vehicles
  - Risk of falling (workers and objects)
  - Hazards linked to confined spaces
  - Fire or explosion hazards
  - Violence in the workplace

- Psychosocial hazards or dangers:
  - Factors associated with the nature of the work
  - Factors related to the organization of the work
  - Social factors

TABLE: SOURCES AND RISK LEVELS FOR EACH COMPETENCY								
420.B0	***COMPUTER SCIENCE TECHNOLOGY***	**Sources of risk**						
		Chemical hazards or dangers	Physical hazards or dangers	Biological hazards or dangers	Ergonomic hazards or dangers	Safety hazards or dangers	Psychosocial hazards or dangers
	STATEMENT OF THE COMPETENCY	1	2	3	4	5	6
0000	Analyze information about working in the field of computer science technology						
00Q1	Install and manage computers		○		○		○
00Q2	Use programming languages				○		○
00Q3	Solve computer-related problems using mathematics						
00Q4	Use office automation software				○		
00Q5	Deploy a local computer network		○		○		
00Q6	Use an object-oriented development approach				○		○
00Q7	Use a database management system				○		○
00Q8	Carry out prevention operations with regard to information security				○		○
00SE	Interact in a professional setting			○			○
00SF	Evaluate software and hardware components				○		○
00SG	Provide users with technical support			○			●
00SH	Adapt to information technologies				○		●
00SJ	Deploy intranet servers		●		○		○
00SK	Deploy Internet servers		●		○		○
00SL	Deploy database servers		●		○		○
00SM	Deploy computer internetworking devices		●		○		○
00SN	Automate computer network management tasks				○		○
00SP	Monitor computer networks				○		●
00SQ	Collaborate on the design of a computer network						○
00SR	Develop native applications without a database				○		○
00SS	Develop native applications with a database				○		○
00ST	Develop non-transactional Web applications				○		○
00SU	Develop transactional Web applications				○		○
00SV	Develop data exchange services				○		○
00SW	Develop gaming or simulation applications				○		●
00SX	Develop applications for connected objects		●		○		○
00SY	Collaborate on the design of applications						○

Risk levels

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

Low risk: ○ High risk: ●

Éducation
et Enseignement
supérieur
Québec