

Technical Education Program

241.D0

Industrial Maintenance Technology

Training Sector

14

Maintenance
Mechanics

Reach for
your **Dreams**

Québec 

Technical Education Program

241.D0

Industrial Maintenance Technology

Training Sector

14

Maintenance
Mechanics

Formation professionnelle et technique
et formation continue

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Please take note of the modifications that have been made to the program

Industrial Maintenance Technology – 241.D0

The following modification pertains to a change in the specific admission requirement:

As of the fall of 2017, in order to be admitted to the program, a person must meet the general requirements for admission set out in section 2 of the *College Education Regulations* (CER) and, if applicable, the following specific requirements:

Have passed the secondary-level courses:

- Secondary IV Mathematics, Technical and Scientific option or Science option, or the Secondary V Cultural, Social and Technical option
- Secondary V Physics

Change approved in 2016

The following modification pertains to the addition of a specific admission requirement:

In order to be admitted to the program a person must meet the general requirements for admission as set out in section 2 of the *College Education Regulations* (CER) and, if applicable, the following specific requirements:

Have passed the secondary-level courses:

- Secondary IV Mathematics, Technical and Scientific option or Science option
- Secondary V Physics

Change approved in 2009

The following modification pertains to the addition of a specific admission requirement:

In order to be admitted to the program a person must meet the general requirements for admission as set out in section 2 of the *College Education Regulations* (CER) and, if applicable, the following specific requirements:

Have passed the secondary-level courses:

- Mathematics 526
- Physical Science 434

Change approved in 2004

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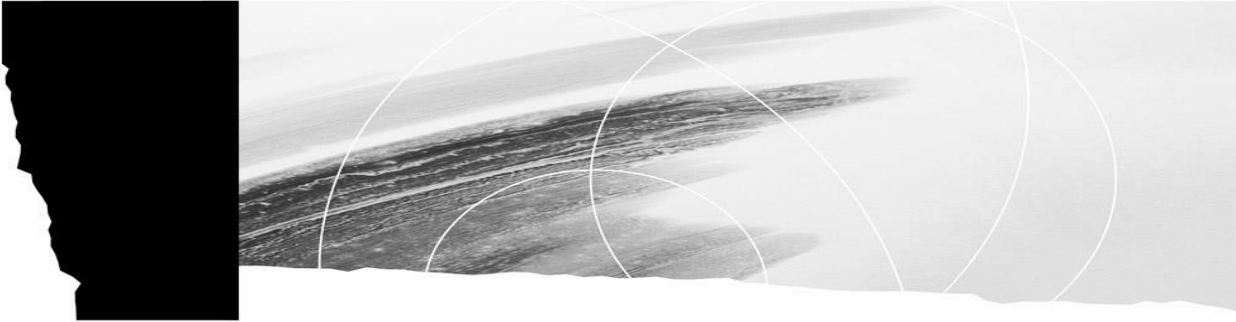
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241.D0

Industrial Maintenance Technology

Year of approval: 2003

Certification: Diploma of College Studies

Number of credits: 89 2/3 credits

Total duration: 2 715 hours of instruction

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

Conditions for Admission:

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

- Secondary IV Mathematics, *Technical and Scientific* option or *Science* option, or the Secondary V *Cultural, Social and Technical* option
- Secondary V *Physics*

Introduction to the Program

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

The *Industrial Maintenance Technology* program includes a general education component common to all programs (16 2/3 credits), a general education component adapted to this program (6 credits), a complementary general education component (4 credits) and a program-specific component of 63 credits.

The program-specific component was also designed according to the framework for developing technical programs. This approach requires the participation of people working in the field and in education, and takes into account training needs, the job analysis and the general goals of technical education. The objectives and standards serve as the basis for the definition and the evaluation of learning activities, for which the colleges are responsible.

By successfully completing this program of study, students acquire not only the entry-level competencies required by the workplace to practise a trade or occupation, but also a range of knowledge, skills and attitudes that will ensure the students' versatility.

General Education Component Common to All Programs

(16 2/3 credits)

- 0004 To analyze and produce various forms of discourse.
- 0005 To apply a critical approach to literary genres.
- 0006 To apply a critical approach to a literary theme.
- 00B2 To apply a logical analytical process to how knowledge is organized and used.
- 000G To apply a critical thought process to world-views.
- 0017 Appliquer les notions de base de la communication en français courant.
- or
- 000A Communiquer en français avec une certaine aisance.
- or
- 000B Communiquer avec aisance en français.
- or
- 000C Traiter d'un sujet culturel et littéraire.
- 0064 To establish the role that being physically active plays amongst the lifestyle behaviours which promote health.
- 0065 To improve one's effectiveness when practising a physical activity.
- 0066 To demonstrate one's responsibility for being physically active in a manner which promotes health.

General Education Component Adapted to This Program**(6 credits)**

- 000L To communicate in the forms of discourse appropriate to one or more fields of study.
- 000U To apply a critical thought process to ethical issues relevant to the field of study.
- 0018 Appliquer des notions fondamentales de la communication en français, liées à un champ d'études.
- or
- 000Q Communiquer en français dans un champ d'études particulier.
- or
- 000R Communiquer avec aisance en français dans un champ d'études particulier.
- or
- 000S Dissserter en français sur un sujet lié au champ d'études.

Complementary General Education Component**(4 credits)**

- 000V To estimate the contribution of the social sciences to an understanding of contemporary issues.
- 000W To analyze one of the major problems of our time using one or more social scientific approaches.
- 000X To explain the general nature of science and technology and some of the major contemporary scientific or technological issues.
- 000Y To resolve a simple problem by applying the basic scientific method.
- 000Z To communicate with limited skill in a modern language.
- 0010 To communicate on familiar topics in a modern language.
- 0067 To communicate with relative ease in a modern language.
- 0011 To recognize the role of mathematics or informatics in contemporary society.
- 0012 To use various mathematical or computer concepts, procedures and tools for common tasks.
- 0013 To consider various forms of art produced by aesthetic practices.
- 0014 To produce a work of art.

023L	To analyze the job function.
023M	To model mathematical results applied to industrial maintenance.
023N	To interpret plans, specifications, standards and technical documentation pertaining to industrial systems.
023P	To carry out tasks involving measurement and verification.
023Q	To analyze industrial mechanisms.
023R	To determine equipment assembly and adjustment parameters.
023S	To verify that installations and equipment conform with standards, plans and specifications.
023T	To solve physics problems related to industrial maintenance.
023U	To use statistical analysis in industrial maintenance.
023V	To carry out tasks related to power devices.
023W	To solve problems involving combinatory and sequential logic.
023X	To carry out tasks related to control systems.
023Y	To identify and analyze problems related to equipment operation.
023Z	To perform tasks related to manufacturing parts.
0240	To solve lubrication problems.
0241	To perform tasks related to vibration analysis.
0242	To perform tasks related to equipment modification.
0243	To analyze industrial equipment systems.
0244	To perform tasks related to industrial systems design.
0245	To perform tasks related to equipment optimization.
0246	To design preventive and predictive maintenance programs.
0247	To coordinate and control the implementation of industrial-maintenance activities.
0248	To provide technical support in industrial maintenance.
0249	To solve industrial-maintenance problems.

Glossary

Program

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

Competency

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

Objective

An objective encompasses the competency, skills or knowledge to be acquired or mastered (*College Education Regulations*, section 1). It describes the competency to be acquired and includes the statement of the competency as well as the elements needed to understand it.

Statement of the Competency

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

Elements of the Competency

In the program-specific component of a technical program, the elements of the competency include only what is necessary in order to understand the competency. They specify the major steps involved in carrying out a task or the main aspects of the competency.

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

Standard

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

Achievement Context

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

Performance Criteria

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

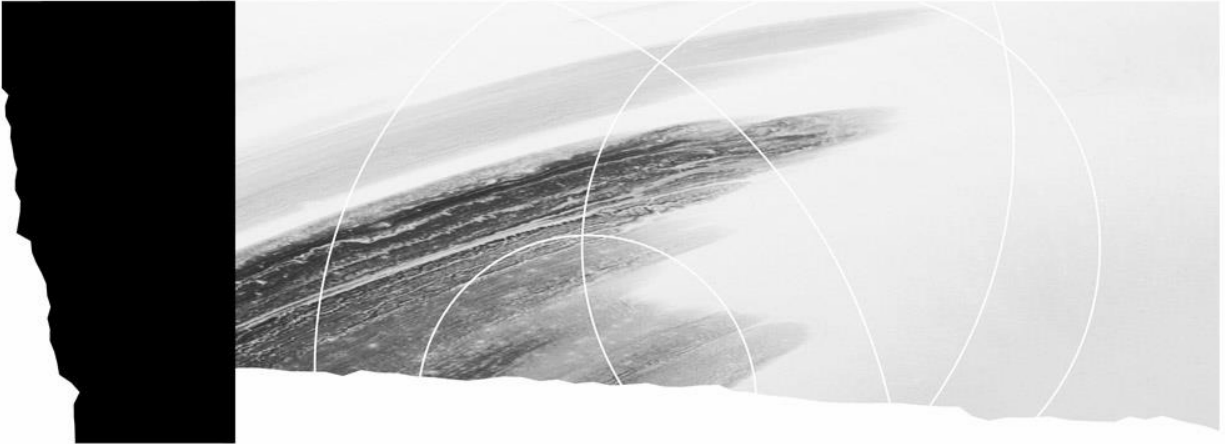
In the general education components, the performance criteria define the requirements for recognition of the attainment of the standard.

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

Learning Activities

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

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



Part I

**Goals of the General Education
Components**

**Educational Aims of the General
Education Components**

**Objectives and Standards of the
General Education Components**

Goals of the General Education Components

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

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

Common Cultural Core

The common cultural core is intended to help students:

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

Generic Skills

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

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

Desirable Qualities and Attitudes

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

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

- creativity
- openness to the world

These goals apply to the three general education components:

- General education component common to all programs, which is allotted 16 2/3 credits distributed as follows:
 - language of instruction and literature: 7 1/3 credits
 - humanities or *philosophie*: 4 1/3 credits
 - physical education: 3 credits
 - second language: 2 credits
- General education component adapted to programs, which introduces tasks or learning situations that are relevant to the program-specific component of a program. The breakdown of credits, for a total of 6, is as follows:
 - language of instruction and literature: 2 credits
 - humanities or *philosophie*: 2 credits
 - second language: 2 credits
- Complementary general education component, which provides students with learning activities chosen to balance their training and complement the program-specific component. Students may choose courses for a total of 4 credits in the following areas:
 - social sciences
 - science and technology
 - modern languages
 - mathematics and computer literacy
 - art and aesthetics

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

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

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

Educational Aims of the General Education Components

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

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

English, Language of Instruction and Literature

General Education Common to All Programs

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

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

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

General Education Adapted to Programs

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

Expected Outcomes

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

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

Humanities

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

Principles

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

Expected Outcomes

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

- describe, explain and organize main elements, ideas, values and implications of a world-view in a coherent fashion
- compare world-views
- recognize the basic elements in a specific example of the organization, transmission and use of knowledge
- define the dimensions, limits, and uses of knowledge in appropriate historical contexts
- identify, organize and synthesize the salient elements of a particular example of knowledge
- situate important ethical and social issues in their appropriate historical and intellectual contexts
- explain, analyze and debate ethical issues in a personal and professional context

Sequence of Objectives and Standards

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

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

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

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

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

Français, langue seconde

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

Principes

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

Résultats attendus

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

- que, sur le plan des connaissances, il ou elle :
 - sait faire une présentation orale structurée;
 - connaît les différentes formes du discours;
 - connaît les différentes techniques de lecture et d'écriture;
- que, sur le plan des habiletés, il ou elle :
 - est capable de questionner, d'analyser, de juger, et d'argumenter en français;
 - est apte à entretenir des rapports sociaux et à partager la vie culturelle du Québec;
 - est apte à établir, à poursuivre et à pratiquer des rapports professionnels en français;
- que, sur le plan des qualités et des attitudes à développer, il ou elle :
 - fait preuve d'ouverture par rapport aux différents aspects de la culture québécoise;
 - a conscience des différences et des similitudes entre sa culture d'origine et la culture québécoise francophone;
 - a la préparation voulue pour s'insérer dans la vie sociale et économique.

Séquence des objectifs et des standards

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

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

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

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

Physical Education

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

Principles

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

Expected Outcomes

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

- their knowledge of:
 - the relationship between physical activity, lifestyle and health based on the findings of scientific research
 - the scientific principles for improving or maintaining physical fitness
 - ways to assess their abilities and needs with respect to activities that can improve their health
 - the rules, techniques and conditions involved in different types of physical activity
 - a method for setting goals
 - the factors that help make physical activity part of their lifestyle
- the skills that will enable them to:
 - choose physical activities on the basis of their motivation, abilities and needs
 - establish relationships between lifestyle and health
 - apply the rules, techniques and conditions involved in different types of physical activity
 - set goals that are realistic, measurable, challenging, and situated within a specific time frame

- improve their mastery of the basic techniques, tactics and strategies associated with sports, outdoor and expression-oriented activities
 - use their creative and communication skills, particularly in group activities
 - evaluate their skills, attitudes and progress with respect to different forms of physical activity
 - maintain or increase their level of physical activity and fitness on their own
 - manage a personal physical activity program and assume responsibility in the organization of physical activities
- the attitudes and qualities that will enable them to:
 - understand the importance of taking responsibility for their health
 - be aware of the need to evaluate and respect their abilities and the conditions for carrying out an activity, before undertaking the activity
 - recognize the importance of self-confidence, self-control, respect for others and cooperation, through knowledge they have acquired and through participation in physical activity
 - respect the environment in which the activities are held
 - appreciate the aesthetic and play value of physical activity
 - promote a balanced and active lifestyle as a social value

Sequence of Objectives and Standards

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

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

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

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

Complementary General Education

Social Sciences

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

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

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

Science and Technology

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

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

Modern Languages

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

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

Mathematics and Literacy Computer Science

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

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

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

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

Art and Aesthetics

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

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

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

Objective**Standard****Statement of the Competency**

To analyze and produce various forms of discourse.

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1. To identify the characteristics and functions of the components of discourse. | <ul style="list-style-type: none"> • Accurate explanation of the denotation of words • Adequate recognition of the appropriate connotation of words • Accurate definition of the characteristics and function of each component |
| 2. To determine the organization of facts and arguments of a given discourse. | <ul style="list-style-type: none"> • Clear and accurate recognition of the main idea and structure • Clear presentation of the strategies employed to develop an argument or thesis |
| 3. To prepare ideas and strategies for a projected discourse. | <ul style="list-style-type: none"> • Appropriate identification of topics and ideas • Adequate gathering of pertinent information • Clear formulation of a thesis • Coherent ordering of supporting material |
| 4. To formulate a discourse. | <ul style="list-style-type: none"> • Appropriate choice of tone and diction • Correct development of sentences • Clear and coherent development of paragraphs • Formulation of a 750-word discourse |
| 5. To edit the discourse. | <ul style="list-style-type: none"> • Thorough revision of form and content |

Learning Activities

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

Language of Instruction and Literature

Code: 0005

Objective**Standard****Statement of the Competency**

To apply a critical approach to literary genres.

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| 1. To distinguish genres of literary discourse. | <ul style="list-style-type: none"> • Clear recognition of the formal characteristics of a literary genre |
| 2. To recognize the use of literary conventions within a specific genre. | <ul style="list-style-type: none"> • Accurate recognition of the figurative communication of meaning • Adequate explanation of the effects of significant literary and rhetorical devices |
| 3. To situate a discourse within its historical and literary period. | <ul style="list-style-type: none"> • Appropriate recognition of the relationship of a text to its period |
| 4. To explicate a discourse representative of a literary genre. | <ul style="list-style-type: none"> • Selective use of appropriate terminology • Effective presentation of a 1000-word integrated response to a text |

Learning Activities

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

Objective**Standard****Statement of the Competency**

To apply a critical approach to a literary theme.

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. To recognize the treatment of a theme within a literary text. 2. To situate a literary text within its cultural context. 3. To detect the value system inherent in a literary text. 4. To explicate a text from a thematic perspective. | <ul style="list-style-type: none"> • 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 • Appropriate recognition of a text as an expression of cultural context • Adequate demonstration of the effects of significant literary and rhetorical devices • Appropriate identification of expression (explicit/implicit) of a value system in a text • Selective use of appropriate terminology • Effective presentation of a 1000-word integrated response to a text |
|---|---|

Learning Activities

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

Humanities

Code: 00B2

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. To recognize the basic elements of a field of knowledge. | <ul style="list-style-type: none"> • Appropriate description of the basic elements • Appropriate use of terminology relevant to fields of knowledge |
| 2. To define the modes of organization and utilization of a field of knowledge. | <ul style="list-style-type: none"> • Adequate definition of the dimensions, limits and uses of fields of knowledge |
| 3. To situate a field of knowledge within its historical context. | <ul style="list-style-type: none"> • Accurate identification of the main components in the historical development of fields of knowledge • Accurate description of the effects of historical development and societal milieu on the limitations and uses of a field of knowledge |
| 4. To organize the main components into coherent patterns. | <ul style="list-style-type: none"> • Coherent organization of the main components |
| 5. To produce a synthesis of the main components. | <ul style="list-style-type: none"> • Appropriate analysis of the components • Coherent synthesis of the main components • Appropriate expression, including a significant individual written component, of an analysis of the context, importance and implications of the organization and uses of knowledge |

Learning Activities

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

Humanities

Code: 000G

Objective**Standard****Statement of the Competency**

To apply a critical thought process to world-views.

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1. To describe world-views. | <ul style="list-style-type: none"> • Accurate description of a society or group with a distinctive world-view • Appropriate use of terminology relevant to these societies or groups |
| 2. To explain the major ideas, values and implications of a world-view. | <ul style="list-style-type: none"> • Adequate explanation of the salient components of a world-view |
| 3. To organize the ideas, values and experiences of a world-view into coherent patterns. | <ul style="list-style-type: none"> • Coherent organization of ideas about a world-view • Appropriate expression, including a significant individual written component, of an analysis of the context, importance and implications of world-views |
| 4. To compare world-views. | <ul style="list-style-type: none"> • Comparative analysis of these world-views • Appropriate inclusion of central elements, relationships and organizational principles of the societies or groups in the analysis |

Learning Activities

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

Langue seconde (niveau I)

Code: 0017

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1. Dégager le sens d'un message oral simple. | <ul style="list-style-type: none"> • Repérage précis des difficultés de compréhension du message. • Utilisation pertinente des techniques d'écoute choisies. • Distinction précise du sens général et des idées essentielles du message. • Description précise du sens général et des idées essentielles du message. |
| 2. Émettre un message oral simple. | <ul style="list-style-type: none"> • Repérage précis des difficultés d'expression. • Utilisation pertinente des techniques d'expression orales choisies. • Emploi pertinent du vocabulaire courant. • Expression intelligible du propos. |
| 3. Dégager le sens d'un texte. | <ul style="list-style-type: none"> • Repérage précis des difficultés de compréhension du texte. • Utilisation pertinente des techniques de lecture choisies. • Distinction claire des principaux éléments du texte. • Description précise du sens général et des idées essentielles d'un texte de 500 mots. |
| 4. Rédiger un texte simple. | <ul style="list-style-type: none"> • Repérage précis des difficultés d'écriture. • Utilisation pertinente des techniques d'écriture choisies. • Emploi pertinent du vocabulaire courant. • Formulation claire et cohérente d'un texte de 100 mots. |

Learning Activities

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

Langue seconde (niveau II)

Code: 000A

Objective**Standard****Statement of the Competency**

Communiquer en français avec une certaine aisance.

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. Interpréter un texte oral simple de trois minutes en français courant. | <ul style="list-style-type: none"> • Distinction claire des principaux éléments du texte oral. • Explication précise du sens des mots dans le texte. • Repérage précis des idées et des sujets traités dans le texte. |
| 2. Produire un texte oral planifié de cinq minutes en français courant. | <ul style="list-style-type: none"> • Emploi pertinent du vocabulaire courant. • Respect du niveau de langue, du code grammatical et des règles de la prononciation. • Formulation claire et cohérente du propos. |
| 3. Interpréter un texte écrit en français courant. | <ul style="list-style-type: none"> • Distinction claire des principaux éléments du texte. • Explication précise du sens des mots dans le texte. • Repérage précis des idées principales et de la structure d'un texte de 700 à 1000 mots. |
| 4. Rédiger un texte simple en français courant. | <ul style="list-style-type: none"> • Respect du code grammatical et orthographique. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente des phrases. • Articulation cohérente des paragraphes. • Rédaction d'un texte de 200 mots. |

Learning Activities

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

Langue seconde (niveau III)

Code: 000B

Objective**Standard****Statement of the Competency**

Communiquer avec aisance en français.

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Produire un texte oral planifié de cinq minutes de complexité moyenne. | <ul style="list-style-type: none"> • Emploi pertinent du vocabulaire courant. • Adaptation à l'interlocuteur ou à l'interlocutrice • Respect du niveau de langue, du code grammatical et des règles de la prononciation. • Formulation claire et cohérente du propos. • Agencement pertinent des idées. |
| 2. Commenter un texte écrit de complexité moyenne. | <ul style="list-style-type: none"> • Distinction claire des principaux éléments d'un texte comprenant entre 2 500 et 3 000 mots. • Explication précise du sens des mots dans le texte. • Distinction précise des idées principales et secondaires, des faits et des opinions. • Formulation d'éléments implicites. |
| 3. Rédiger un texte de complexité moyenne. | <ul style="list-style-type: none"> • Respect du code grammatical et orthographique. • Adaptation au lecteur ou à la lectrice. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente des phrases, dont au moins trois sont complexes. • Articulation cohérente des paragraphes. • Rédaction d'un texte de 350 mots. |

Learning Activities

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

Langue seconde (niveau IV)

Code: 000C

Objective**Standard****Statement of the Competency**

Traiter d'un sujet culturel et littéraire.

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| 1. Analyser un texte culturel ou littéraire. | <ul style="list-style-type: none"> • Formulation personnelle des éléments principaux du texte. • Inventaire des thèmes principaux. • Relevé d'indices qui permettent de situer le texte dans son contexte socioculturel et historique. • Repérage des valeurs véhiculées. • Repérage juste de la structure du texte. • Articulation claire d'un point de vue personnel. |
| 2. Rédiger un texte sur un sujet culturel ou littéraire. | <ul style="list-style-type: none"> • Respect du sujet. • Respect du code grammatical et orthographique. • Adaptation au lecteur ou à la lectrice. • Utilisation judicieuse des principaux éléments du corpus. • Formulation claire et cohérente d'un texte de 500 mots. • Articulation claire d'un point de vue personnel. |

Learning Activities

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

Physical Education

Code: 0064

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| 1. To establish a relationship between their lifestyle and their health. | <ul style="list-style-type: none"> • Appropriate use of documentation • Appropriate connections between their lifestyle and their health |
| 2. To be physically active in a manner that promotes health. | <ul style="list-style-type: none"> • Observance of the rules involved in physical activities, including safety rules • Respect for their abilities when engaging in physical activities |
| 3. To recognize their needs, abilities and motivational factors with respect to regular physical activity. | <ul style="list-style-type: none"> • Appropriate use of quantitative and qualitative physical data • Statement of their main physical needs and abilities • Statement of their main motivational factors with respect to regular physical activity |
| 4. To propose physical activities that promote health. | <ul style="list-style-type: none"> • Appropriate and justified choice of physical activities according to their needs, abilities, and motivational factors |

Learning Activities

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

Physical Education

Code: 0065

Objective**Standard****Statement of the Competency**

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

Element of the Competency**Performance Criteria**

1. To use a process designed to improve their effectiveness during a physical activity.

- Initial assessment of their skills and attitudes in relation to a physical activity
- Statement of their expectations and needs with respect to their ability to carry out the activity
- Appropriate formulation of personal objectives
- Statement of the means selected to achieve their objectives
- Observance of the rules involved in the physical activity, including safety rules
- Periodic evaluation of their skills and attitudes in relation to the activity
- Meaningful interpretation of the progress achieved and the difficulties experienced during the activity
- Appropriate, periodic adjustments of their objectives or the means used to achieve them
- Appreciable improvement of the motor skills required by the activity

Learning Activities

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

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | Elements of the Competency | Performance Criteria |
|---|--|
| 1. To make physical activity part of a healthy lifestyle. | <ul style="list-style-type: none"> • Practise of a physical activity while maintaining a balance between effectiveness and the factors promoting health |
| 2. To manage a personal physical activity program. | <ul style="list-style-type: none"> • Statement of their priorities according to their needs, skills, and motivational factors in relation to regular physical activity • Proper formulation of the objectives for their personal programs • Appropriate choice of activity or activities for their personal programs • Appropriate planning of the conditions in which the activity or activities in their personal programs are carried out • Appropriate choice of criteria for measuring the attainment of their personal programs • Periodic assessment of the time invested and the activities carried out during the program • Meaningful interpretation of the progress achieved and difficulties experienced during the activities • Appropriate, periodic adjustment of their objectives or the means used to attain them |

Learning Activities

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

Language of Instruction and Literature

Code: 000L

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. To identify the forms of discourse appropriate to given fields of study. 2. To recognize the discursive frameworks appropriate to given fields of study. 3. To formulate a discourse. | <ul style="list-style-type: none"> • Accurate recognition of specialized vocabulary and conventions • Accurate recognition of the characteristics of the form of discourse • Clear and accurate recognition of the main ideas and structure • Appropriate distinction between fact and argument • Appropriate choice of tone and diction • Correctly developed sentences • Clearly and coherently developed paragraphs • Appropriate use of program-related communication strategies • Formulation of a 1000-word discourse • Thorough revision of form and content |
|--|---|

Learning Activities

Discipline:	English
Hours of instruction:	60
Credits:	2

Humanities

Code: 000U

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. To situate significant ethical issues in appropriate world-views and fields of knowledge. 2. To explain the major ideas, values, and social implications of ethical issues. 3. To organize the ethical questions and their implications into coherent patterns. 4. To debate the ethical issues. | <ul style="list-style-type: none"> • 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 • Adequate description of the salient components of the issues • 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 • Adequate development of substantiated argumentation including context and diverse points of view • Clear articulation of an individual point of view |
|--|--|

Learning Activities

Discipline:	Humanities
Hours of instruction:	45
Credits:	2

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| <p>1. Dégager le sens d'un message oral simple lié à un champ d'études.</p> | <ul style="list-style-type: none"> • Repérage précis des difficultés de compréhension du message. • Distinction juste des caractéristiques du message. • Repérage juste du vocabulaire spécialisé. • Utilisation pertinente des techniques d'écoute choisies. • Distinction claire des principaux éléments du message. • Description précise du sens général et des idées essentielles du message. |
| <p>2. Dégager le sens et les caractéristiques d'un texte lié à un champ d'études.</p> | <ul style="list-style-type: none"> • Repérage précis des difficultés de compréhension du texte. • Distinction juste des caractéristiques du texte. • Repérage précis du vocabulaire spécialisé. • Utilisation pertinente des techniques de lectures choisies. • Distinction claire des principaux éléments du texte. • Description précise du sens général et des idées essentielles du texte. |
| <p>3. Émettre un message oral simple lié à un champ d'études.</p> | <ul style="list-style-type: none"> • Repérage précis des difficultés d'expression orale. • Utilisation pertinente des techniques d'expression orale choisies. • Utilisation pertinente du vocabulaire courant et spécialisé. • Expression intelligible du propos. |

Langue seconde (niveau I)

Code: 0018

4. Rédiger un court texte lié à un champ d'études.
- Repérage précis des difficultés d'écrire.
 - Utilisation pertinente des techniques d'écriture choisies.
 - Utilisation pertinente du vocabulaire courant et spécialisé.
 - Formulation claire et cohérente du texte.

Learning Activities

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

Langue seconde (niveau II)

Code: 000Q

Objective**Standard****Statement of the Competency**

Communiquer en français dans un champ d'études particulier.

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. Distinguer les types de textes propres au champ d'études. | <ul style="list-style-type: none"> • Distinction précise des caractéristiques formelles de chacun des principaux types de textes et des conventions utilisées. |
| 2. Interpréter des textes représentatifs du champ d'études. | <ul style="list-style-type: none"> • Distinction claire des principaux éléments du texte. • Interprétation claire du vocabulaire spécialisé. • Repérage précis des idées et des sujets traités. • Utilisation pertinente des techniques de lecture et d'écoute. |
| 3. Utiliser des techniques de production de textes appropriées au champ d'études. | <ul style="list-style-type: none"> • Emploi pertinent du vocabulaire spécialisé et des conventions. • Respect du niveau de langue et du code grammatical. • Formulation claire et cohérente du propos. • Utilisation pertinente des techniques d'expression. |

Learning Activities

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

Langue seconde (niveau III)

Code: 000R

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

1. Commenter des textes propres au champ d'études.

- Distinction précise des caractéristiques formelles des principaux types de textes et des conventions utilisées.
- Explication précise du sens des mots dans le texte.
- Repérage précis de la structure du texte.
- Reformulation juste des idées principales et secondaires, des faits et des opinions.
- Emploi juste du vocabulaire spécialisé.

2. Produire un texte sur un sujet lié au champ d'études.

- Respect du sujet.
- Emploi pertinent du vocabulaire spécialisé et des conventions.
- Respect du niveau de langue et du code grammatical.
- Formulation claire et cohérente du propos.
- Agencement pertinent des idées.
- Adéquation entre forme et fond.

Learning Activities

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

Langue seconde (niveau IV)

Code: 000S

Objective**Standard****Statement of the Competency**

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

Elements of the Competency**Performance Criteria**

1. Analyser un texte lié au champ d'études.

- Distinction précise des caractéristiques formelles des types particuliers de textes.
- Formulation personnelle des éléments principaux.
- Inventaire des thèmes principaux.
- Repérage juste de la structure du texte.
- Relevé d'indices qui permettent de situer le texte dans son contexte.
- Articulation claire d'un point de vue personnel, s'il y a lieu.
- Association juste des éléments du texte au sujet traité.

2. Rédiger un texte sur un sujet lié au champ d'études.

- Respect du sujet.
- Emploi pertinent du vocabulaire spécialisé et des conventions.
- Choix judicieux des principaux éléments du corpus en fonction du type de texte.
- Formulation claire et cohérente du texte.
- Respect du code grammatical et orthographique.
- Articulation claire d'un point de vue personnel, s'il y a lieu.

Learning Activities

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

Social Sciences

Code: 000V

Objective**Standard****Statement of the Competency****Achievement Context**

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

- Working alone
- In an essay of approximately 750 words on the contribution of the social sciences to an understanding of contemporary issues
- Using documents and data from the social sciences

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Recognize the focus of one or more of the social sciences and their main approaches. | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • Association of these issues with the pertinent areas of research in the social sciences |
| 3. Demonstrate the contribution of one or more of the social sciences to an understanding of contemporary issues. | <ul style="list-style-type: none"> • Presentation of contemporary issues by emphasizing the interpretation of the social sciences • Illustration of the interaction between certain social changes and the contribution of the social sciences |

Learning Activities

Hours of instruction:	45
Credits:	2

Social Sciences

Code: 000W

Objective**Standard****Statement of the Competency**

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

Achievement Context

- Working alone
- In an essay of approximately 750 words on a topic related to human existence
- Using reference materials from one or more disciplines in the social sciences

Elements of the Competency**Performance Criteria**

1. Formulate a problem using one or more social scientific approaches.

- Presentation of the background to the problem
- Use of appropriate concepts and language
- Brief description of individual, collective, spatiotemporal and cultural aspects of the problem

2. Deal with an issue using one or more social scientific approaches.

- Clear formulation of an issue
- Selection of pertinent reference materials
- Brief description of historical, experimental and survey methods

3. Draw conclusions.

- Appropriate use of the selected method
- Determination of appropriate evaluation criteria
- Identification of strengths and weaknesses of the conclusions
- Broadening of issue studied

Learning Activities

Hours of instruction: 45
Credits: 2

Science and Technology

Code: 000X

Objective**Standard****Statement of the Competency**

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

Achievement Context

- Working alone
- Given a written commentary on a scientific discovery or technological development
- In an essay of approximately 750 words

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| 1. Describe scientific thinking and the standard method. | <ul style="list-style-type: none"> • Brief description of the essential characteristics of scientific thinking, including quantification and demonstration • Organized list and brief description of the essential characteristics of the main steps in the standard scientific method |
| 2. Demonstrate how science and technology are complementary. | <ul style="list-style-type: none"> • Definition of terms and description of the primary ways in which science, techniques and technology are interrelated: logical and temporal connections, and mutual contributions |
| 3. Explain the context and the stages related to several scientific and technological discoveries. | <ul style="list-style-type: none"> • Pertinent and coherent explanation of the relationship between the determining contexts of several scientific and technological discoveries • List of the main stages of scientific and technological discoveries |
| 4. Deduce different consequences and questions resulting from certain recent scientific and technological innovations. | <ul style="list-style-type: none"> • Brief description of important consequences (of different types) and the current major challenges resulting from several scientific and technological discoveries • Formulation of relevant questions and credibility of responses to the questions formulated |

Learning Activities

Hours of instruction: 45
Credits: 2

Science and Technology

Code: 000Y

Objective**Standard****Statement of the Competency****Achievement Context**

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

- Working alone or in groups
- Given a simple scientific and technological problem that can be resolved by applying the standard scientific method
- Using common scientific instruments and reference materials (written or other)

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Describe the main steps of the standard scientific method. | <ul style="list-style-type: none"> • Organized list and brief description of the characteristics of the steps of the standard scientific method |
| 2. Formulate a hypothesis designed to solve a simple scientific and technological problem. | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • Pertinence, reliability and validity of the experimental method used • Observance of established experimental method • Appropriate choice and use of instruments • Clear, satisfactory presentation of results • Validity of the connections established between the hypothesis, the verification and the conclusion |

Learning Activities

Hours of instruction:	45
Credits:	2

Modern Languages

Code: 000Z

Objective	Standard
Statement of the Competency	Achievement Context
To communicate with limited skill ¹ in a modern language.	<ul style="list-style-type: none"> For modern Latin-alphabet languages: <ul style="list-style-type: none"> during a conversation consisting of at least eight sentences of dialogue in a written text consisting of at least eight sentences Or For non-Latin-alphabet languages: <ul style="list-style-type: none"> during a conversation consisting of at least six sentences of dialogue in a written text consisting of at least six sentences Based on learning situations on familiar themes Using reference materials
Elements of the Competency	Performance Criteria
1. Understand the meaning of a verbal message.	<p>Learning a modern language requires becoming aware of the culture of the people who use the language.</p> <ul style="list-style-type: none"> Accurate identification of words and idiomatic expressions Clear recognition of the general meaning of simple messages Logical connections between the various elements of the message
2. Understand the meaning of a written message.	<ul style="list-style-type: none"> Accurate identification of words and idiomatic expressions Clear recognition of the general meaning of simple messages Logical connections between the various elements of the message

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

Modern Languages**Code: 000Z**

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

Learning Activities

Hours of instruction: 45
Credits: 2

Objective**Standard****Statement of the Competency**

To communicate on familiar topics in a modern language.

Achievement Context

- During a conversation consisting of at least 15 sentences of dialogue
- In a written text consisting of at least 20 sentences for Latin-alphabet languages
- In a written text consisting of at least 10 sentences for non-Latin alphabet languages
- Based on:
 - situations in everyday life
 - simple topics from everyday life
- Using reference materials

Elements of the Competency**Performance Criteria**

1. Understand the meaning of a verbal message.

Learning a modern language requires becoming aware of the culture of the people who use the language.

- Accurate identification of words and idiomatic expressions
- Clear recognition of the general meaning and essential ideas of messages of average complexity
- Logical connection between the various elements of the message

2. Understand the meaning of a written message.

- Accurate identification of words and idiomatic expressions
- Clear recognition of the general meaning and essential ideas of messages of average complexity
- Logical connection between the various elements of the message

3. Express a simple message verbally, using sentences of average complexity.

- Appropriate use of language structures in main or subordinate clauses
- Appropriate application of grammar rules
- Use of verbs in the present indicative
- Appropriate use of enriched basic vocabulary and idiomatic expressions
- Comprehensible pronunciation
- Coherent sequence of sentences of average complexity
- Coherent dialogue of average complexity

Modern Languages**Code: 0010**

4. Write a text on a given subject, using sentences of average complexity.

- Appropriate use of language structures in main or subordinate clauses
- Appropriate application of grammar rules
- Use of verbs in the present and past indicative
- Appropriate use of enriched basic vocabulary and idiomatic expressions.
- Coherent sequence of sentences of average complexity
- Acceptable application of graphic rules for writing systems that do not use the Latin alphabet

Learning Activities

Hours of instruction: 45
Credits: 2

Modern Languages

Code: 0067

Objective	Standard
Statement of the Competency	Achievement Context
To communicate with relative ease in a modern language.	<ul style="list-style-type: none"> • Working alone • During a conversation consisting of at least 20 sentences of dialogue • In a written text of medium length (at least 25 sentences for Latin-alphabet languages and 15 sentences for other languages) • Given documents of a sociocultural nature • Using reference materials for the written text
Elements of the Competency	Performance Criteria
1. Understand the meaning of a verbal message in everyday language.	<p>Learning a modern language requires being aware of the culture of the people who use the language.</p> <ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Accurate explanation of the general meaning and essential ideas of the text • Clear identification of structural elements of the language
3. Have a conversation about a subject.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Appropriate use of the structural elements of the language according to the text to be written • Accurate vocabulary • Coherence of the text as a whole • Observance of presentation and writing rules

Learning Activities

Hours of instruction: 45
Credits: 2

Mathematics Literacy and Computer Science

Code: 0011

Objective**Standard****Statement of the Competency**

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

Achievement Context

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

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. Demonstrate the acquisition of basic general knowledge in mathematics or informatics. | <ul style="list-style-type: none"> • Identification of basic notions and concepts • Identification of main branches of mathematics or informatics • Appropriate use of terminology |
| 2. Describe the evolution of mathematics or informatics. | <ul style="list-style-type: none"> • Descriptive summary of several major phases |
| 3. Recognize the contribution of mathematics or informatics to the development of other areas of knowledge. | <ul style="list-style-type: none"> • Demonstration of the existence of important contributions, using concrete examples |
| 4. Illustrate the diversity of mathematical or informatics applications. | <ul style="list-style-type: none"> • Presentation of a range of applications in various areas of human activity, using concrete examples |
| 5. Evaluate the impact of mathematics or informatics on individuals and organizations. | <ul style="list-style-type: none"> • Identification of several major influences • Explanation of the way in which mathematics or informatics have changed certain human and organizational realities • Recognition of the advantages and disadvantages of these influences |

Learning Activities

Hours of instruction:	45
Credits:	2

Mathematics Literacy and Computer Science

Code: 0012

Objective**Standard****Statement of the Competency**

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

Achievement Context

- Working alone
- While carrying out a task or solving a problem based on everyday needs.
- Using familiar tools and reference materials

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. Demonstrate the acquisition of basic functional knowledge in mathematics or informatics. | <ul style="list-style-type: none"> • Brief definition of concepts • Correct execution of basic operations • Appropriate use of terminology |
| 2. Select mathematical or computer tools and procedures on the basis of specific needs. | <ul style="list-style-type: none"> • List of numerous possibilities available with mathematical and computer tools and procedures • Analysis of concrete situations and recognition of the usefulness of mathematical or computer tools and procedures • Appropriate choice according to needs |
| 3. Use mathematical or computer tools and procedures to carry out tasks and solve problems. | <ul style="list-style-type: none"> • Planned, methodical process • Correct use of tools and procedures • Satisfactory results, given the context • Appropriate use of terminology specific to a tool or procedure |
| 4. Interpret the quantitative data or results obtained using mathematical or computer tools and procedures. | <ul style="list-style-type: none"> • Accurate interpretation, given the context • Clear, precise formulation of the interpretation |

Learning Activities

Hours of instruction: 45

Credits: 2

Art and Aesthetics

Code: 0013

Objective**Standard****Statement of the Competency**

To consider various forms of art produced by aesthetic practices.

Achievement Context

- Working alone
- Given a specified work of art
- In a written commentary of approximately 750 words.

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Develop an appreciation for the dynamics of the imagination in art. 2. Describe art movements. 3. Give a commentary on a work of art. | <ul style="list-style-type: none"> • Precise explanation of a creative process connected to the construction of an imaginary universe • Descriptive list of the main characteristics of three art movements from different periods, including a modern movement • Coherent organization of observations, including identification of four basic elements of form and structure related to the language used as well as a justified description of the meaning of the work of art |
|--|---|

Learning Activities

Hours of instruction:	45
Credits:	2

Art and Aesthetics

Code: 0014

Objective**Standard****Statement of the Competency**

To produce a work of art.

Achievement Context

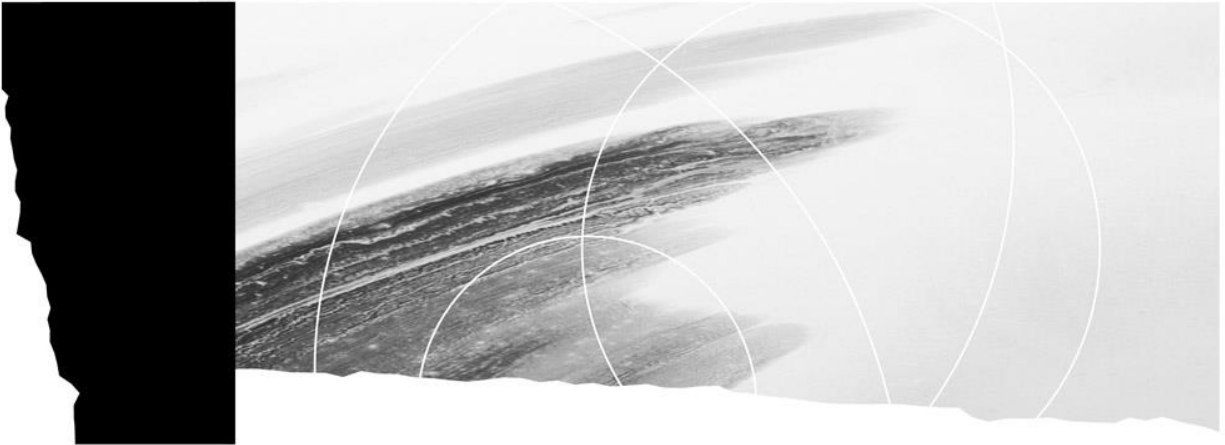
- Working alone
- During a practical exercise
- In the context of a creation or an interpretation
- Using the basic elements of the language and techniques specific to the medium selected

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Recognize the primary forms of expression of an artistic medium. 2. Use the medium. | <ul style="list-style-type: none"> • Identification of specific features: originality, essential qualities, means of communication, styles, genres • Personal, coherent use of elements of language • Satisfactory application of artistic techniques • Observance of the requirements of the method of production |
|---|--|

Learning Activities

Hours of instruction:	45
Credits:	2



Part II

**Goals of the Program-Specific
Component**

Grid of Competencies

Harmonization

**Objectives and Standards of the
Program-Specific Component**

Goals of the Program-Specific Component

The *Industrial Maintenance Technology* program prepares students to practise the occupation of Industrial Maintenance Technician.

Industrial maintenance technicians work in all industrial sectors such as: pulp and paper, metal mining, primary transformation and manufacture of metal products, food processing, wood, petrochemical, transportation, and subcontracting of maintenance services. While present in all industrial sectors, industrial maintenance technicians also work in the construction field.

The tasks of industrial maintenance technicians consist primarily in ensuring that installations and equipment conform with standards and plans. They also identify and analyze the functional condition of the equipment; participate in designing, manufacturing and optimizing the equipment; design and implement preventive and predictive maintenance programs; coordinate and verify maintenance tasks; provide technical assistance and solve various problems related to equipment maintenance and performance.

The goals of the program-specific component of the *Industrial Maintenance 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 work force, that is:
 - to familiarize students with the job market in general and the context surrounding the occupation they have chosen
 - to familiarize students with their rights and responsibilities as workers
- To foster students' personal development and acquisition of occupational knowledge, skills, perceptions and attitudes, that is:
 - to help students develop their autonomy and the desire to learn, and acquire effective work methods
 - to help students understand the principles underlying the techniques and the technology used in the trade or occupation
 - to help students develop self-expression, creativity, initiative and entrepreneurial spirit
 - to help students adopt the attitudes required to successfully practise the trade or occupation, and instill in them a sense of responsibility and a concern for excellence
- To promote job mobility, that is:
 - to help students develop positive attitudes toward change
 - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

Grid of Competencies

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

The grid of competencies includes:

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

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

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

GRID OF COMPETENCIES															
PROGRAM-SPECIFIC COMPETENCIES	Competence number	GENERAL COMPETENCIES													
		To analyze the job function	To model mathematical results applied to industrial maintenance	To interpret plans, specifications, standards and technical data pertaining to industrial systems	To carry out tasks involving measurement and verification	To analyze industrial mechanisms	To determine equipment assembly and adjustment parameters	To solve physics problems related to industrial maintenance	To perform industrial maintenance analysis, using statistics	To perform tasks related to power devices	To solve problems involving combinatory and sequential logic	To perform tasks related to control systems	To solve lubrication problems	To perform tasks related to vibration analysis	To analyze industrial equipment systems
Competence number		1	2	3	4	5	6	8	9	10	11	12	15	16	18
To verify that the installations and equipment conform with standards, plans and specifications	7	O	O	O	O	O	O	O	O				O		
To identify and analyze problems related to equipment performance	13	O	O	O	O	O	O	O	O	O	O	O	O	O	O
To perform tasks related to manufacturing parts	14	O	O	O	O	O	O	O	O	O	O	O	O		O
To perform tasks related to equipment modification	17	O	O	O	O	O	O	O	O	O	O	O	O		O
To design industrial systems	19	O	O	O	O	O	O	O	O	O	O	O	O		O
To optimize equipment	20	O	O	O	O	O	O	O	O	O	O	O	O	O	O
To design preventive and predictive maintenance programs	21	O	O	O	O	O	O		O	O	O	O	O	O	O
To coordinate and control the implementation of industrial-maintenance-related operations	22	O	O	O	O	O	O		O	O	O	O	O	O	O
To provide technical assistance in the field of industrial maintenance	23	O	O	O	O	O	O	O	O	O	O	O	O	O	O
To solve industrial-maintenance-related problems	24	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Harmonization

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

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

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

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

Harmonization of the *Industrial Maintenance Technology* program has resulted in identifying competencies that are shared with other programs. Detailed information on the harmonization of this program and its results are presented in the document entitled *Tableaux d'harmonisation Technologie de maintenance industrielle*.

Objective**Standard****Statement of the Competency**

To analyze the job function.

Achievement Context

- Using recent data on the job description, the regulatory framework and occupational health and safety rules pertaining to industrial maintenance
- Using occupational health and safety software

Elements of the Competency**Performance Criteria**

1. Describe the job function and conditions of employment.

- Relevance of information gathered
- Thorough analysis of general characteristics of the job function and conditions of employment
- Accurate identification of entrepreneurial opportunities
- Accurate identification of various work environments
- Accurate identification of various career paths

2. Analyze the tasks and operations related to the job function.

- Detailed analysis of what the operations entail, how each task is to be carried out, and what the performance criteria are for each task
- Accurate determination of tasks' relative importance
- Relationship drawn between steps involved in the work process, and the tasks of the job function

3. Analyze the skills and behaviours required by the job function.

- Relevance of relationship between skills and behaviours, and various tasks of the job function
- Thorough analysis of ethical requirements

4. Analyze the terminology and the regulatory framework governing industrial maintenance.

- Thorough analysis of terminology according to job-related tasks and activities
- Accuracy of relationships between French, English and industry terms
- Accurate identification of the significance and importance of each standard governing work-related tasks

Code: 023L

5. Draw relationships between occupational health and safety rules and industrial maintenance tasks.
 - Accurate identification of risks associated with:
 - products and materials
 - equipment
 - organization of work, procedures and methods
 - Accurate relationships drawn between occupational health and safety rules and the risks inherent in the job

Objective**Standard****Statement of the Competency**

To model mathematical results applied to industrial maintenance.

Achievement Context

- Given mathematical and graphic problems specific to industrial maintenance
- Using algebraic, exponential and trigonometric functions; mathematical symbols and algebraic expressions; tables, graphs, reference guides and a calculator

Elements of the Competency**Performance Criteria**

1. Draw relationships between mathematical concepts and industrial maintenance.

- Accuracy of relationships
- Accurate differentiation of the various types of problems to be solved and calculations to be made in industrial maintenance
- Appropriate choice and use of units of measurement

2. Convert industrial maintenance phenomena and problems into mathematical terms.

- Graphic representation of phenomenon and problem
- Thorough analysis of phenomenon and problem
- Conversion of phenomenon and problem into appropriate equation form
- Accurate calculation of interpolation and extrapolation
- Appropriate use of scientific notation in calculations
- Observance of rules related to rounded numbers
- Accurate calculation of angles and segments using trigonometric ratios
- Accurate interpretation of results, given the phenomenon and the problem

3. Calculate the value of a variable.

- Appropriate use of:
 - problem-solving methods
 - scientific calculator
- Accurate solving of variable in terms of argument and image
- Correct interpretation of results, given the problem
- Clear, careful presentation of:
 - method used and steps taken
 - results

- | | |
|--|---|
| <p>4. Do a vector analysis of forces exerted on an object.</p> | <ul style="list-style-type: none"> • Accurate graphic representation in the form of a free-body diagram • Thorough vector analysis • Appropriate choice of vector operation to be carried out • Accurate interpretation of results |
| <p>5. Solve equation systems involving several unknowns.</p> | <ul style="list-style-type: none"> • Accurate identification of: <ul style="list-style-type: none"> – aim sought – different unknowns • Appropriate conversion of systems into equation form • Appropriate use of problem-solving methods • Clear, careful presentation of: <ul style="list-style-type: none"> – method used and steps taken – results |
| <p>6. Establish a simple correspondence between derivative and integral symbols.</p> | <ul style="list-style-type: none"> • Detailed graphic representation of problem • Thorough analysis of phenomenon • Accurate determination of variables • Relationships drawn between variables in algebraic form • Appropriate determination of type of differential equation representing the problem • Accurate solving of equations • Description of variation rate by derivative • Accurate interpretation of results, given the situation |

Objective**Standard****Statement of the Competency**

To interpret plans, specifications, standards and technical documentation pertaining to industrial systems.

Achievement Context

- Given plans and specifications for piping as well as mechanical, mechanically welded and electromechanical assemblies; assembly and detail drawings in international and imperial units of measurement and appropriate standards
- Using relevant technical documentation (in French and English); drawing tools and catalogues of mechanical, hydraulic, pneumatic, electrical and steel products

Elements of the Competency**Performance Criteria**

1. Interpret a plan and specifications.
2. Interpret the dimensions, fits, clearances and tolerances.

- Accurate differentiation among the various types of projections:
 - orthographic (third- and first-angle)
 - isometric and oblique
- Appropriate identification of views, sections and cross-sections
- Accurate interpretation of lines and hatching lines
- Accurate relationships between lines, points and surfaces between the views
- Identification of industrial materials, fasteners, metallic structural elements and mechanical components
- Correct placement of part, mechanism and sub-assembly on the technical drawing
- Accurate observations concerning the shape of the part and its position in general
- Accurate interpretation of:
 - dimensions
 - dimensions with tolerances
 - form tolerances
 - positioning tolerances
 - run-out tolerances
 - displacement and outline dimensions
- Relevant relationships between dimensions and surfaces of various views

3. Verify that plans and specifications conform with current standards.
 - Identification of information regarding the disassembly and reassembly of the following equipment:
 - mechanical
 - hydraulic
 - pneumatic
 - electrical
 - electronic
 - steel structures
 - Identification of information regarding:
 - manufacturing techniques and techniques for permanent and temporary assemblies
 - sequence of procedures
 - Systematic identification of errors related to:
 - symbols
 - choice of disassembly and reassembly sequences
 - order of procedures
 - choice of manufacturing, and permanent and temporary assembly techniques.
 - Thorough verification of conformity with current standards
4. Check complementary information contained in the technical documentation.
 - Complete identification of information relevant to the task to be carried out in:
 - manufacturers' manuals
 - technical manuals
 - maintenance sheets
 - Complete identification of information relevant to all types of tasks:
 - mechanical
 - hydraulic
 - pneumatic
 - electrical
 - electronic
 - lubrication
 - structure

Code: 023N

5. Produce industrial maintenance sketches and diagrams.

- Observance of standards and conventions related to:
 - lines
 - hatching
 - elevation plans
 - third- and first-angle projections
 - use of appropriate symbols for circuits and objects to be represented
- Observance of proportions and shapes of object to be represented
- Appropriate use of drawing tools
- Correct application of tracing techniques
- Clean, clear lines
- Clear, accurate dimensioning of sketches and diagrams
- Clear, concise notes and information on title block

Objective**Standard****Statement of the Competency**

To carry out tasks involving measurement and verification.

Achievement Context

- Based on appropriate standards, plans, specifications and applications specific to industrial maintenance
- Using trigonometric calculations
- Using a calculator; isostatic assemblies; manual and electronic measuring instruments; pressure-, flow-, speed-, temperature-, movement- and position-control devices, and a computerized system

Elements of the Competency**Performance Criteria**

1. Choose measuring instruments and control devices.
2. Carry out isostatic assemblies.
3. Maintain and calibrate measuring instruments and control devices.
4. Take measurements.
5. Verify form and positioning tolerances.

- Appropriate choice of instruments and devices, according to:
 - specific characteristics
 - tasks to be carried out
 - degree of precision sought and tolerances set
- Appropriate choice and use of assemblies
- Precise, accurate calculations
- Correct interpretation of results
- Correct application of maintenance and storage techniques
- Thorough verification of calibration data
- Correct application of calibration methods
- Appropriate use of measuring instruments and control devices
- Accurate interpretation of specifications and plans
- Accurate recording of measurements
- Accurate measurements and calculations
- Accurate interpretation of results
- Appropriate trigonometric calculations
- Accurate verification of form and positioning tolerances
- Complete observance of specifications and plans
- Accurate interpretation of results

Code: 023P

6. Organize data.

- Appropriate use of computerized system
- Accurate data entry and organization, given specifications
- Accurate interpretation of results

Objective**Standard****Statement of the Competency**

To analyze industrial mechanisms.

Achievement Context

- Given industrial equipment and spare parts
- Using printed and electronic catalogues, relevant technical documentation, standards related to machine parts and a computerized workstation

Elements of the Competency**Performance Criteria**

1. Produce a diagram of machine components and simple mechanisms.

- Accurate identification of:
 - various machine components
 - temporary and permanent fasteners
- Accurate identification of the constraints due to joints and the degrees of mobility about the three axes
- Accurate identification of degree of indeterminateness
- Complete analysis of fasteners
- Appropriate sketching of:
 - fasteners
 - elementary fasteners of simple mechanisms

2. Choose dimensional tolerances.

- Accurate description of the main types of adjustments of the surface finish components, according to international and American standards
- Accurate calculation of clearance or torque of adjustments
- Choice of appropriate adjustments, given established standards and parameters of use

3. Calculate the dimensions of components of driving mechanisms.
 - Accurate determination of shaft rotation speeds
 - Accurate calculation of:
 - shaft speed ratio
 - load distribution to be transferred to each component of the driving mechanisms
 - Choice of components from catalogue, given the load
 - Appropriate choice of bearings, according to:
 - description and classification of various types of bearings
 - equivalent radial load
 - service life
 - conditions of use
 - Accurate determination of machining tolerances for shafts and bearing housings

4. Analyze the relationships between components of complex mechanisms.
 - Accurate description of gear reducers and variable speed drives
 - Determination of energy transmission
 - Appropriate determination of the functions of each component of the mechanisms
 - Accurate description of motion transfer drives
 - Identification of weak points in the mechanisms

5. Produce an analysis report.
 - Clear presentation of the analytical process
 - Appropriate choice and justification of elements to be included in the report
 - Proper description of assembly
 - Accurate determination of required conditions for use and performance
 - Accurate comparison of the mechanisms' actual and predicted performance
 - Relevant recommendations

Objective**Standard****Statement of the Competency**

To determine equipment assembly and adjustment parameters.

Achievement Context

- Given industrial equipment; spare parts; drawings, plans, diagrams and specifications; the manufacturer's specifications and a work order
- Using printed and electronic catalogues; relevant technical documentation; specialized tools, measuring instruments and alignment systems

Elements of the Competency**Performance Criteria**

1. Interpret specifications.

- Accurate interpretation of:
 - Work order
 - drawings, plans, diagrams and specifications
 - standards
 - manufacturers' removal and adjustment methods
 - start-up methods
 - conditions for using equipment

2. Check equipment.

- Proper disassembly of components
- Thorough verification of tolerances and parameters
- Accurate identification of maintenance points
- Proper detection of anomalies and malfunctions
- Proper reassembly of components

3. Establish parameters for adjusting bearings and bushings.

- Accurate measurement of:
 - reduction of clearance between the roller elements and tracks of a self-aligning roller bearing
 - clearance and torque of a bearing on a shaft or in a housing, given the load
 - clearance between shaft and bushing
- Accurate determination of parameters, according to:
 - specifications
 - tolerances
 - adjustment methods

- | | |
|---|--|
| <p>4. Establish parameters for aligning shafts.</p> | <ul style="list-style-type: none"> • Observance of methods used in conventional and optical alignment • Determination of soft foot • Accurate calculation of thickness of shims for each hold-down foot • Accurate verification of driving shaft alignment • Accurate determination of parameters, according to: <ul style="list-style-type: none"> – specifications – tolerances – alignment methods |
| <p>5. Establish parameters for removing and adjusting gear reducers and variable speed drives.</p> | <ul style="list-style-type: none"> • Observance of manufacturer's removal and adjustment methods • Accurate determination of parameters for: <ul style="list-style-type: none"> – adjusting internal components of worm-gear reducers and gear reducers – removing various types of variable speed drives (ball bearings, disks, chains, belts and cones) – adjusting an electric variable speed drive • Observance of specifications |
| <p>6. Establish parameters for adjusting and installing mechanisms on a complex piece of equipment.</p> | <ul style="list-style-type: none"> • Observance of standards, plans and specifications • Accurate determination of parameters for: <ul style="list-style-type: none"> – levelling equipment – adjusting shaft alignment – aligning pulleys, sprockets and gears – belt and chain tension – adjusting motor brake – balancing rotating parts – installing a driving mechanism – installing clamping devices • Thorough verification of installation • Thorough verification of parameters for charging mode operations |

Objective**Standard****Statement of the Competency**

To verify that installations and equipment conform with standards, plans and specifications.

Achievement Context

- Based on current standards, relevant technical documentation (in French and English) and assembly and detail drawings in international and imperial units of measurement
- Using measuring instruments and equipment, as well as charts, nomograms and conversion tables

Elements of the Competency**Performance Criteria**

1. Plan the work to be done.

- Accurate evaluation of the context and the characteristics of the equipment to be verified
- Accurate interpretation of information contained in the drawings and specifications related to:
 - dimensions
 - tolerances
 - notes
- Relevant choice of elements to be verified, according to:
 - conformity with plans and specifications
 - installation
 - construction
 - performance
 - conformity with standards
 - conformity with occupational health and safety rules
- Appropriate choice of measuring instruments and equipment, according to the tasks involved

2. Verify the installation and equipment.

- Careful calibration of measuring instruments and verification tools
- Accurate readings and measurements
- Accurate interpretation of results according to initial parameters, standards and rules, as well as plans and specifications
- Recording of results leading to preventative and corrective action

3. Suggest improvements.

- Relevant, convincing justification of modifications or adjustments to be made
- Conformity of suggested interventions with initial parameters

Code: 023S

4. Plan the required modifications.
 - Accurate determination of modifications
 - Accurate identification of needs, related to:
 - equipment and tools
 - materials and components
 - measuring and checking instruments
 - Realistic determination of tasks and schedule
5. Record and transmit information.
 - Detailed, methodical filing of changes, adjustments and modifications
 - Clear, accurate description of modifications to be carried out
 - Clear, coherent and complete verification report

Objective**Standard****Statement of the Competency**

To solve physics problems related to industrial maintenance.

Achievement Context

- Based on situations specific to industrial maintenance
- Using sources of information on materials; tables, nomograms and charts; various measuring instruments used to solve physics problems; and a scientific calculator

Elements of the Competency**Performance Criteria**

1. Analyze the forces exerted on a member or an object.

- Appropriate sketching of situations involving physics
- Accurate use of units of measurement
- Accurate determination of the distribution of forces on a member or an object
- Accurate calculation of the resultant of several forces on a member or an object
- Proper sequence of problem-solving operations

2. Analyze the stress and limits of materials.

- Accurate determination of the following types of stress:
 - tension and compression
 - shear
 - torsional
 - bending
- Accurate calculation of deflection stresses
- Accurate determination of limits of materials

3. Solve problems relates to kinematics and translational motion.

- Clear definition of problem to be solved
- Accurate interpretation of units involved
- Accurate calculation and appropriate graphic representation of the specific characteristics of kinematics and translational motion
- Clear representation of stress vectors
- Accurate resolution of the resultant of stress vectors
- Accurate interpretation and clear presentation of results

Code: 023T

4. Solve problems involving dynamics of a moving body.
 - Clear definition of problem to be solved
 - Accurate interpretation of units involved
 - Accurate calculation and appropriate graphic representation of the dynamics of a body in motion
 - Clear representation of stress vectors
 - Accurate resolution of the resultant of stress vectors
 - Accurate interpretation and clear presentation of results

Objective**Standard****Statement of the Competency**

To use statistical analysis in industrial maintenance.

Achievement Context

- In job-related situations
- Based on company policies and rules
- Using a computerized system and relevant software; equipment history and files; tables, graphs and calculators, measuring instruments and relevant reference manuals

Elements of the Competency**Performance Criteria**

1. Determine how to deal with the situation.

- Careful analysis of the situation
- Determination of objectives
- Choice of appropriate method

2. Collect and organize data.

- Determination of an appropriate sample
- Methodical collection of data
- Efficient organization of data
- Appropriate use of measuring instruments

3. Process data.

- Determination of appropriate calculations to be made
- Proper application of a scientific approach
- Accurate description and estimation of parameters
- Efficient use of software, tables, graphs and calculators
- Accurate calculations

4. Present results.

- Appropriate method used to present results
- Clear, orderly presentation of results
- Strict application of standards for presenting tables, graphs and reports
- Concern for accuracy and detail

Code: 023U

5. Interpret results.

- Highlighting of significant elements, given the situation
- Relevant relationships drawn among the various elements
- Logical synthesis of results

Objective**Standard****Statement of the Competency**

To carry out tasks related to power devices.

Achievement Context

- Based on current standards, diagrams, plans and specifications
- Using technical documentation and appropriate catalogues; relevant tools; mechanical, pneumatic, hydraulic and electrical components; power-assisted systems; a simulator; measuring instruments and devices; diagnostic procedures and software, and a computerized system

Elements of the Competency**Performance Criteria**

1. Perform power calculations.

- Strict analysis of “power” component and power networks
- Precise identification of potential problems
- Accurate relationships drawn among the various sources of energy (e.g. pneumatic, hydraulic and electrical)
- Proper use of problem-solving methods

2. Choose the components.

- Detailed analysis of:
 - diagrams, plans and specifications
 - relevant technical documentation
- Thorough consultation of catalogues
- Appropriate choice of components, according to:
 - calculations
 - results of analysis
 - standards and specifications

3. Sketch the network to be installed.

- Conversion of solutions into proper equation form
- Accurate sketching of equations

4. Simulate the adopted solution.

- Accurate interpretation of results and sketching
- Proper installation of components and network
- Strict observance of occupational health and safety rules
- Observance of procedure for testing on a simulator

Code: 023V

- 5 Perform a function check.
- Accurate analysis of production cycle
 - Thorough verification of conformity with standards and specifications
 - Accurate recording of data gathered
 - Accurate interpretation of results

Objective**Standard****Statement of the Competency**

To solve problems involving combinatory and sequential logic.

Achievement Context

- Given problems related to industrial maintenance
- Using a calculator
- Using appropriate methods; a logic simulator and an electropneumatic simulator, as well as diagnostic procedures

Elements of the Competency**Performance Criteria**

1. Collect data on the problems.

- Accurate interpretation of the nature and scope of the problems
- Accurate identification of the various components involved
- Appropriate collection of data on power and control components
- Strict application of the systems approach

2. Perform algebraic calculations.

- Accurate conversion of decimal numeric values in octal, hexadecimal, binary and DCB number systems
- Appropriate use of Boolean algebraic properties
- Simplification of algebraic equations

3. Choose methods of analysis to be used.

- Detailed analysis of data and results
- Appropriate choice of methods, according to combinatory and sequential logic

4. Use problem-solving methods involving combinatory logic.

- Detailed analysis of problems
- Accurate determination of input and output variables
- Accurate establishment of truth table
- Accurate interpretation of Karnaugh maps
- Accurate determination of logic equations
- Accurate interpretation of diagrams on simulator

Code: 023W

5. Use problem-solving methods involving sequential logic.
 - Thorough analysis of problems
 - Accurate determination of primary and secondary input and output variables
 - Accurate determination of logic equations
 - Detailed graphic representation of algebraic results
 - Accurate interpretation of diagrams on simulator
6. Verify the efficacy of results.
 - Accurate presentation and interpretation of various solutions
 - Appropriate choice of solutions
 - Appropriate testing of solutions on simulator
 - Accurate interpretation of results
 - Clear, precise presentation of data and results in a report

Objective**Standard****Statement of the Competency**

To carry out tasks related to control systems.

Achievement Context

- Based on current standards and diagrams, plans and specifications
- Using relevant technical documentation and catalogues; the necessary tools; mechanical, pneumatic, hydraulic and electrical components; feedback systems; a simulator; measuring instruments and devices; programmable controllers; automated systems; software and computerized system

Elements of the Competency**Performance Criteria**

1. Interpret the schematic diagrams of a control circuit.

- Accurate differentiation of symbols and standards
- Accurate identification of the various circuits and networks

2. Analyze the operation of circuits.

- Thorough analysis of circuits
- Accurate identification of specific characteristics and functions
- Accurate identification of placement of each component in control circuits

3. Diagnose faults in a control circuit.

- Accurate identification of faults
- Accurate determination of the different types of problems to be solved
- Accurate relationships drawn between the different sources of energy (e.g. pneumatic, hydraulic and electrical)
- Appropriate use of problem-solving methods
- Accurate solution to the problem

Code: 023X

4. Modify a control circuit.
 - Accurate determination of types of problems to be solved
 - Proper choice of:
 - an open- or closed-loop feedback system
 - components
 - a programmable controller or a robot to be placed in the automation process
 - programming tool
 - Accurate modifications, according to the problems to be solved
5. Perform a function check.
 - Appropriate testing of automated system
 - Accurate interpretation of response time
 - Proper analysis of system accuracy and stability
 - Thorough verification of efficacy of solutions, according to the problems to be solved
 - Accurate recording of data
 - Accurate interpretation of results

Objective**Standard****Statement of the Competency**

To identify and analyze problems related to equipment operation.

Achievement Context

- Given automated industrial equipment systems; drawings, diagrams and plans; job instructions; printed and electronic catalogues
- Using relevant technical documentation; vibration and oil analyzers; measuring instruments; algorithms; programming software; function charts; hydraulic, pneumatic, logic, electrical, electronic and electrohydraulic simulators; and a test bench

Elements of the Competency**Performance Criteria**

1. Gather information on equipment operation.

- Gathering of relevant data from operators and machinists
- Thorough consultation of catalogues and technical documentation
- Systematic gathering of drawings, diagrams, plans, algorithms, programs and function charts
- Thorough verification of equipment operation
- Exhaustive documentation of problems

2. Verify the condition of the equipment.

- Observance of troubleshooting flowchart
- Observance of inspection procedure
- Observance of occupational health and safety rules
- Accurate measurement of the various parameters
- Thorough verification of:
 - clearances and adjustments between components of the equipment
 - alignment of drive components
- Accurate comparison of equipment operation with its function chart, programming or algorithm

Code: 023Y

3. Compare equipment operation with manufacturer's specifications and set parameters.
 - Thorough analysis of equipment history
 - Complete analysis of all parameters
 - Accurate interpretation of plans, diagrams, assembly and detail drawings provided by the manufacturer
 - Accurate determination of predicted performance of equipment
 - Accurate determination of actual performance
 - Thorough comparative analysis of all parameters
 - Recording of principal elements
4. Analyze the data.
 - Complete, thorough analysis of all relevant data, given the problems involved
 - Proper choice and observance of a logical problem-solving approach
 - Accurate deduction of sources of problems, according to the situation
 - Accurate diagnosis of problems
5. Provide recommendations.
 - Clear presentation of situation
 - Presentation of elements gathered with a view to rectifying the problems
 - Clear presentation of main points of analyses
 - Clear, accurate recommendations

Objective**Standard****Statement of the Competency**

To perform tasks related to manufacturing parts.

Achievement Context

- In manufacturing parts made of metallic, non-metallic and composite materials
- Given specifications and current standards; relevant technical documentation (in French and English); technical drawings; reference manuals concerning materials; printed and electronic catalogues and occupational health and safety rules
- Using machine tools, an appropriate welding machine, and measuring and checking instruments

Elements of the Competency**Performance Criteria**

1. Become familiar with objectives and requirements.

- Accurate interpretation of:
 - specifications
 - standards
 - technical drawings
 - occupational health and safety rules
- Accurate identification of dimensions and tolerances of parts to be manufactured
- Accurate identification of constraints and parameters for using materials

2. Choose manufacturing techniques, equipment and measuring instruments.

- Proper choice of technique according to:
 - objectives and requirements
 - material-related constraints
 - required degree of precision and surface finishing
- Accurate identification of the capacity and limits of welding stations and machine tools, given the specific characteristics of the parts to be manufactured
- Appropriate choice of treatments, according to requirements
- Proper choice of:
 - machine tools
 - welding machine
 - measuring and checking instruments
- Thorough verification of calibration data of tools and devices

Code: 023Z

3. Apply manufacturing techniques.
 - Thorough preparation of materials and assemblies, according to operations to be performed
 - Accurate representation of machining and welding operations
 - Accurate adaptation of operations, according to the specific characteristics of the equipment in use
 - Accurate, safe handling and installation of fittings of parts
 - Proper, safe use of equipment required in the manufacturing process
 - Proper application of techniques and treatments
 - Accurate use of measuring and checking instruments

4. Verify the quality of the work done.
 - Thorough verification of:
 - dimensions
 - observance of tolerances
 - quality of surfaces
 - Careful appraisal of the quality of the work
 - Complete report on the quality of the manufactured product

Objective**Standard****Statement of the Competency**

To solve lubrication problems.

Achievement Context

- Given situations specific to industrial maintenance
- Using maintenance manuals; lubricant analysis reports; tables and standards; lubricant data sheets; measuring instruments used in lubrication; a calculator; testing and analysis devices; and lubrication software

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| 1. Collect data related to lubrication problems. | <ul style="list-style-type: none"> • Accurate identification of problem • Thorough visual inspection of equipment and lubricant • Systematic search for information and specifications provided by the equipment or lubricant manufacturer |
| 2. Determine the types of tests and analyses to perform, according to lubrication problems. | <ul style="list-style-type: none"> • Proper choice of tests and analyses • Clear explanation of types of specialized analyses to be done |
| 3. Perform tests and analyses. | <ul style="list-style-type: none"> • Use of appropriate protective gear • Proper use of sampling methods • Accurate use of measuring instruments |
| 4. Determine the cause of the lubrication problem. | <ul style="list-style-type: none"> • Accurate interpretation of analysis results • Accurate verification of conformity with standards and recommendations of the equipment and lubricant manufacturer |
| 5. Choose the lubricant, lubrication methods and filter. | <ul style="list-style-type: none"> • Proper choice of lubricant • Proper choice of lubrication method • Proper choice of filtration method • Maintenance schedule for lubricant, lubrication method and filter conforms with quality assurance plan |
| 6. Make the necessary corrections. | <ul style="list-style-type: none"> • Observance of lubrication schedule • Precise, accurate corrections • Methodical recording of work done |

Code: 0240

7. Produce a written report.

- Observance of standards and specifications
- Clear, complete report
- Accurate identification of recipients of the report

Objective**Standard****Statement of the Competency**

To perform tasks related to vibration analysis.

Achievement Context

- Given industrial equipment; plans and specifications; standards related to vibration analysis; tables and nomograms; job instructions
- Using relevant technical documentation; vibration analyzers; data collectors; vibration analysis software; an automatic balancing machine; a balancing stand; and a sound level meter

Elements of the Competency**Performance Criteria**

1. Use devices for measuring vibrations and sounds.

- Proper use of sound level meter, in conformity with occupational health and safety rules
- Proper use of specialized equipment
- Relevant phase, spectrum and real-time analyses
- Proper use of vector, graphic and automatic dynamic balancing methods for a rotating part on one or two planes
- Accurate detection of noise and vibration problems

2. Analyze the vibration path.

- Accurate determination of parameters used in collecting data
- Accurate determination of vibration alarm levels for each reading point on path
- Accurate determination of type of analysis to be done (phase, spectrum and real-time)
- Proper choice of reading points on equipment

Code: 0241

3. Interpret equipment signatures.
 - Accurate calculation of sound pressure produced by various noise sources
 - Accurate calculation of frequencies characteristic of various mechanical and electrical problems
 - Estimation of natural resonant frequency of equipment
 - Accurate determination of specific frequencies to be identified in the spectrum analysis of equipment involving several mechanisms
 - Thorough interpretation of all points on a spectrum analysis
4. Interpret a vibration analysis report.
 - Accurate interpretation of:
 - terminology
 - units of measurement
 - analysis methods
 - analysis results
 - recommendations

Objective**Standard****Statement of the Competency**

To perform tasks related to equipment modification.

Achievement Context

- Given situations related to industrial equipment performance; job specifications; relevant specifications and standards; equipment-related history and files; relevant technical documentation (in French and English); technical drawings, tables and nomograms
- Using measuring and checking instruments, relevant software and an electronic library

Elements of the Competency**Performance Criteria**

1. Analyze the job specifications and technical documentation.

- Accurate reading of system parameters
- Identification of expected performance criteria
- Systematic identification of the characteristics, functions and expected performance of components
- Clear understanding of expectations and constraints, given requirements

2. Check the equipment.

- Proper choice and use of:
 - measuring and checking instruments
 - software
- Adaptation of diagnostic method appropriate to the situation
- Careful reading of operational parameters and performance indicators
- Determination of possible modifications
- Detailed recording of results

3. Choose the modifications to be made.

- Determination of all physical, mechanical, economic and human constraints
- Proper choice of modifications to be made
- Relevant, convincing justification of modifications
- Verification of conformity of optimization with initial parameters and job specifications

4. Choose the technologies and components.
 - Accurate calculation of:
 - power
 - loads
 - speed
 - acceptable tolerances
 - Accurate interpretation of tables and nomograms
 - Objective analysis of applicability of technologies
 - Optimal choice of technologies and components, according to:
 - conditions of use
 - required performance levels
 - other project data
5. Record and transmit the information.
 - Proper choice of types of diagrams and sketches
 - Clear, meaningful representation of modifications and components
 - Observance of standards and conventions related to diagrams and sketches
 - Clear, precise representation of modifications, interventions and adjustments to be made
6. Verify that the modifications conform with standards and specifications.
 - Thorough verification of conformity of modifications with:
 - occupational health and safety rules
 - current standards
 - performance objectives
 - material, economic and human constraints
 - Thorough verification of conformity of diagrams and sketches with initial parameters and standards

Objective**Standard****Statement of the Competency**

To analyze industrial equipment systems.

Achievement Context

- Given different types of industrial equipment; drawings, plans and diagrams; specifications and manufacturer's specifications
- Using relevant technical documentation, relevant software and an electronic library

Elements of the Competency**Performance Criteria**

1. Collect data related to systems.

- Complete collection of necessary data
- Methodical recording of data
- Accurate interpretation of:
 - technical data
 - manufacturers' recommendations
 - plans, specifications and diagrams of the equipment

2. Identify system-control links.

- Methodical identification of linkages between the:
 - hydraulic, electrical and electrohydraulic systems
 - pneumatic, electrical and electropneumatic systems
 - controls and pneumatic, electrohydraulic and electropneumatic systems
- Identification of linkages on plans, diagrams and equipment

3. Analyze the set of linkages.

- Thorough analysis of data
- Accurate observations concerning the operation of the systems

4. Produce a written report.

- Clear, precise presentation of results of analysis
- Complete, coherent report
- Accurate representation of systems in diagram form

Objective**Standard****Statement of the Competency**

To perform tasks related to industrial systems design.

Achievement Context

- In designing power transmission systems
- Given job specifications; relevant standards and specifications; tables and nomograms
- Using relevant technical documentation (in French and English); material available on a computer network; measuring and checking instruments; relevant software and an electronic library

Elements of the Competency**Performance Criteria**

1. Become familiar with objectives and requirements.

- Accurate identification of type of industrial system required, its functions and characteristics
- Identification of expected performance criteria
- Accurate identification of expectations and constraints, given the requirements
- Accurate interpretation of:
 - standards and specifications
 - technological function of system
 - elements of the industrial context to be taken into consideration

2. Establish the operating conditions of system.
 - Accurate calculation of:
 - power
 - loads
 - rotation speed
 - tolerances
 - Consideration of conditions of use, required performance and other relevant project data
 - Accurate interpretation of tables and nomograms
 - Complete analysis of the system's basic mechanical linkages
 - Thorough analysis of applicability of technologies related to:
 - mechanics
 - hydraulics
 - pneumatics
 - automated systems
 - electricity and electronics
 - assembly and welding
3. Establish the initial design.
 - Accuracy of calculations and simulations
 - Proper choice of:
 - materials
 - components
 - safety devices
 - equipment
 - Objective evaluation of the technological and economic feasibility of the solutions considered
 - Proper use of software
 - Accurate representation of the solution retained, in sketch form
 - Realistic determination of project schedule and steps involved
 - Accurate estimate of design costs
4. Validate the design.
 - Clear, convincing presentation of design, based on relevant sketches and documents
 - Detailed recording of comments and suggested modifications
 - Relevant corrections made, according to validation results

Code: 0244

5. Produce design-related technical drawings.
 - Proper choice of drawings required
 - Clear, meaningful representation of design
 - Accurate tolerances and layout of parts
 - Accuracy and inclusion of all data required for design implementation
 - Complete list of materials and costs
 - Observance of drawing standards and conventions
 - Proper use of software
 - Conformity of drawings with design
 - Observance of schedule
6. Transmit the information.
 - Complete, thorough recording of data
 - Clear, concise presentation of drawings and sketches
 - Relevant justification of choices related to the project design
 - Conformity of project with objectives, expectations and constraints

Objective**Standard****Statement of the Competency**

To perform tasks related to equipment optimization.

Achievement Context

- With a view to replacing or adding components
- Given equipment histories and files; plans and sketches; job specifications; tables and nomograms
- Using relevant technical documentation (in French and English); material available on a computer network; relevant software and an electronic library.

Elements of the Competency**Performance Criteria**

1. Become familiar with objectives and requirements.

- Identification of the characteristics and functions of components of the industrial system to be optimized
- Precise formulation of productivity objectives and expectations
- Accurate determination of the technological function of the system to be optimized
- Relevant identification of elements of the industrial context to be taken into consideration

2. Analyze the actual performance of the equipment.

- Proper choice of:
 - performance-testing devices
 - software
- Proper application and adaptation of performance evaluation method
- Accurate identification of forces, movements, positioning, guide and motion transmission and transformation
- Careful reading of operating parameters and optimization potential

3. Search for information.
 - Efficient researching of information in documentation
 - Proper identification of technologies and components available, according to requirements
 - Accurate interpretation of tables and nomograms
 - Accurate comparisons of various technologies and components

4. Choose the technologies and components.
 - Accurate calculation of:
 - power
 - loads
 - speed
 - acceptable tolerances
 - Consideration of conditions of use, required performance and other relevant data
 - Accurate interpretation of tables and nomograms
 - Complete analysis of basic mechanical linkages
 - Accurate determination of the efficacy of technologies and components, according to optimization objectives and requirements
 - Proper choice of the technologies and components, according to data collection and analysis results

5. Validate the proposed improvements.
 - Clear diagrams and sketches
 - Clear presentation of proposed improvements
 - Detailed recording of comments and suggested modifications
 - Relevance of corrections made, according to validation results

6. Produce a written report and transmit the information.
 - Methodical filing of data and of modifications to the original design
 - Clear, accurate presentation of transformations and characteristics of technologies and spare components
 - Conformity with standards related to diagrams and sketches
 - Clear, coherent and complete report

Objective**Standard****Statement of the Competency**

To design preventive and predictive maintenance programs.

Achievement Context

- Given situations related to industrial maintenance; quality standards; “total productive” and “just-in-time” maintenance principles
- Using technical documentation (in French and English); maintenance manuals; equipment-related histories and files; flow charts; a computerized work station connected to the Internet; and industrial maintenance software

Elements of the Competency**Performance Criteria**

1. Analyze the information.

- Accurate analysis of expectations and constraints related to:
 - company objectives
 - standards and regulations
 - inventory
 - personnel and subcontracting
 - equipment and its importance in the manufacturing process
- Proper use of terminology
- Accurate identification of maintenance function with regards to:
 - roles and responsibilities
 - applicable maintenance policies
 - centralized and decentralized organizational principles
 - standards
- Realistic assessment of expected performance criteria

2. Design the initial project.

- Participation in exchanges
- Inclusion of all the elements to be dealt with
- Proper choice of:
 - software
 - type(s) of programs
 - maintenance methods
- Objective evaluation of the technological and financial feasibility of possible solutions
- Proper choice of solutions according to expectations, requirements and constraints
- Estimation of maintenance time and implementation costs
- Realistic determination of schedule

- | | |
|---|--|
| 3. Validate the project. | <ul style="list-style-type: none"> • Clear, convincing presentation of project • Attentive listening and detailed recording of comments • Relevance of corrections made, according to results of the validation |
| 4. Produce technical documents for the program. | <ul style="list-style-type: none"> • Complete listing of the equipment's specifications, performance and frequency of use • Clear, precise and complete: <ul style="list-style-type: none"> – data sheets – work orders – master schedule – control sheets • Efficient use of maintenance software • Clear maintenance instructions • Accurate determination of control intervals • Technical documentation adapted to requirements and constraints |
| 5. Develop the program. | <ul style="list-style-type: none"> • Clear, accurate master schedule • Conformity of program with expectations and requirements • Efficient use of maintenance software |
| 6. Plan program implementation. | <ul style="list-style-type: none"> • Observance of master schedule, deadlines and program • Proper planning of: <ul style="list-style-type: none"> – technical assistance and training methods – human and material resources |
| 7. Produce a written report. | <ul style="list-style-type: none"> • Observance of standards and specifications • Proper choice of data • Relevant recommendations for updating programs • Clear, thorough presentation of data |

Objective**Standard****Statement of the Competency**

To coordinate and control the implementation of industrial-maintenance activities.

Achievement Context

- Given corrective, preventive and predictive maintenance programs, as well as current standards
- Using maintenance manuals; equipment-related histories and files; program-related technical documentation; measuring instruments; product data sheets; computerized work station connected to the Internet; industrial maintenance software

Elements of the Competency**Performance Criteria**

1. Analyze maintenance programs.

- Accurate identification of corrective, preventive and predictive maintenance elements
- Methodical analysis of:
 - master schedule
 - work orders
 - control sheets
 - technical data
 - equipment-related history and files

2. Plan scheduled maintenance and preventive and predictive maintenance activities.

- Observance of master schedule
- Accurate determination of scheduling, according to availability of resources
- Proper choice of:
 - tools
 - measuring instruments
 - protective gear
- Proper organization of work areas
- Preparation conforms with work orders and control sheets

3. Plan corrective maintenance activities.
 - Accurate diagnosis of the nature and causes of malfunctions
 - Accurate analysis of conditions of use and expected performance
 - Detailed evaluation of condition of components
 - Proper choice of:
 - corrective measures
 - testing devices
 - human and material resources
 - Accurate determination of risks involved in the work, as well as in handling hazardous materials
 - Accurate estimation of labour and material costs
 - Accurate determination of priorities
 - Clear, complete work orders appropriate to a given situation
 - Proper organization of work areas
4. Control the activities.
 - Safe testing of equipment
 - Thorough verification of functional parameters
 - Proper completion of work orders
 - Control sheets duly completed
5. Control inventory.
 - Proper choice of spare parts and suppliers
 - Proper use of inventory control software
6. Evaluate the efficacy of maintenance activities.
 - Detailed computerized compilation of work orders and control sheets duly completed
 - Proper analysis of:
 - Material failure and behaviour
 - statistics on equipment reliability and maintenance operations
 - performance indicators
 - Accurate determination of:
 - maintenance optimization
 - equipment lifespan
 - material carrying costs
 - equipment replacement

Code: 0247

7. Produce a written report.

- Observance of standards and specifications
- Proper choice of data
- Relevant recommendations for updating programs
- Clear, thorough presentation of data

Objective**Standard****Statement of the Competency**

To provide technical support in industrial maintenance.

Achievement Context

- Based on training and technical assistance needs related to the use of equipment and materials, the application of maintenance methods and programs, as well as occupational health and safety rules
- Given plans and specifications; standards and specifications related to management, procedures, quality control, maintenance and safety
- Using specialized technical documentation on the equipment and installations; instructional material; and a computerized system

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Define training and technical assistance needs. 2. Define the objectives to be achieved and standards to be observed. 3. Choose training and technical assistance methods. | <ul style="list-style-type: none"> • Accurate determination of discrepancy between actual and expected situations • Accurate identification of the characteristics of the clientele to be trained and assisted • Accurate identification of needs • Accurate identification of training needs in terms of technical support requirements • Accurate identification of the scope and nature of problems • Accurate definition of technical objectives • Methodical identification of standards and constraints to be observed • Accurate determination of content in accordance with objectives, constraints and standards • Proper choice and preparation of instructional material • Proper identification and choice of data in the specialized technical documentation • Accurate determination of learning methodology, media redundancy and evaluation procedures |
|---|---|

Code: 0248

- | | |
|--|--|
| 4. Produce a written training plan. | <ul style="list-style-type: none">• Clear presentation of objectives• Accurate, logical presentation of content, learning methodology and evaluation criteria• Careful, coherent presentation of plan• Technical information presented in appropriate lay terminology |
| 5. Write out a technical support procedure. | <ul style="list-style-type: none">• Clear, careful presentation of procedure• Logical order of steps• Technical information presented in appropriate lay terminology |
| 6. Design instruments used to follow up and measure results. | <ul style="list-style-type: none">• Appropriate choice of instruments according to objectives to be achieved and standards to be observed• Accurate, reliable instruments |

Objective**Standard****Statement of the Competency**

To solve industrial-maintenance problems.

Achievement Context

- Given industrial equipment; spare parts; drawings and plans; standards related to quality management and industrial maintenance activities; and occupational health and safety rules
- Using printed and electronic catalogues; relevant technical documentation; tools, equipment and measuring instruments

Elements of the Competency**Performance Criteria**

1. Interpret and document problems.

- Complete verification of the equipment's condition and operation
- Detailed recording of data on the equipment's operation
- Accurate interpretation of:
 - plans
 - standards
 - job instructions
- Identification of relevant data

2. Formulate problem-solving hypotheses.

- Thorough analysis of all data gathered
- Formulation and comparison of various hypotheses
- Proper choice of hypotheses

3. Determine a testing plan.

- Accurate determination of required materials
- Accurate determination of time required to complete the job
- Accurate cost estimate
- Relevant repair method and scheduling of activities

4. Carry out the testing procedure.

- Correct, safe use of equipment and instruments
- Observance of method
- Observance of schedule
- Detailed compilation of results

Code: 0249

5. Analyze the results.
 - Thorough analysis of all data gathered
 - Proper choice of main data
 - Systematic comparison of equipment's operation before and after modifications
 - Comparison of data obtained with operating parameters and standards
 - Correct analysis of relevance of solutions retained

6. Produce a written report.
 - Clear presentation of problems to be solved and of problem-solving procedure used
 - Presentation of main elements on which hypotheses are based
 - Proper presentation and justification of hypotheses retained
 - Coherent synthesis of testing procedure and results obtained
 - Clear, accurate recommendations

