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Vocational Education Program

5766

Installation and Repair of Telecommunications Equipment

Training Sector

9

Electrotechnology

Québec 

Vocational Education Program

5766

Installation and Repair of Telecommunications Equipment

Training Sector

9

Electrotechnology

Formation professionnelle et technique
et formation continue

Direction générale des programmes
et du développement

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ELECTROTECHNOLOGY

INSTALLATION AND REPAIR OF TELECOMMUNICATIONS EQUIPMENT

PROGRAM OF STUDY 5766

*The Installation and Repair of
Telecommunications Equipment*
program leads to the Diploma of
Vocational Studies (DVS) and prepares
the student to work as a
**telecommunications installation and
repair worker.**

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Representatives from Business and Industry

Mario Amyot
RÉ-MI inc.
Gatineau

André Beaulieu
Artech Intercommunication inc.
Ancienne-Lorette

Jacques Boudreau
Comité sectoriel de main-d'œuvre des produits
électriques et électroniques

Gaston Charland
Entourage Solutions Technologiques
Montréal

Yoland Contant
Vidéotron
Montréal

Steeve Daigle
HS Télécom
Montréal-Est

Marie Daigneault
Emploi-Québec

Nathalie Denis
Commission de la construction du Québec

Sossie Der Stepanian
Comité sectoriel de main-d'œuvre de l'industrie
électrique et électronique

Representatives from Education

Stéphane Bédard
Centre de formation professionnelle Émile-Legault
Commission scolaire Marguerite-Bourgeoys

Rémy Bergeron
Cégep de Sherbrooke

Guy Deslauriers
École d'enseignement technique Gabriel-Rousseau
Commission scolaire des Navigateurs

Ghislain Lachance
Centre de formation professionnelle Rimouski-Neigette
Commission scolaire des Phares

Abdou Mansouri
Centre de formation professionnelle de l'Outaouais
Commission scolaire des Portages-de-l'Outaouais

Nicole Massicotte
École d'enseignement technique Gabriel-Rousseau
Commission scolaire des Navigateurs

Charles Ménard
Centre de formation professionnelle Émile-Legault
Commission scolaire Marguerite-Bourgeoys

Marzia Michielli
Centre de formation professionnelle Rosemont
Technology
English-Montréal School Board

Constantin Munteanu
Centre de formation professionnelle Rosemont
Technology
English-Montréal School Board

Representatives from Business and Industry

Pierrot Fortier
Inter-Sélect Québec inc.
Sainte-Foy

Mark Kucharik
Systèmes de câblage intégrés inc.
Saint-Laurent

Martin Lanoue
Bell Mobilité
Saint-Laurent

Stéphane Lecours
CTM
Québec

René Lesiège
Entourage Solutions Technologiques
Brossard

Guyline Maltais
Horizon Connexions
Anjou

Michel Morisseau
Télébec Ltée
Saint-Thomas-d'Aquin

Carole Pageau
Comité sectoriel de main-d'œuvre des technologies de
l'information et des communications

Marc-André Proulx
Communication Intervox inc.
Sherbrooke

Martin Proulx
Vidéotron Laurentien Ltée
Hull

Alpha Tounkara
Commission de la santé et de la sécurité du travail

Representatives from Education

Aimé Plourde
École d'enseignement technique Gabriel-Rousseau
Commission scolaire des Navigateurs

Vincent Roy
École d'enseignement technique Gabriel-Rousseau
Commission scolaire des Navigateurs

Gérald Tremblay
Centre de formation professionnelle Émile-Legault
Commission scolaire Marguerite-Bourgeoys

DEVELOPMENT TEAM

Coordination

Nicole Verret
Coordinator of the Electrotechnology sector
Vocational and Technical Training
Direction générale des programmes et du
développement
Ministère de l'Éducation

Design and Development

Henri-Pierre Laridan
Telecommunications Teacher
Commission scolaire des Portages-de-l'Outaouais

Technical Support

Pierre Cloutier
Program Consultant

Translation

Services à la communauté anglophone
Direction de la production en langue anglaise

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INTRODUCTION

The *Installation and Repair of Telecommunications Equipment* program is based on a framework for developing vocational education programs that calls for the participation of experts from the workplace and the field of education.

The program of study is developed in terms of competencies, expressed as objectives. These objectives are divided into modules. Various factors were kept in mind in developing the program: training needs, the job situation, aims, goals, and strategies and means used to attain objectives.

The program of study lists the competencies that are the minimum requirements for a Diploma of Vocational Studies (DVS) for students in both the youth and adult sectors. It also provides the basis for organizing courses, planning teaching strategies, and designing instructional and evaluation materials.

The *Installation and Repair of Telecommunications Equipment* program leads to the Diploma of Vocational Studies. To be admitted to the program, students must meet one of the following conditions:

- For students holding a Secondary School Diploma or a recognized equivalent, no additional conditions are required.

OR

- For students who are at least 16 years of age on September 30 of the school year in which they begin the program, the following condition applies: they must have obtained Secondary IV credits in language of instruction, second language and mathematics, or the recognized equivalents.

OR

- For students who are at least 18 years of age, successful completion of the General Development Test, the SPR 06 test in the language of instruction and MTH-4068-1, or their equivalents, are prescribed as functional prerequisites.

OR

- For students having obtained Secondary III credits in language of instruction, second language and mathematics in programs established by the Minister, general education is required in conjunction with vocational education in order to obtain the following credits, if applicable: Secondary IV language of instruction, second language and mathematics in programs established by the Minister.

The duration of the program is 1800 hours, which includes 870 hours spent on the specific competencies required to practise the trade and 930 hours on general competencies. The program of study is divided into 26 modules, which vary in length from 30 to 120 hours (multiples of 15). The time allocated to the program is to be used not only for teaching but also for evaluation and remedial work.

The document contains two parts. Part I is of general interest and provides an overview of the training plan. It is broken down into five chapters: the first is a synoptic table of basic information about the

modules; the second defines the program training goals; the third, the competencies to be developed; the fourth, the general objectives, the fifth chapter explains the operational objectives and the sixth chapter covers harmonization. Part II is designed primarily for those directly involved in implementing the program. It contains a description of the operational objective of each module.

GLOSSARY

Program Training Goals

Statements that describe the educational aims of a program. These goals are the general goals of vocational education adapted to a specific trade or occupation.

Competency

A set of socioaffective behaviours, cognitive skills or psychosensorimotor skills that enable a person to correctly perform a role, function, activity or task.

General Objectives

Instructional objectives that provide an orientation for leading the students to attain one or more related objectives.

Operational Objectives

Statements of the educational aims of a program in practical terms. They serve as the basis for teaching, learning and evaluation.

Module of a Program

A component part of a program of study comprising a first-level operational objective and the related second-level operational objectives.

Credit

A unit used for expressing quantitatively the value of the modules in a program of study. One credit corresponds to 15 hours of training. Students must accumulate a set number of credits to graduate from a program.

Part I

1. SYNOPTIC TABLE

Number of modules:	26	Program title:	Installation and Repair of Telecommunications Equipment
Duration in hours:	1800	Code:	5766
Credits:	120	Type of certification:	DVS

CODE	TITLE OF THE MODULE		HOURS	CREDITS*
790 302	1	The Trade and the Training Process	30	2
790 316	2	DC Circuits	90	6
790 326	3	AC Circuits	90	6
790 337	4	Semiconductor Circuits	105	7
790 342	5	Occupational Health and Safety	30	2
790 355	6	Logic Circuits	75	5
790 363	7	Oscillator and Filter Circuits	45	3
790 375	8	Cable Installation	75	5
790 385	9	Microprocessor Circuits	75	5
790 394	10	Using a Computer	60	4
790 406	11	Amplitude Modulation and Single Sideband Modulation Circuits	90	6
790 415	12	Frequency-, Phase- and Pulse-Modulation Circuits	75	5
790 424	13	Fibre Optic Cables	60	4
790 435	14	Antennas and Propagation	75	5
790 442	15	Component Replacement	30	2
790 456	16	Radio Communications Equipment Installation	90	6
790 464	17	Repeater System Installation	60	4
790 473	18	Wireless communication Equipment Repair	45	3
790 488	19	Intercom Systems	120	8
790 495	20	Connection to the Telephone Network	75	5
790 505	21	Telephone System Installation and Configuration	75	5
790 513	22	Wired Communication Equipment Repair	45	3
790 526	23	Cable Distribution Equipment Installation	90	6
790 533	24	Cable Distribution Equipment Repair	45	3
790 543	25	Cellular Telephone System Installation	45	3
790 557	26	Entering the Work Force	105	7

* 15 hours = 1 credit.

2. PROGRAM TRAINING GOALS

The training goals of the *Installation and Repair of Telecommunications Equipment* program are based on the general goals of vocational education and take into account the specific nature of the trade. These goals are:

To develop effectiveness in the practice of a trade.

- To teach students to perform installation and repair of telecommunications equipment tasks correctly and at an acceptable level of competence for entry into the job market.
- To prepare students to perform satisfactorily on the job by fostering:
 - intellectual skills and techniques conducive to making wise choices in carrying out tasks
 - attention and precision when performing technical work
 - a constant concern for occupational health and safety
 - work planning and organization
 - constant attention to the quality of work performed
 - teamwork and cooperation with specialists and clients
 - neat and orderly work

To ensure integration into the work force.

- To familiarize students with:
 - different types of companies that employ telecommunications equipment installation and repair technicians
 - characteristics and functions of the technologies used in each type of company
 - tasks and activities of the trade
 - nature of the program, its requirements and organization as well as possibilities of continuing education and specialization

To foster personal and professional development.

- To foster independence and a sense of responsibility in the execution of tasks.
- To foster flexibility and constant attention to the latest technological advances in the field.
- To ensure that students understand the principles underlying the techniques and technologies used.

- To foster the ability to characterize and solve technical problems.
- To foster good work methods and a sense of discipline.

To ensure job mobility.

- To provide solid basic training that will equip students to perform a wide variety of tasks.
- To help students to form a proper perception of the job possibilities within various types of companies.
- To help students prepare for a creative job search.

3. COMPETENCIES

The competencies to be developed in the *Installation and Repair of Telecommunications Equipment* program are shown in the grid of learning focuses on the following page. The grid lists general and specific competencies as well as the major steps in the work process.

General competencies involve activities common to several tasks or situations. They cover, for example, the technological or scientific principles that the students must understand to practise the trade or occupation. Specific competencies focus on tasks and activities that are of direct use in the trade or occupation. The work process includes the most important steps in carrying out the tasks and activities of the trade or occupation.

The grid of learning focuses shows the relationship between the general competencies on the horizontal axis and the specific competencies on the vertical axis. The symbol (Δ) indicates a correlation between a specific competency and a step in the work process. The symbol (O) indicates a correlation between a general and a specific competency. Shaded symbols indicate that these relationships have been taken into account in the formulation of objectives intended to develop specific competencies related to the trade or occupation.

The logic used in constructing the grid influences the course sequence. Generally speaking, this sequence follows a logical progression in terms of the complexity of the learning involved and the development of the students' autonomy. The vertical axis of the grid shows the competencies directly related to the practice of a specific trade or occupation. These competencies are arranged in a relatively fixed order; therefore, the modules should be taught, insofar as possible, in the order represented on the grid. The modules including the general competencies on the horizontal axis should be taught in relation to those on the vertical axis. This means that some modules are prerequisite to others, while other modules are taught concurrently.

GRID OF LEARNING FOCUSES

GRID OF LEARNING FOCUSES IN INSTALLATION AND REPAIR OF TELECOMMUNICATIONS EQUIPMENT		FIRST-LEVEL OPERATIONAL OBJECTIVES		DURATION (IN HOURS)		WORK PROCESS (major steps)						GENERAL COMPETENCIES (related to technology, subjects, personal development, etc.)														TOTALS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
						Examine the request	Plan the work	Perform the work	Perform the tests	Record information	Tidy the work area	Determine their suitability for the trade and the training process	Verify a DC circuit	Verify an AC circuit	Verify a semiconductor circuit	Prevent health and safety violations	Verify a logic circuit	Verify an oscillator and filter circuit	Install cables	Verify a microprocessor circuit	Use a computer	Verify an amplitude modulation and single sideband modulation circuit	Verify a frequency-, phase- and pulse-modulation circuit	Install fibre optic cables	Replace components			NUMBER OF OBJECTIVES	DURATION (IN HOURS)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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△ Correlation between a step and a specific competency

▲ Correlation to be taught and evaluated

○ Correlation between a general and a specific competency

● Correlation to be taught and evaluated

B: Behavioural

S: Situational

4. GENERAL OBJECTIVES

The general objectives of the *Installation and Repair of Telecommunications Equipment* program are presented below, along with the major statement of each corresponding first-level operational objective.

To develop in the students the competencies required to integrate harmoniously into the school and work environments.

- Determine their suitability for the trade and the training process.
- Enter the work force.

To develop in the students the competencies required to safely and efficiently practise the trade.

- Prevent health and safety violations.
- Install cables.
- Use a computer.
- Install fibre optic cables.
- Replace components.

To develop in the students the competencies required to verify telecommunications equipment circuits.

- Verify a DC circuit.
- Verify an AC circuit.
- Verify a semiconductor circuit.
- Verify a logic circuit.
- Verify an oscillator and filter circuit
- Verify a microprocessor circuit
- Verify an amplitude modulation and single sideband modulation circuit
- Verify a frequency-, phase- and pulse-modulation circuit

To develop in the students the competencies required to perform installation and repair tasks.

- Install antennas
- Install radio communications equipment
- Install a repeater system
- Repair wireless communication equipment
- Install and configure intercom systems

- Connect to a telephone network.
- Install and configure telephone systems.
- Repair wired communication equipment.
- Install cable distribution equipment.
- Repair cable distribution equipment.
- Install and configure cellular telephone systems.

5. OPERATIONAL OBJECTIVES

5.1 DEFINITION OF OPERATIONAL OBJECTIVES

An operational objective is defined for each competency to be developed. Competencies are organized into an integrated training program designed to prepare students to practise the trade or occupation. This systematic organization of competencies produces better overall results than training by isolated objectives. More specifically, it fosters a smooth progression from one objective to the next, saves teaching time by eliminating needless repetition, and integrates and reinforces learning material.

Operational objectives are the main, compulsory teaching/learning targets and they are specifically evaluated for certification. There are two kinds of operational objectives: behavioural and situational.

- **A behavioural objective** is a relatively closed objective that describes the actions and results expected of the student by the end of a learning step. Evaluation is based on expected results.
- **A situational objective** is a relatively open-ended objective that outlines the major phases of a learning situation. It allows for output and results to vary from one student to another. Evaluation is based on the student's participation in the activities of the learning context.

Note: Programs accompanied by an Analysis and Planning Tables (APT) do not have second-level operational objectives.

5.2 HOW TO READ OPERATIONAL OBJECTIVES

A. How to Read a Behavioural Objective

Behavioural objectives consist of six components. The first three provide an overview of the objective:

1. The **expected behaviour** states a competency in terms of the general behaviour that the students are expected to have acquired by the end of the module.
2. The **conditions for performance evaluation** define what is necessary or permissible to the students during evaluation designed to verify whether or not the students have attained the objective. This means that the conditions for evaluation are the same wherever and whenever the program is taught.
3. The **general performance criteria** define the requirements by which to judge whether or not the results obtained are generally satisfactory.

The last three components ensure that the objective is understood clearly and unequivocally:

4. The **specifications of the expected behaviour** describe the essential elements of the competency in terms of specific behaviours.
5. The **specific performance criteria** define the requirements for each of the specifications of behaviour. They ensure a more enlightened decision on the attainment of the objective.
6. The **field of application** defines the limits of the objective, where necessary. It indicates cases where the objective applies to more than one task, trade or field.

B. How to Read a Situational Objective

Situational objectives consist of six components:

1. The **expected outcome** states a competency as an aim to be pursued throughout the course.
2. The **specifications** outline the essential aspects of the competency and ensure a better understanding of the expected outcome.
3. The **learning context** provides an outline of the learning situation designed to help students develop the required competencies. It is normally divided into three phases of learning:
 - information
 - performance, practice or involvement
 - synthesis, integration and self-evaluation
4. The **instructional guidelines** provide suggested ways and means of teaching the course to ensure that learning takes place and that the same conditions apply wherever and whenever the course is taught. These guidelines may include general principles or specific procedures.
5. The **participation criteria** describe the requirements students must fulfill, which are usually related to each phase of the learning context. They focus on how students take part in the activities rather than on the results obtained. Participation criteria are normally provided for each phase of the learning context.
6. **The field of application** defines the limits of the objective, where necessary. It indicates cases where the objective applies to more than one task, trade or field.

6. HARMONIZATION

The Ministère de l'Éducation harmonizes vocational and technical programs to establish similarities and continuity between secondary- and college-level programs. Harmonization also establishes correlations between programs within the same educational level.

Regardless of whether the harmonization be inter- or intra-level or in the same or different fields of study, its purpose is to acknowledge the competencies acquired in order to facilitate the training process.

Harmonization is considered throughout the program planning and revision process. Regardless of the method used, it is always based on correlations between the competencies of the various programs.

The *Installation and Repair of Telecommunications Equipment* program of study has been harmonized with programs leading to a Diploma of Vocational Studies (DVS) in:

- Home Electronic and Equipment Repair and Installation
- Équipement bureautique
- Maintenance Electricity / Construction Electricity
- Systèmes de sécurité
- Automated Systems Electromechanics
- Appareils électroménagers
- Computing Support

The program has also been harmonized with the program *Technologie de l'électronique, voie de spécialisation Télécommunication*, which leads to a Diploma of College Studies (DCS).

The results of this harmonization are presented in *Harmonisation des programmes d'études du secteur de formation Électrotechnique*.

Part II

MODULE 1: THE TRADE AND THE TRAINING PROCESS

Code: 790 302

Duration: 30 hours

SITUATIONAL OBJECTIVE

EXPECTED OUTCOME

By participating in the required activities of the learning context according to the indicated criteria, the students will be able to
determine their suitability for the trade and the training process.

SPECIFICATIONS

During this module, the students will:

- Become familiar with the nature of the trade.
- Understand the training program.
- Assess their career choice.

LEARNING CONTEXT

PHASE 1: Information on the Trade

- Identifying the characteristics of the various types of companies that would hire graduates of this program of study.
- Identifying the characteristics and limitations of each trade and occupation within each type of company.
- Learning about the nature of the requirements of telecommunication equipment installation and repair work (tasks, work conditions, physical requirements, absence of vertigo and colour-blindness, etc.) by visiting work sites, doing interviews or consulting documentation.
- Recognizing the importance of working as a group and communicating effectively with the clients when performing tasks (gather information on occupational ethics regulations for the trade: presenting a good company image, confidentiality, diplomacy, appropriate dress and client treatment, clean and orderly toolbox, etc.).
- Identifying regulatory organizations and the various categories of telecommunications standards.
- Identifying the occupational health and safety rules that must be respected according to type of work site.
- Presenting the information during a group meeting and discussing individual perceptions of the trade: advantages, inconveniences and requirements.

SITUATIONAL OBJECTIVE (cont.)

PHASE 2: Information on the Training Process

- Discussing the capabilities, attitudes, aptitudes and knowledge required to exercise the trade.
- Learning about the different possibilities regarding vocational and technical telecommunications training programs (occupations and trades considered, admission conditions, program goals and training certification).
- Discussing the relevance of the training program versus the reality of telecommunications equipment installation and repair work.
- Sharing individual first impressions of the trade and training.
- Applying basic communication techniques when introducing oneself, ascertaining the client's needs, providing explanations, consulting resource personnel and negotiating with suppliers: active listening, feedback, empathy, etc.

PHASE 3: Evaluation and Confirmation of Career Choice

- Writing a report in which they:
 - describe their preferences, aptitudes and interests with respect to electronic equipment repair
 - assess their career choice by comparing the different facets and demands of the trade with their own aptitudes and interests

INSTRUCTIONAL GUIDELINES

The teacher should:

- Create an environment conducive to personal growth and professional development.
- Encourage students to engage in discussions and express their opinions.
- Involve students in learning activities.
- Provide students with the means to acquire a clear, objective understanding of the trade.
- Provide students with the means to honestly and objectively assess their career choice.
- Organize field trips to establishments associated with electronic equipment repair.
- Make suitable reference material available to the students (e.g. information on the trade, training programs, handbooks, etc.).
- Arrange for students to meet with trade specialists.

SITUATIONAL OBJECTIVE (cont.)

PARTICIPATION CRITERIA

- PHASE 1:**
- To collect information on most of the topics to be covered.
 - To express their views on the trade at a group meeting, interrelating the information they have collected.
- PHASE 2:**
- To give their opinion on some requirements of practising the trade.
 - To examine the reference material provided.
 - To listen carefully to explanations.
 - To express their reactions clearly.
- PHASE 3:**
- To write a report that:
 - sums up their preferences, interests, aptitudes and personal qualities
 - explains how they arrived at their career choice
 - explains why they chose to continue or abandon the training program

MODULE 2: DC CIRCUITS

Code: 790 316

Duration: 90 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify a DC circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- According to instructions
- Working with:
 - a mixed circuit composed only of resistors
 - a circuit diagram
- Using measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Adherence to the verification process
- Precise and methodical work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Interpret a circuit diagram.

B. Calculate values at different points in the circuit.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of the terminology
- Proper understanding of the diagram:
 - proper recognition of symbols
 - proper identification of conventions
 - exact identification of specified values
- Proper identification of components to be verified
- Application of laws
- Precise calculations

BEHAVIOURAL OBJECTIVE (*cont.*)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

C. Take measurements at different points in the circuit.

- Proper choice of measuring instruments
- Appropriate use of measuring instruments
- Proper connections at measuring points
- Exact measurements

D. Interpret results.

- Proper understanding of calculations
- Proper understanding of measurements
- Determination of the causes of differences

MODULE 3: AC CIRCUITS

Code: 790 326

Duration: 90 h

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify an AC circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- According to instructions
- Working with:
 - a circuit comprised of resistors, inductors and capacitors
 - a circuit diagram
- Using measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Adherence to the verification process
- Precise and methodical work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Interpret a circuit diagram.

B. Calculate values at different points in the circuit.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of the terminology
- Proper understanding of the schematic diagram:
 - proper recognition of symbols
 - proper identification of conventions
 - exact identification of specified values
- Proper identification of components to be verified
- Application of laws
- Precise calculations

BEHAVIOURAL OBJECTIVE (*cont.*)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

C. Take measurements at different points in the circuit.

D. Interpret results.

SPECIFIC PERFORMANCE CRITERIA

- Proper choice of measuring instruments
- Appropriate use of measuring instruments
- Proper connections at measurement points
- Exact measurements

- Proper understanding of calculations
- Proper understanding of measurements
- Determination of the causes of differences

MODULE 4: SEMICONDUCTOR CIRCUITS

Code: 790 337

Duration: 105 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify a semiconductor circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- With a circuit containing an active component and its associated circuits
- Based on:
 - instructions
 - a circuit diagram
- Using:
 - technical diagrams
 - a calculator
 - measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Neat, orderly work
- Appropriate use of technical diagrams

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of components to be verified
- Proper understanding of:
 - symbols
 - conventions
 - measurements to be taken
 - specified values

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Identify the different circuit configurations.

- Correct identification of components
- Identification of amplification and power supply circuit configurations

C. Take measurements.

- Appropriate choice and application of verification techniques according to the measurements to be taken
- Appropriate use of measuring instruments
- Exact measurements

D. Interpret results.

- Correct comparison of measured values with specified values
- Exact identification of irregularities
- Precise record of measurements and irregularities

MODULE 5: OCCUPATIONAL HEALTH AND SAFETY

Code: 790 342

Duration: 30 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **prevent health and safety violations** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- According to instructions
- Using relevant documentation

GENERAL PERFORMANCE CRITERIA

- Appropriate use of reference documents

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Identify the source of danger.

B. Identify the cause.

C. Identify the effects on health and safety.

D. Select preventive measures.

SPECIFIC PERFORMANCE CRITERIA

- Careful inspection of the work area
- Exact identification of the danger source
- Correct identification of dangerous materials
- Precise determination of the cause
- Correct determination of short-term effects
- Correct determination of long-term effects
- Appropriate choice of preventive methods
- Correct correlation between the risks and the preventive methods
- Safe setup of the work area
- Clean area
- Adherence to laws and regulations

MODULE 6: LOGIC CIRCUITS

Code: 790 355

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify a logic circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working with:
 - a combinational logic circuit
 - a sequential logic circuit
- Using a circuit diagram
- Using:
 - technical data sheets
 - measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Neat, orderly work
- Appropriate use of technical diagrams

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

A. Read and understand the specifications.

- Proper identification of components to be verified
- Proper understanding:
 - symbols
 - conventions
 - truth tables for logic gate and flip-flop operation
 - timing diagrams
- Appropriate and exact conversion between number systems or character codes:
 - decimal
 - binary
 - hexadecimal
 - BCD codes

B. Take measurements.

- Proper choice of test points
- Appropriate use of measuring instruments
- Exact measurements

C. Interpret results.

- Correct comparison of measured values with specified values
- Proper understanding of measurements
- Exact identification of irregularities

MODULE 7: OSCILLATOR AND FILTER CIRCUITS

Code: 790 363

Duration: 45 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify an oscillator and filter circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Working with:
 - an oscillator circuit
 - a filter circuit
- Using circuit diagrams
- Using:
 - appropriate technical documentation
 - test equipment
 - measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Observance of the specifications
- Adherence to verification techniques
- Appropriate use of technical documentation

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - oscillator and filter circuit characteristics
 - types of oscillators and filters
 - verification technique
- Proper identification of components to be verified

BEHAVIOURAL OBJECTIVE *(cont.)*

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Measure and interpret signals produced by oscillators.

- Appropriate use of measuring instruments
- Exact measurements
- Exact interpretation of:
 - waveform
 - frequency
 - bandwidth
- Correct comparison of measured values with specified values
- Exact identification of irregularities

C. Measure and interpret filter input and output signals.

- Proper understanding of the response curve
- Exact determination of gain or attenuation
- Exact identification of irregularities

D. Adjust oscillators and filters.

- Adherence to the adjustment procedure
- Precise adjustment of:
 - frequency
 - response curve
 - bandwidth

MODULE 8: CABLE INSTALLATION

Code: 790 375

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install cables** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - telephone, computer network and cable distribution cables
- Using:
 - appropriate technical documentation
 - blueprints and specifications
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and blueprints and specifications
- Appropriate use of tools and equipment
- Adherence to the installation procedure
- Strict adherence to the scope of work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the installation type (aerial, underground, underwater)
- Proper understanding of:
 - manufacturer's instructions
 - regulations and procedures
 - the scope of work
 - blueprints and specifications
 - installation standards

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Select and prepare the equipment.

- Proper selection of cables according to the type of installation
- Proper choice of:
 - tools
 - fastening or anchoring systems
 - type of ladder, stepladder or scaffolding
 - safety equipment

C. Inspect the installation.

- Exact determination of the scope of work
- Identify cable paths according to the diagram
- Identification of potential sources of danger

D. Pull, attach and splice cables.

- Safe use of access equipment
- Proper and safe use of tools
- Strict application of techniques to pull, attach and splice cables
- Aesthetic and clean installation

E. Check the installation.

- Verification that the cables were correctly installed

F. Tidy and clean the work area.

- Careful storage of tools and materials
- Appropriate cleaning of the work area

G. Write an installation report.

- Record of all modifications to the blueprints and specifications

MODULE 9: MICROPROCESSOR CIRCUITS

Code: 790 385

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify a microprocessor circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Using circuit diagrams
- Using:
 - appropriate technical documentation
 - test equipment
 - measuring instruments
 - telecommunications microprocessors

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Adherence to the verification technique
- Appropriate use of technical documentation

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - microprocessor's characteristics to verify
 - interfaces
 - diagrams
 - documentation
 - verification technique
- Proper identification of components to be verified as a function of microprocessor characteristics

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Take measurements.

- Proper choice and application of verification techniques according to the measurements to take
- Proper choice of test points
- Appropriate use of measuring instruments
- Exact measurement of different signals

C. Interpret results.

- Correct comparison of measured values with specified values
- Exact identification of irregularities

MODULE 10: USING A COMPUTER

Code: 790 394

Duration: 60 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **use a computer** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- According to instructions
- Using:
 - a computer
 - peripherals, cards and software
 - Internet
 - instruction manuals
 - appropriate technical documentation

GENERAL PERFORMANCE CRITERIA

- Proper understanding of instruction manuals
- Adherence to regulations and procedures
- Appropriate use of technical documentation

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFIC PERFORMANCE CRITERIA
A. Install a computer.	<ul style="list-style-type: none"> — Proper understanding of terminology in English and French — Proper understanding of computer network terminology — Proper choice of external interfaces and accessories — Proper selection of cable types and connectors — Proper connection of exterior interfaces and accessories — Adherence to manufacturer's instructions
B. Use an operating system.	<ul style="list-style-type: none"> — Proper startup of the operating system — Correct use of main commands — Adherence to the startup procedure
C. Install a card.	<ul style="list-style-type: none"> — Proper understanding of card characteristics — Exact identification of interconnections, cables and connectors — Appropriate use of tools — Adherence to techniques and installation procedures — Appropriate use of installation software
D. Use application software.	<ul style="list-style-type: none"> — Appropriate use of: <ul style="list-style-type: none"> – a word processing program – a data processing program (database and spreadsheet)
E. Use a browser program.	<ul style="list-style-type: none"> — Proper understanding of the terminology and Internet services — Appropriate use of a browser program — Proper choice of search tools — Proper use of e-mail

MODULE 11: AMPLITUDE MODULATION AND SINGLE SIDEBAND MODULATION CIRCUITS

Code: 790 406

Duration: 90 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify an amplitude modulation and a single sideband modulation circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - circuit diagrams
 - communications equipment
- Using:
 - appropriate technical documentation
 - test equipment
 - a monitor
 - measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Adherence to verification techniques
- Appropriate use of technical documentation

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - circuit characteristics
 - types of modulation (AM and SSB)
 - parameters
 - basic diagrams
 - verification techniques
- Proper identification of components to be verified

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Measure and interpret signals.

- Appropriate use of:
 - measuring instruments
 - a service monitor
- Exact identification of test points
- Exact measurements
- Proper understanding of:
 - signal trajectory
 - modulation frequency
 - modulation index
 - power
- Correct comparison of measured values with specified values
- Identification of irregularities

C. Adjust circuits.

- Adherence to the alignment procedure
- Exact identification of test points
- Precise adjustment of:
 - frequency
 - modulation index
 - power

D. Perform tests.

- Proper performance of operational tests
- Proper suggestion of corrective measures
- Precise record of test results

MODULE 12: FREQUENCY-, PHASE- AND PULSE-MODULATION CIRCUITS

Code: 790 415

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **verify a frequency-, phase- and pulse-modulation circuit** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - circuit diagrams
 - frequency-, phase-, and pulse-modulation communications equipment
- Using:
 - appropriate technical documentation
 - test equipment
 - a monitor
 - measuring instruments

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Adherence to verification techniques
- Appropriate use of technical documentation

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - circuit characteristics
 - types of modulation
 - parameters
 - basic schematics
 - verification technique
- Proper identification of components to be verified

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

B. Measure and interpret signals.

C. Adjust circuits.

D. Perform tests.

SPECIFIC PERFORMANCE CRITERIA

- Appropriate use of:
 - measuring instruments
 - a service monitor
- Exact identification of test points
- Exact measurements
- Proper understanding of:
 - signal trajectories
 - signal frequency
 - deviation
 - power
 - selectivity
 - sensibility
- Correct comparison of measured values with specified values
- Identification of irregularities

- Adherence to the adjustment procedure
- Exact identification of adjustment points
- Precise adjustment of:
 - carrier frequency
 - modulation index
 - power

- Proper performance of operational tests
- Proper suggestion of corrective measures
- Precise record of test results

MODULE 13: FIBRE OPTIC CABLES

Code: 790 424

Duration: 60 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install fibre optic cables** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - fibre optic cables and connectors
- Using:
 - appropriate technical documentation
 - blueprints and specifications
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and blueprints and specifications
- Appropriate use of tools and equipment
- Adherence to the installation procedure
- Strict adherence to the scope of work

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the installation type
- Proper understanding of:
 - manufacturer's instructions
 - regulations and procedures
 - the scope of work
 - blueprints and specifications
 - installation standards

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFIC PERFORMANCE CRITERIA
B. Select and prepare the equipment.	<ul style="list-style-type: none"> — Proper selection of fibre optic cables according to the type of installation — Proper choice of: <ul style="list-style-type: none"> – connectors – tools – fastening or anchoring systems – measuring instruments – safety equipment
C. Inspect the installation.	<ul style="list-style-type: none"> — Exact determination of the scope of work — Identification of the cable path according to the diagram — Identification of potential sources of danger
D. Pull and attach cables.	<ul style="list-style-type: none"> — Safe use of equipment — Proper and safe use of tools — Strict application of cable pulling and fastening techniques (tension and bend) — Aesthetic and clean installation
E. Attach connectors.	<ul style="list-style-type: none"> — Careful preparation of the fibres — Performance of assembly steps according to manufacturer's instructions — Safe use of solvents and fibre optics
F. Check the installation.	<ul style="list-style-type: none"> — Appropriate use of measuring instruments — Proper understanding of the readings — Correction of irregularities
G. Tidy and clean the work area.	<ul style="list-style-type: none"> — Careful storage of tools and materials — Safe cleaning of polishing surfaces and work clothes

MODULE 14: ANTENNAS AND PROPAGATION

Code: 790 435

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install antennas** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - manufacturer's instructions
 - current regulations and procedures
 - regulations limiting the scope of work
- Using:
 - antenna assembly diagrams
 - technical diagrams
 - measuring instruments
 - test equipment for antennas and wave propagation
 - components of different types of antennas
 - reference documentation

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation
- Appropriate use of tools and equipment
- Adherence to the installation procedure

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - manufacturer's instructions
 - regulations and the procedure
 - the scope of work
 - propagation mode
 - type of antenna and transmission line

BEHAVIOURAL OBJECTIVE *(cont.)*

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Select and prepare the equipment.

- Proper selection of the antenna and transmission line according to specific performance criteria
- Appropriate choice of measuring instruments
- Careful verification of:
 - safety equipment
 - equipment necessary for installation

C. Assemble, install and connect antennas.

- Wearing of appropriate protective equipment
- Safe use of tools and equipment
- Adherence to:
 - assembly, fastening and connection techniques
 - regulations and the procedure
 - the scope of work
 - site-specific instructions

D. Check the installation.

- Appropriate use of measuring instruments
- Correct comparison of measured values with specified values
- Precise adjustments according to parameters
- Systematic identification of irregularities
- Proper corrective measures
- Precise record of measurements and corrective measures

MODULE 15: COMPONENT REPLACEMENT

Code: 790 442

Duration: 30 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **replace components** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - printed circuits
- Using:
 - appropriate technical documentation
 - replacement parts
 - soldering and unsoldering materials
 - chemicals

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Respect for specifications
- Appropriate use of technical documentation
- Appropriate use of soldering and unsoldering materials

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper understanding of:
 - terminology in English and French
 - security and protection measurements
- Proper determination of techniques to use according to circuit type

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Select equipment and accessories.

- Appropriate choice of:
 - equipment and accessories
 - soldering products
- Proper choices according to the tasks to perform and the techniques to use

C. Remove a component.

- Exact identification of the component to replace
- Appropriate use of tools
- Adherence to the techniques and the disassembly procedure
- Proper protection against electrostatic discharge
- Appropriate use of desoldering techniques
- Careful cleaning of the site where the component will be installed

D. Install a component.

- Correct choice of component according to manufacturer's instructions
- Proper protection against electrostatic discharge
- Adherence to positioning standards and methods according to circuit type
- Appropriate use of tinning and soldering techniques
- Careful cleaning of the site where the component will be installed

E. Check the work.

- Careful inspection of the quality of solder joints as well as the component's positioning and physical condition
- Proper identification of irregularities
- Adequate touch-up
- Equipment storage and work area clean-up

MODULE 16: RADIO COMMUNICATIONS EQUIPMENT INSTALLATION

Code: 790 456

Duration: 90 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install radio communications equipment** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - blueprint and the installation procedure
 - cables and connectors
 - radio communication equipment
- Using:
 - appropriate technical documentation
 - configuration software
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation as well as blueprints and specifications
- Appropriate use of tools and equipment
- Adherence to the installation procedure

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the installation type
- Proper understanding of:
 - instructions
 - current regulations
 - blueprints and specifications
 - installation procedure

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFIC PERFORMANCE CRITERIA
B. Select and prepare the equipment.	<ul style="list-style-type: none"> — Proper selection of cables according to the type of installation — Proper choice of: <ul style="list-style-type: none"> – connectors – tools – fastening or anchoring systems – measuring instruments – protective equipment — Careful verification of the condition of materials and equipment
C. Adapt equipment parameters.	<ul style="list-style-type: none"> — Appropriate use of configuration software — Precise adaptation of reception and transmission parameters — Strict application of the adaptation procedure
D. Install and connect the equipment.	<ul style="list-style-type: none"> — Proper and safe use of tools and equipment — Proper assembly according to manufacturer's instructions — Strict application of cable fastening techniques — Aesthetic and clean installation — Careful installation and crimping of connectors
E. Check the installation.	<ul style="list-style-type: none"> — Strict application of the startup procedure — Operational check of reception and transmission mode — Appropriate choice and performance of tests — Appropriate use of measuring instruments — Proper understanding of the readings — Identification of irregularities — Proper corrective measures
F. Tidy and clean the work area.	<ul style="list-style-type: none"> — Careful storage of tools and materials — Cleanliness of the work area
G. Write an installation report.	<ul style="list-style-type: none"> — Record of test results — Careful record of information regarding the installation

MODULE 17: REPEATER SYSTEM INSTALLATION

Code: 790 464

Duration: 60 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install a repeater system** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - blueprints and the installation procedure
 - repeaters, a remote control and filtering systems
- Using:
 - appropriate technical documentation
 - configuration software
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and blueprints and specifications
- Appropriate use of tools and equipment
- Adherence to the installation procedure

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the type of station
- Appropriate use of terminology according to the telecommunications network
- Proper understanding of:
 - instructions
 - current regulations
 - blueprints and specifications
 - installation procedure

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

B. Select and prepare the equipment.

C. Adapt equipment parameters.

D. Install and connect the equipment.

E. Check the installation.

F. Tidy and clean the work area.

G. Write an installation report.

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

— Proper selection of cables according to the type of installation

— Proper choice of:

- repeater and interfaces
- connectors
- tools
- conductor types
- measuring instruments
- protective equipment

— Appropriate use of configuration software

— Precise alignment of:

- multicouplers or duplexers
- squelch and volume levels
- repeater input level, deviation and output power

— Proper and safe use of tools and equipment

— Proper assembly according to manufacturer's instructions

— Strict application of cable fastening techniques

— Aesthetic and clean installation

— Careful installation of connectors

— Strict application of the startup procedure

— Strict application of performance tests in reception and transmission mode

— Appropriate use of measuring instruments

— Proper understanding of the readings

— Identification of irregularities

— Proper corrective measures

— Careful storage of tools and materials

— Clean work area

— Record of test results

— Careful record of information regarding the installation

MODULE 18: WIRELESS COMMUNICATION EQUIPMENT REPAIR

Code: 790 473

Duration: 45 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **repair wireless communication equipment** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - wireless communication equipment
 - work orders for transmission or reception problems
 - manufacturer's instructions
- Using:
 - appropriate technical documentation
 - troubleshooting flow charts
 - configuration software
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Appropriate use of technical documentation and troubleshooting flow charts
- Appropriate use of tools and equipment
- Adherence to manufacturer's instructions
- Effectiveness of the repair

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- A. Gather information relative to the problem.

SPECIFIC PERFORMANCE CRITERIA

- Correct identification of the type of repair
- Correct identification of the origin or the problem
- Proper understanding of:
 - the work order
 - manufacturer's instructions
 - current regulations

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFICATIONS OF THE EXPECTED BEHAVIOUR
B. Perform verifications.	<ul style="list-style-type: none"> — Exact identification of subassemblies, parts or components to be verified — Appropriate choice of verification method — Proper testing — Precise use of measuring and test equipment — Proper understanding of measurements and results
C. Make a diagnosis.	<ul style="list-style-type: none"> — Precise problem identification — Correct diagnosis — Proper selection of components and equipment to replace or repair
D. Make repairs.	<ul style="list-style-type: none"> — Appropriate handling of components and equipment — Strict application of component replacement techniques — Adherence to assembly steps according to manufacturer's instructions
E. Verify that the repair was effective.	<ul style="list-style-type: none"> — Strict application of adjustment and alignment procedures — Operational check in reception and transmission mode — Appropriate use of measuring instruments — Proper understanding of measurements
F. Write a repair report.	<ul style="list-style-type: none"> — Precise record of: <ul style="list-style-type: none"> – problems detected – materials used in repairing the equipment – time spent repairing the equipment – the cost of repairs – difficulties encountered

MODULE 19: INTERCOM SYSTEMS

Code: 790 488

Duration: 120 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install and configure intercom systems** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - installation standards and diagrams
 - intercom systems and associated equipment
- Using:
 - appropriate technical documentation
 - configuration manuals
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and installation diagrams
- Appropriate use of tools and equipment
- Adherence to manufacturer's instructions

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the installation and system type
- Proper understanding of:
 - work order
 - the terminology in English and French
 - manufacturer's instructions
 - current regulations

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFICATIONS OF THE EXPECTED BEHAVIOUR
B. Plan the installation.	<ul style="list-style-type: none"> — View of cable paths and outlet locations — Verification of interconnections with other systems — Precise purchase order for the materials and equipment needed for the installation
C. Install and connect the system.	<ul style="list-style-type: none"> — Adherence to the manufacturer's installation procedure — Precision assembly and equipment adjustment — Appropriate installation of cables and equipment — Proper and safe use of tools and equipment — Strict application of procedures to connect with other systems — Proper choice of power source and test equipment
D. Perform tests on the installation.	<ul style="list-style-type: none"> — Systematic verification of: <ul style="list-style-type: none"> – conformity of connection points – power source and operational voltage – interconnection points
E. Configure the system.	<ul style="list-style-type: none"> — Appropriate use of configuration manual — Proper following of the steps in the configuration process — Proper understanding of the client's needs — Proper installation of the musical element
F. Check and adjust system operation.	<ul style="list-style-type: none"> — Exact identification of test points — Appropriate use of measuring instruments — Proper understanding of measurements — Systematic configuration check — Precise identification of irregularities — Proper corrective measures

BEHAVIOURAL OBJECTIVE (cont.)

**SPECIFICATIONS OF THE
EXPECTED BEHAVIOUR**

G. Tidy and clean the work area.

H. Write an installation report.

**SPECIFICATIONS OF THE EXPECTED
BEHAVIOUR**

- Careful storage of tools and materials
- Waste elimination or recycling
- Clean work area

- Record of test results
- Careful record of information regarding the installation

MODULE 20: CONNECTION TO THE TELEPHONE NETWORK

Code: 790 495

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **connect to a telephone network** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - standards and procedures
 - installation blueprints
 - required wiring materials
- Using:
 - appropriate technical documentation
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and installation blueprints
- Appropriate use of tools and equipment
- Adherence to standards and procedures

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the installation type and characteristics of transmission lines
- Proper understanding of:
 - the work order
 - the terminology in English and French
 - network characteristics
 - standards and procedures
 - safety regulations
 - the subscriber's wishes

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

B. Plan the installation.

- Exact identification of sources of danger
- Precise determination of wire paths
- Precise purchase order for materials and equipment needed for the installation

C. Perform checks.

- Systematic verification at the connection points:
 - of the presence of active telephone lines
 - of compliance with standards relative to wire pairs
 - of the need to install boxing terminals at junction points
- Inspection of the installation site:
 - lightning rod
 - ground
 - demarcation points
 - junction boxes
 - modular jacks

D. Perform the installation.

- Solid and safe installation of service wires
- Fastening in accordance with safety standards
- Appropriate use of tools
- Respect for the client's wishes
- Safe use of access means

E. Perform tests and evaluate the quality of the installation.

- Appropriate use of measuring instruments
- Proper understanding of measurements
- Verification that the installation meets established standards
- Precise identification of irregularities
- Proper corrective measures

F. Tidy and clean the work area.

- Careful storage of tools and materials.
- Clean work area

G. Write an installation report.

- Record of test results
- Careful record of information regarding the installation

MODULE 21: TELEPHONE SYSTEM INSTALLATION AND CONFIGURATION

Code: 790 505

Duration: 75 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install and configure telephone systems** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - standards and equipment installation blueprints
 - telephone systems and related equipment
- Using:
 - appropriate technical documentation
 - configuration manuals
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and installation blueprints
- Appropriate use of tools and equipment
- Adherence to manufacturer's instructions

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the type of installation and system
- Proper understanding of:
 - work order
 - terminology in English and French
 - manufacturer's instructions
 - current regulations
 - client's wishes

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Plan the installation.

- View of cable paths and outlet locations
- Verification of interconnections with other systems
- Precise purchase order for materials and equipment needed for the installation
- Appropriate coordination of your work with that of other specialists

C. Install and connect the system.

- Adherence to the manufacturer's installation procedure
- Solid fastening of the assembly panel
- Precision assembly and equipment adjustment
- Appropriate and aesthetic installation of cables and equipment
- Proper and safe use of tools and equipment
- Strict application of demarcation points interconnection procedures
- Proper choice of power source and UPS system

D. Test the installation.

- Systematic verification of:
 - connection points
 - power source and operational voltage
 - interconnection points
 - the telephone number

E. Configure the system.

- Appropriate use of configuration manual
- Proper following of the steps in the configuration process
- Proper understanding of the client's needs
- Proper installation of the musical element

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

F. Check and adjust system operation.

- Exact identification of check points
- Appropriate use of measuring instruments
- Proper understanding of measurements
- Systematic configuration check
- Precise identification of irregularities
- Proper corrective measures
- Explanation of system operation to the client

G. Tidy and clean the work area.

- Careful storage of tools and materials
- Waste elimination or recycling
- Clean work area

H. Write an installation report.

- Record of test results
- Careful record of information regarding the installation

MODULE 22: WIRED COMMUNICATION EQUIPMENT REPAIR

Code: 790 513

Duration: 45 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **repair wired communication equipment** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - wired communication equipment
 - a repair order for configuration or communications problems
 - the manufacturer's or company's instructions
- Using:
 - appropriate technical documentation
 - troubleshooting flow charts
 - configuration software
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Appropriate use of technical documentation
- Appropriate use of tools and equipment
- Adherence to the manufacturer's and company's instructions
- Effectiveness of the repair

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

A. Gather information regarding the problem.

- Correct identification of the type of repair
- Correct identification of the origin or the problem
- Proper understanding of:
 - the work order
 - the manufacturer's and company's instructions
 - current regulations

B. Perform checks.

- Exact identification of subassemblies, parts or components to check
- Appropriate choice of verification method
- Proper testing
- Precise identification of test points:
 - at the interconnection point with the network
 - at the client's residence
- Precise use of measuring instruments and test equipment
- Proper understanding of measurements taken

C. Make a diagnosis.

- Precise problem location
- Correct diagnosis
- Proper selection of components and equipment to replace or repair

D. Make repairs.

- Appropriate handling of components and equipment
- Strict application of component replacement techniques

E. Check the effectiveness of the repair.

- Verification of the configuration and telephone network connection
- Appropriate use of measuring instruments
- Proper understanding of measurements
- Verification of system operation with the client

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFICATIONS OF THE EXPECTED BEHAVIOUR
F. Tidy and clean the work area.	<ul style="list-style-type: none"> — Careful storage of tools and materials — Clean work area
G. Write an installation report.	<ul style="list-style-type: none"> — Precise record of: <ul style="list-style-type: none"> – problems detected – materials used in repairing the equipment – time spent repairing the equipment – the cost of repairs – difficulties encountered

MODULE 23: CABLE DISTRIBUTION EQUIPMENT INSTALLATION

Code: 790 526

Duration: 90 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install cable distribution equipment** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - standards and procedures
 - installation diagrams
 - cable distribution equipment
- Using:
 - appropriate technical documentation
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and installation diagrams
- Appropriate use of tools and equipment
- Adherence to standards and procedures

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

A. Read and understand the specifications.

- Proper identification of the type of installation and equipment
- Proper understanding of:
 - the work order
 - terminology in English and French
 - network characteristics
 - current regulations
 - standards, procedures and installation diagrams
 - safety regulations
 - the client's wishes

B. Plan the installation.

- Precise identification of sources of danger
- Precise determination of cable paths
- Precise purchase order for materials and equipment needed for the installation
- Proper understanding of the network plan
- Exact identification of elements of the distribution network

C. Perform checks.

- Verification of the signal at the network connection point
- Careful inspection of the existing installation
- Confirmation of the subscriber's choice of service

D. Install aerial lines.

- Solid fastening of network connection equipment
- Installation of aerial lines according to the cable service provider's standards
- Proper installation of the demarcation point
- Safe use of tools and equipment
- Strict adherence to safety regulations regarding working at heights

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFICATIONS OF THE EXPECTED BEHAVIOUR
E. Test and evaluate the installation.	<ul style="list-style-type: none"> — Adherence to cable distribution standards — Strict application of the test procedure — Appropriate use of measuring instruments — Proper understanding of measurements
F. Install cable equipment in a building.	<ul style="list-style-type: none"> — Description of installation steps to the client — Appropriate use of: <ul style="list-style-type: none"> – interior cable installation techniques – detection instruments – tools and installation equipment – connector crimping techniques
G. Check the installation.	<ul style="list-style-type: none"> — Application of verification procedures for: <ul style="list-style-type: none"> – quality of signals received – proper operation of installed equipment — Precise explanation of equipment operation to the client — Verification that the client has understood explanations and is satisfied with the installation
H. Tidy and clean the work area.	<ul style="list-style-type: none"> — Careful storage of tools and materials — Clean work area
I. Write an installation report.	<ul style="list-style-type: none"> — Record of client comments — Record of information regarding the installation

MODULE 24: CABLE DISTRIBUTION EQUIPMENT REPAIR

Code: 790 533

Duration: 45 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **repair cable distribution equipment** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - cable distribution equipment
 - work orders for problems related to sound, image or data reception
- Using:
 - appropriate technical documentation
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Adherence to health and safety regulations
- Appropriate use of technical documentation
- Appropriate use of tools and equipment
- Adherence to the manufacturer's or company's instructions
- Effectiveness of the repair

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

- A. Gather information regarding the problem.

SPECIFIC PERFORMANCE CRITERIA

- Correct identification of the type of repair
- Correct identification of the origin of the problem
- Proper understanding of:
 - the work order
 - the manufacturer's or company's instructions
 - current regulations

BEHAVIOURAL OBJECTIVE (cont.)	
SPECIFICATIONS OF THE EXPECTED BEHAVIOUR	SPECIFIC PERFORMANCE CRITERIA
B. Perform verifications.	<ul style="list-style-type: none"> — Exact identification of subassemblies, parts or components to be verified — Choice of the appropriate verification method — Proper testing — Precise identification of test points: <ul style="list-style-type: none"> – at the interconnection point with the network – at the client's residence — Precise use of measuring instruments and test equipment — Proper understanding of measurements taken
C. Make a diagnosis.	<ul style="list-style-type: none"> — Precise problem location — Correct diagnosis — Confirmation with the subscriber of the nature and impact of the planned repairs — Proper selection of components and equipment to replace or repair
D. Make necessary repairs.	<ul style="list-style-type: none"> — Appropriate handling of components and equipment — Strict application of component replacement techniques
E. Check the effectiveness of the repair.	<ul style="list-style-type: none"> — Strict adherence to the standards of the cable distribution industry — Verification that the system or service works properly — Appropriate use of measuring instruments — Proper understanding of the readings — Demonstration to the client that the equipment works properly
F. Tidy and clean the work area.	<ul style="list-style-type: none"> — Careful storage of tools and materials — Clean work area

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

G. Write a repair report.

SPECIFIC PERFORMANCE CRITERIA

- Precise record of:
 - problems detected
 - materials used in repairing the equipment
 - time spent repairing the equipment
 - the cost of repairs
 - difficulties encountered

MODULE 25: CELLULAR TELEPHONE SYSTEM INSTALLATION

Code: 790 543

Duration: 45 hours

BEHAVIOURAL OBJECTIVE

EXPECTED BEHAVIOUR

To demonstrate the required competency, the students must **install and configure cellular telephone systems** in accordance with the following conditions, criteria and specifications.

CONDITIONS FOR PERFORMANCE EVALUATION

- Based on:
 - instructions
 - standards and installation blueprints
 - cellular telephone systems and appropriate interfaces
- Using:
 - appropriate technical documentation
 - configuration manuals
 - tools and measuring instruments
 - personal protection equipment

GENERAL PERFORMANCE CRITERIA

- Respect for specifications
- Appropriate use of technical documentation and installation blueprints
- Appropriate use of tools and equipment
- Adherence to manufacturer's instructions

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

A. Read and understand the specifications.

SPECIFIC PERFORMANCE CRITERIA

- Proper identification of the type of installation, equipment and interfaces involved
- Proper understanding of:
 - work order
 - terminology in English and French
 - system characteristics
 - installation standards
 - safety regulations
 - client's wishes

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

B. Plan the installation.

- Identification of sources of danger
- Determination of cable path
- Purchase request for equipment required for the installation
- Exact identification of:
 - installation points
 - power sources
 - telephone network interconnection points
- Appropriate coordination of your work with that of other specialists
- Confirmation of the installation points with the client

C. Perform the installation.

- Secure anchorage and fastening of an assembly panel
- Fastening of the control unit according to manufacturer's instructions
- Aesthetic installation of necessary interfaces
- Proper choice and pulling of cables
- Proper and safe use of tools and equipment
- Adherence to applicable telephone and radio communications standards
- Strict application of security measurements

D. Perform tests and evaluate the quality of the installation.

- Appropriate use of measuring instruments
- Proper understanding of measurements
- Systematic verification of adherence to standards for:
 - telephone systems
 - radio communications equipment
 - wave propagation
- Identification of irregularities
- Proper corrective measures

E. Configure the system.

- Appropriate use of a programming manual
- Proper following of the steps in the configuration process

BEHAVIOURAL OBJECTIVE (cont.)

SPECIFICATIONS OF THE EXPECTED BEHAVIOUR

SPECIFIC PERFORMANCE CRITERIA

F. Verify that the system works properly.

- Systematic verification of:
 - all system outlets
 - all configured options

G. Tidy and clean the work area.

- Careful storage of tools and materials
- Clean work area

H. Write an installation report.

- Careful record of information regarding the installation

MODULE 26: ENTERING THE WORK FORCE

Code: 790 557

Duration: 105 hours

SITUATIONAL OBJECTIVE

EXPECTED OUTCOME

By participating in the required activities of the learning context according to the indicated criteria, the students will be able to **enter the work force.**

SPECIFICATIONS

At the end of this module, the students will:

- Be able to use job search methods.
- Integrate the knowledge, capabilities, attitudes and habits acquired from the training.
- Evaluate the changes in perception after an internship.

LEARNING CONTEXT

PHASE 1: Using Job Search Methods

- Establishing a plan of action.
- Identifying companies corresponding to individual and professional interests.
- Writing a cover letter and résumé.

PHASE 2: Participating in Activities in a Work Environment

- Observing the work environment: types of services offered and techniques used, internal structure and working conditions, health and safety, interpersonal relationships, etc.
- Participating in a work team.
- Observing professional tasks or participating in them independently or as part of a team.
- Preparing a brief report based on observations of the work environment and tasks performed.

SITUATIONAL OBJECTIVE (cont.)

PHASE 3: Comparing Initial Conceptions with the Actual Work Environment

- Identifying correlations between the work activities and what was learned in the training course.
- Discussing individual perceptions of the trade before and after the internship: work environment, workplace practices, etc.
- Discussing the internship's impact on the choice of trade: aptitudes, preferences, and interests.

INSTRUCTIONAL GUIDELINES

The teacher should:

- Provide students with the means to choose internships judiciously.
- Maintain close cooperation between the school and the company.
- Make possible the observation and performance of professional tasks.
- Provide students with proper supervision.
- Intervene in case of difficulty.
- Encourage the students to exchange opinions and express themselves.

PARTICIPATION CRITERIA

PHASE 1: ■ Strive to understand the practical aspects of internship organization and associated responsibilities.

PHASE 2: ■ Respect company policy concerning the tasks to be performed, working hours and other regulations.
■ Apply current health and safety regulations and environmental standards at the internship location.
■ Actively participate in the performance of the trade's tasks.
■ Stay current on issues relative to the trade, techniques and working tools.
■ Produce daily reports on individual observations concerning tasks to perform.

PHASE 3: ■ Share individual internship experiences with other students.

